Mercury brings you extra features at no extra cost

You'll enjoy using the new MERCURY.

- High output level: Crystal, -50 db; Dynamic, -53 db. Smooth response 50-8000 cps.
- Non-directional, becoming directional at higher frequencies. "On-Off" switch.
- Acoustalloy Diaphragm in Model 611. Fully enclosed Metal Seal crystal in Model 911.

Dynamic is available in Hi-Z, 50, 150, 250 or 500 ohms. Crystal is Hi-Z.

Model 911-8 Crystal, 8 ft. cable .......... List $22.50
Model 911-20 Crystal, 20 ft. cable .......... List $24.00
Model 611-8 Dynamic, 8 ft. cable .......... List $29.50
Model 611-20 Dynamic, 20 ft. cable .......... List $31.00

Order from Your E-V Distributor or Write for Bulletin No. 154.

ELECTRO-VOICE, INC., BUCHANAN, MICH.
Export: 13 East 40th St., N. Y. 16, U. S. A.
Cables: Arlab

The CARDAX
World's favorite premium crystal mike. The only high level crystal cardioid with dual freq. response.

The "630"

Model 1000
SPEECH CLIPPER
Clips the peaks from speech frequencies which exceed a pre-set amplitude. Adds greatly to intelligibility in speech transmission, especially in the presence of high QRM or QRN. Response 200-3000 cps. High impedance input. Requires 150 v. at 5 ma and 6.3 v. at .6 amp. With tubes. Easy to install. List Price ....... $24.50
Maybe you're designing a "best-yet" speech amplifier, with miniature tubes at every stage. So... how about the rectifier socket? Can the tube you plug in there match the others in compactness?

The answer's yes, and right away an advantage shows, in that the saving in space may allow you to make the power supply part of the speech-amplifier chassis. Thus the 6X4 does its part with other Ken-Rad miniatures in packing performance into every inch of area you have available.

Being the miniature equivalent of a 6X5 metal rectifier, the 6X4 gives you substantial output. It will supply, for instance, 370 v (approx) at 70 ma.

The tube's long life and dependability stem from Ken-Rad manufacturing skill. Here is a miniature precision-built to serve!

See your Ken-Rad distributor or dealer to examine the 6X4, weigh what it will do against its small size, and learn the low price. You'll find that Ken-Rad quality once more has set new standards of tube value and usefulness!

For Ken-Rad Quality
Look Beyond the Data Sheet!

Ken-Rad Radio Tubes
Product of General Electric Company
Schenectady 5, New York

Your preferred source for amateur tubes is your nearby Ken-Rad distributor or dealer.
Announcing the New 32V-2 and 35C-1 Low-pass Filter

The new Collins 32V-2 amateur transmitter is actually the 32V-1 with added features and refinements, which include:

1. Both fine and coarse antenna loading controls operated by a single dial on the front panel.
2. Trap circuits to attenuate spurious emissions of the multiplier stages.
3. A tune-operate switch on the front panel.
4. A coaxial antenna terminal at rear.
5. A harmonic attenuating L output network added to the single ended pi.

The net domestic price of the Collins 32V-2 is $575 at your dealer’s. Through your dealer, you can have your 32V-1 factory converted to 32V-2 for $100.

The new Collins 35C-1 50 ohm three-section low-pass filter, with approximately 0.2 db insertion loss below 29.7 mc, provides approximately 80 db attenuation of harmonic emissions at the television frequencies. This high attenuation is added to that already provided in your present transmitter regardless of model.

The net domestic price of the Collins 35C-1 low-pass filter is $40 at your dealer’s.

FOR RESULTS IN AMATEUR RADIO, IT’S...
CONTENTS

"It Seems to Us ..." ........................................... 9
Your QSL Manager ........................................... 10
In QST 25 Years Ago This Month .................................. 16
A Super Interlaced Beam for 10 and 20 Meters ............ Arland Ussher, ZS6Z 17
Noise-Generator Technique for the V.H.F. Man .............. Edward P. Tilton, W1HDQ 20
The Coffee-Can VFO ....................................... Edward Hayward, W1PH 22
TVI Reduction — Western Style ............................... Clayton E. Murdock, W6OMC 24
Happenings of the Month .................................. 28
A Power-Distribution Panel ................................. Benson B. Boss, W3DAZ 30
Silent Keys .................................................. 31
Technical Topics —
Adjusting the Antenna Coupler and Harmonic Filters .... 32
New Apparatus .............................................. 33
Results, Seventh ARRL Party ................................ 34
The World Above 50 Mc. ................................... 36
Coming ARRL Conventions .................................. 39
ARRL West Gulf Division Convention ...................... 39
Simplicity on 6 ............................................. 40
WWV Schedule .............................................. 41
How's DX? .................................................. 42
Our Cover .................................................. 44
TVI Tips .................................................. 45
Military Amateur Radio System ............................ 46
Single Sideband for the Average Ham ...................... William M. Rust, W2UNJ 47
Hints and Kinks ............................................. 51
Correspondence from Members ............................. 53
Operating News ............................................ 54
1949 V.H.F. Sweepstakes Results ............................ 60
Station Activities .......................................... 61
New hallicrafters
15-in. Custom Installation TV
136 sq. in. picture

MODEL T-69
$259.50
complete with 15-in. tube

Free

Send for folder of original custom-installation designs by Hallicrafters.

A new chassis, specially designed for big picture-tube operation. Completely aligned and tested. Regular RMA 90-day guarantee applies to all parts. See your local parts distributor for details.

Other TV Chassis

Model T-64 with 10-inch Tube.. $179.50
Model T-64 with 12-inch Tube.. $199.50

the hallicrafters co.
4401 WEST FIFTH AVENUE • CHICAGO 24, ILLINOIS
SOLE HALICRAFTERS REPRESENTATIVE IN CANADA: ROGERS MAJESTIC LIMITED, TORONTO, MONTREAL
PICK YOUR SPOTS!

There's a tough winter ahead. All bands-phone and CW-will be screaming with signals. QRM is due for a new high! If you want to enjoy your radio, get set to move on spot frequencies with PR Precision CRYSTALS. PR has made it easy to select the spots you want—for all bands. This summer hundreds of PR Jobbers were supplied with new VISUAL DISPLAY CASES, stocked with all frequencies available to amateurs... and kept up to date! This means you can walk into your favorite jobber's store and get PRs for the EXACT FREQUENCIES (INTEGRAL KILOCYCLE) YOU WANT WITHIN AMATEUR BANDS AT NO EXTRA COST... NO PREMIUM... NO "PLUS OR MINUS" THE SPOT YOU WANT. If you buy your radio gear at a distance... your jobber can supply PRs at exact frequencies by return mail. Get set... go PR and KNOW WHERE YOU ARE! — Petersen Radio Company, Inc., 2800 W. Broadway, Council Bluffs, Iowa. (Telephone 2760)

Your PR Jobber has them in Stock

Harmonic oscillator. Ideal for "straight through" mobile operation. High activity. Heavy drive without damage in our special circuit ................. $5.00

10 METERS PR Type Z-5.

20 METERS PR Type Z-3.

Rugged, low drift fundamental oscillators. High activity and power output with maximum crystal currents. Accurate calibration... $3.75

40, 80 & 160 METERS PR Type Z-2.
<table>
<thead>
<tr>
<th>Section Communications Managers of the ARRL Communication Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reports Invited. All amateurs, especially League members, are invited to report station activities on the first day of each month (for preceding month) directly to the SCM, the Legislative Affairs Manager, or to an official elected by members in each Section. Reports Invited. All amateurs are invited to report station activities on the first day of each month (for preceding month) directly to the SCM, the Legislative Affairs Manager, or to an official elected by members in each Section.</td>
</tr>
</tbody>
</table>

### ATLANTIC DIVISION

- **Eastern Pennsylvania**
  - W3BBS: Jerry Matthis
- **Washington, D.C.-NOVA**
  - W3TX: G. W. (Bill) Tunnell
- **Southern New Jersey**
  - W2ONX: Harding A. Clark
- **Western New York**
  - W3KWL: Ernest J. Hilsy
- **Western Pennsylvania**
  - W3XK: Ernest J. Hilsy

### CENTRAL DIVISION

- **Illinois**
  - W9EJY: Lloyd E. Hoopes
- **Indiana**
  - W9PSG: Charles H. Conway
- **Wisconsin**
  - W9RMQ: Reo W. Grotez

### DAKOTA DIVISION

- **North Dakota**
  - W6ZGD: Paul M. Bosseloot
- **South Dakota**
  - W6AGM: John B. Morgan
- **Minnesota**
  - W9RA: John B. Morgan

### DELTA DIVISION

- **Arkansas**
  - W5IC: Marshall Rags
- **Louisiana**
  - W5VT: W. J. Wilkinson, Jr.
- **Mississippi**
  - W5LA: J. C. Wells
- **Tennessee**
  - W4QT: Ward Buhrman

### GREAT LAKES DIVISION

- **Kentucky**
  - W4CDA: W. C. Alcock
- **Michigan**
  - W8QA: Robert B. Cooper
- **Ohio**
  - W8WZ: Dr. Harold B. Stecker

### HUDSON DIVISION

- **Eastern New York**
  - W2EOJ: Fred Skinner
- **New England**
  - W1LMA: Charles Ham
- **New York**
  - W2KDC: John L. Johnson
- **Northern New Jersey**
  - W2ANW: John L. Johnson

### MIDDLETOWN DIVISION

- **Iowa**
  - W5PP: William L. Davis
- **Kansas**
  - W5TV: Earl N. Johnston
- **Missouri**
  - W5C: Ben H. Stephens
- **Nebraska**
  - W5RKQ: William T. Germer

### NEW ENGLAND DIVISION

- **Connecticut**
  - W1V: Walter L. Goffer
- **Maine**
  - W1V: Manley W. Haskell
- **Massachusetts**
  - W1LX: Frank L. Baker
- **New Hampshire**
  - W1KJ: Clifford R. Wilkinson
- **Rhode Island**
  - W1CH: Roy H. Fuller
- **Vermont**
  - W1LI0: Berit E. Dean

### NORTHWEST DIVISION

- **Alaska**
  - KL7J: Charles M. Gray
- **Idaho**
  - W7AVI: Alan R. Ross
- **Kansas**
  - W7MQ: Fred B. Timmerman
- **Missouri**
  - W7C: J. K. Roden
- **Nebraska**
  - W7BKQ: Clifford Lavenaha

### PACIFIC DIVISION

- **Hawaii**
  - KH6II: Dr. Robert Katsuki
- **Nevada**
  - K7C: N. Arthur Seville
- **Santa Clara Valley**
  - W6PT: Roy E. Flannigan
- **Rocky Bay**
  - W6NL: Horace R. Greer
- **San Francisco**
  - W6GY: Samuel C. Van Liew
- **Sacramento Valley**
  - W6ZGC: Ronald G. Trunick
- **San Joaquin Valley**
  - W6KDL: Ted R. Sousa

### ROANOKE DIVISION

- **North Carolina**
  - W4VH: W. J. Moomin
- **South Carolina**
  - W4VR: Tim Ferguson
- **Virginia**
  - W4VR: Victor E. Clark
- **West Virginia**
  - W8MJ: Donald B. Morris
- **W4VR: Bruce D. Ramey

### ROCKY MOUNTAIN DIVISION

- **Colorado**
  - W0IQ: M. W. Mitchell
- **Utah-Wyoming**
  - W7PU: Alvin M. Phillips

### SOUTHEASTERN DIVISION

- **Alabama**
  - W4GJW: Dr. Robert W. Woods
- **Eastern Florida**
  - W4FZ: Arthur W. Boodig
- **Georgia**
  - W4DX: L. B. Wood
- **Western Florida**
  - WP4R: L. B. Wood
- **Central Florida**
  - WP4Y: L. B. Wood

### SOUTHWESTERN DIVISION

- **Los Angeles**
  - W6OZ: Vincent J. Haggerty
- **Arizona**
  - W7M: Gladden C. Elliott
- **San Diego**
  - W6W: Dale E. Seel

### WEST GULF DIVISION

- **Texas**
  - W5C: Joe G. Huchison
- **Louisiana**
  - W5XK: Frank R. Fisher
- **Mississippi**
  - W5DS: Amnon A. Young
- **New Mexico**
  - W5SA: Lawrence H. Weibh
- **Southwestern Texas**
  - W5MA: P. O. Box 1003

### MARITIME DIVISION

- **Maine**
  - W1ARQ: A. M. Fogg
- **New Hampshire**
  - W1QI: 100 Harvard St.
- **Massachusetts**
  - W1RQ: Charles H. Cumber
- **Connecticut**
  - W1G: Tufts University

### ONTARIO DIVISION

- **Ontario**
  - VE5CP: Thomas Hunter
- **Québec**
  - VE3G: Gordon A. Lynn
- **Quebec**
  - VE3GL: Montreal Air
- **VANALTA DIVISION**
  - VE3G: Montreal Air

### PRINCE ALBERT DIVISION

- **Alberta**
  - VE3B: A. W. Marry
- **Saskatchewan**
  - VE3AM: A. W. Marry

### QUEBEC DIVISION

- **Québec**
  - VE5G: Gordon A. Lynn
- **Ontario**
  - VE5G: Gordon A. Lynn
- **Québec**
  - VE5G: Quebec City
- **Prince Albert**
  - VE3G: Prince Albert
- **Prince Edward Island**
  - VE3G: Prince Edward Island
- **Quebec**
  - VE3G: Montreal Air

### SOUTHWESTERN DIVISION

- **California**
  - W6OZ: Vincent J. Haggerty
- **Arizona**
  - W7Q: Gladden C. Elliott
- **San Diego**
  - W6W: Dale E. Seel

### WEST GULF DIVISION

- **Texas**
  - W5C: Joe G. Huchison
- **Louisiana**
  - W5XK: Frank R. Fisher
- **Mississippi**
  - W5DS: Amnon A. Young
- **New Mexico**
  - W5SA: Lawrence H. Weibh
- **Southwestern Texas**
  - W5MA: P. O. Box 1003

### MARITIME DIVISION

- **Maine**
  - W1ARQ: A. M. Fogg
- **New Hampshire**
  - W1QI: 100 Harvard St.
- **Massachusetts**
  - W1RQ: Charles H. Cumber
- **Connecticut**
  - W1G: Tufts University

### ONTARIO DIVISION

- **Ontario**
  - VE5CP: Thomas Hunter
  - VE5C: 1930 Elros Ave.
- **Québec**
  - VE3G: Gordon A. Lynn
- **Québec**
  - VE5C: VE3G
- **Prince Albert**
  - VE3G: VE3G

### PRINCE ALBERT DIVISION

- **Alberta**
  - VE3B: A. W. Marry
- **Saskatchewan**
  - VE3AM: A. W. Marry
- **Québec**
  - VE5C: VE5C
- **Prince Albert**
  - VE3G: VE3G
- **Prince Edward Island**
  - VE3G: VE3G
- **Québec**
  - VE5C: VE5C

*Officials appointed, to act temporarily in the absence of a regular official.*
All set to go places with you this summer. Extra sensitivity for weak signal areas... extra performance for good Ham operation.

The newest thing in portables, just introduced by Hallicrafters.

- One r-f, two i-f stages. Range 540 kc to 31 Mc in 4 Bands. 8 tubes plus rectifier. AC, DC, or batteries.

See it at your nearest Hallicrafters distributor now.

the hallicrafters co.

4401 W. Fifth Ave. • Chicago 24, Ill.

Manufacturers of Precision Radio and Television Equipment
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 relay of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateurs in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

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

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

Past Presidents
HIRAM PERCY MAXIM, W1AW, 1914-1936
EUGENE C. WOODRUFF, W8CMP, 1936-1940

Officers
President ........................................ GEORGE W. BAILEY, W2KH
New York, N. Y.
Vice-President ................................. J. LINCOLN MCCARGAR, W6EY
Oakland, California
Secretary ........................................ A. L. BUDLONG, W1BUD
West Hartford, Connecticut
Communications Manager .................... FRANCIS E. HANDY, W1BDI
West Hartford, Connecticut
Treasurer ....................................... DAVID H. HOUGHTON
West Hartford, Connecticut

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

Assistant Secretaries ....................... JOHN HUNTOON, W1LYQ
LEROY T. WAGGNER, W1PEK, RICHARD L. BALDWIN, W1KE
West Hartford, Connecticut

DIRECTORS
President
GEORGE W. BAILEY ............ W2KH
1 East 70th St., New York 21, N. Y.

Vice-President
J. LINCOLN MCCARGAR ............ W6EY
66 Hamilton Place, Oakland 12, Calif.

Canadian General Manager
ALEX REID .................. W6EJ
240 Logan Ave., St. Lambert, P. Q.

Alternate: Leonard W. Mitchell ........ W6AZ
8 Orchard Green, Toronto 17, Ont.

Atlantic Division
WALTER BRADLEY MARTIN .......... W3QV

Alternate: Gene W. Wileshin, W2KWA
1112 State Ave., Corpus Christi, Tex.

Central Division
JOHN Q. DOYLE .................. W5GPI
4311 W. Wilson Ave., Milwaukee 11, Wis.

Alternate: Wesley E. Mattner .......... W8AND
624 College Ave., Dixon, Ill.

Dakota Division
GOODWIN I. DOLSON .......... W5ITN
6750 12th Ave., Minneapolis, Minn.

Alternate: Robert A. Klinsner .... W6HJK
Canyon Lake Rd., Rapid City, S. D.

Data Division
VICTOR CANFIELD ................ W6SSR
P. O. Box 965, Lake Charles, La.

Alternate: James W. Watkins .......... W4PBL
220 N. Howard St., Charleston, W. Va.

Great Lakes Division
HAROLD C. BIRD ............ W148H
114 Hildreth Dr., Crescent Lake, Pontiac, Mich.

Alternate: John W. Hubbard .......... W8SHP
1321 Birkshire Rd., Greenville Park 33, Mich.

Hudson Division
JOSIAH M. JOHNSTON ........ WFOX
222 Monmouth St., Bayonne, N. J.

Alternate: Gay E. Millin, Jr. ........ W2NBF
157 Broadway, New York 1, N. Y.

Midwest Division
LEONARD COLLEY ............ W7DNA
Civil Aeronautics Administration
Box 710, Joplin, Mo.

Alternate: Alvah J. Keynes .......... W6STQ
1201 Merechants Nat'l Bank Bldg., Cedar Rapids, Ia.

New England Division
PERCY C. NOHR .. W1VBR
37 Dream St., Westfield, Mass.

Alternate: Claryon C. Gordon ........ WATRC
70 Columbus Ave., Providence 6, R. I.

Northwestern Division
R. REX ROBERTS ............ W7CPY
110 W. Bremann St., Glenview, Mont.

Alternate: Allan D. Gunston .......... W7GDP
7299 Wight Ave., Seattle 6, Wash.

Pacific Division
WILLIAM A. LADLEY ........ W6DBQ
200 Naglee St., San Francisco 12, Calif.

Alternate: Kenneth E. Hughes .......... W2CBU
810 W. Orange Ave., Santa Monica, Calif.

Roanoke Division
EVERETT L. BATTLEY ........ W4IA
1104 N. Cleveland Ave., Roanoke, Va.

Alternate: J. Frank Key ........ W4ZA
Box 707, Buena Vista, Va.

Rocky Mountain Division
FRANKLIN E. MATTNA, JR. ........ W6DD
P. O. Box 212, Estes Park, Colo.

Alternate: William R. White .......... W8FPA
1293 Pearl St., Denver 5, Colo.

Southeastern Division
WILLIAM C. SHEETON ........ W4ARW
527 Reviso Bivd., Daytona Beach, Fla.

Alternate: William E. Blake .......... W4ATF
Pleasant Road, Montgomery, Ala.

Southwestern Division
JOHN R. GREGGS ............ W6KWL
2212 Grape St., San Diego 9, Calif.

Alternate: John E. Eldred .......... W6NY
1834 Whittler Ave., Whittier, Calif.

West Gulf Division
WAYLAN D M. ODOZO .......... W5SNW
P. O. Box 585, Houston, Texas

Alternate: David F. Call .... W5EIO
7320 Joplin St., Houston 17, Texas
GOVERNMENT REGULATION OR GOVERNMENT DIRECTION—WHICH?

THE ACTION of the League's Board of Directors on May 28th with respect to the FCC proposals has since been subject to a variety of interpretations over the air and in print. People who aren't on the Board and didn't attend the meeting appear to be able to discuss at length just why the Board did what it did, and what that action means. Since most of what we've heard and read misses the point completely, it seems to us to be in order to give the straight dope for the information of any amateurs who may be in doubt as to the meaning of the Board's action.

First of all, it might not be a bad idea to turn to page 33 of the July QST and, in paragraph 59, read the Board's resolution (it is apparent some of the commentators haven't). It is a carefully-worded job, which winds up doing two things: First, it directs the Secretary of the League to withdraw the proposals of the League now on file with FCC, resulting from Board action a year ago; second, it directs that FCC be advised that it is the intention of the ARRL to submit the representative opinion of radio amateurs opposing the "overall plan or blueprint to provide scope and direction for the immediate and long-range development of the amateur radio service."

The issue the Board considered is the issue of whether or not the course of amateur radio is to be directed from Washington, the issue of whether or not the future development of amateur radio is to be blueprinted by a Government agency. In its notice, FCC says perfectly plainly that just such direction is what amateur radio needs, in its judgment, and that we would very much benefit from a "new overall plan or blueprint to provide scope and direction for the immediate and long-range development of the [amateur] service." It states clearly that its current proposals are "interrelated and constitute an overall plan." It explains at length the purpose of this plan in language characterized by references to "directed enhancement," "continued improvement . . . through a program" and "establishment of an integrated and continuously reviewed and revitalized plan for improving operations and techniques." Directed activity, a planned program of development in both technical and operating fields, a blueprint for our future . . . of which this is the beginning. All by Government.

It is on this point, on this basic philosophy of regulation, that the League's Board of Directors felt it could take no other course of action than to express its disagreement. It has done so. It is not necessarily opposing the specific proposals; it may very well find itself in agreement with many of them. But it doesn't believe we can discuss the merits of individual proposals until the basic issue has been settled — and to clear the air to the extent it can, pending settlement of this all-essential point, it has withdrawn the proposals it previously had on file with FCC.

The League isn't going to argue League recommendation against FCC rule; it is going to argue a philosophy of regulation. FCC says it thinks we'd be better off if someone (Government in this case) took over and gave us a planned and directed future. The Board takes a different view; its action expresses its conviction that the phenomenal accomplishments of amateur radio in the United States have come about only because of the freedom it has enjoyed from "planning" or "direction" — by Government or anyone else; that the unique thing which amateur radio is today in this country has come about as a direct result of a philosophy of minimum
regulation consistent with protection to other services, of freedom of the amateur in this country to try whatever the ingenuity of the American ham has seen fit to contrive in his search for newer, different, better — or even crazier — ways of doing things.

The Board believes that when you have someone spending his own time and money and energy on something for the sheer love of it you get better results, and eventually a stronger and healthier amateur body, by letting the guy alone. Its action reflects its serious doubts that a planned future, a directed program of development, would have got us “across the pond” in 1923 on the “useless” high frequencies. Its action reflects its concern over the ability of blue-printing, even by the best-intentioned, to come up with such things as the months of work by Ross Hull and other v.h.f. pioneers which eventually gave us a whole new concept of the manner in which these frequencies are propagated. Would, or could, a planned development have produced the initial work and eventual general acceptance by amateurs of crystal filters in receivers, the determination of an initial handful of persistent experimenters to convert an interesting laboratory gimmick into a practical operating tool? Would programming produce a Twin-lamp, or the host of other ingenious answers hams dream up to their practical problems? Could direction by Government imbue the amateur body with the high flame of devotion to public service that is the fiber of our voluntary emergency work today?

The Board doesn’t think so. It appreciates deeply the good intentions behind the new philosophy expressed by FCC, and it respects just as deeply the acknowledged real desire of the Commission to achieve only what is best for amateur radio. But it believes just as sincerely and feels just as strongly that what is best for amateur radio must evolve from amateur radio itself, that to “plan” or “direct” our art, despite the sincerity of objective by the planners, is to circumscribe and limit its development.

Let there be an end to loose talk of what is involved in the Board’s action. The Board’s action is simply a declared intention to defend, and to guarantee unhindered the continuance, if it humanly can, of the priceless ingredient of amateur radio that has made us what we are, that has resulted in our becoming the invaluable asset we are to our country — the probing inquisitiveness, the infinite ingenuity, the “I-guess-it-can’t-be-done-but-let’s-try-it-anyway” spirit of the individual amateur.

— A. L. B.

Your QSL Manager

In an attempt to get data concerning another of the pioneers of the ARRL QSL Bureau system, we hounded Frank E. Pratt, W7DXZ, who finally came up with the following:

“For over a year, I’ve been stalling on that QSL manager story dope you’ve been asking for in the hope you would forget I’m around. However, since you’re so persistent, I’ll break down. As you can see from the enclosed snap, I’m anything but photogenic. In fact, all the neighbors with children have asked for a copy of this picture: they want to use it to frighten their kids into behaving!

“Here goes: Been interested in amateur radio since I was eight years old. Have held present ticket since 1932. Mainly interested in DX chasing. Have worked 157 countries; 148 confirmed. Member of A-1 Operators Club, WAC, WAS and DXCC. Station: homemade VFO-xtal unit, Millen exciter unit, S12H buffer, p.p. VT127A final, 750 watts input; DB20 preselector, HQ129X, Q5-er; 3-element 20-meter rotary beam, 347-foot Zepp. Bands used: 10-20-40, with 20 as favorite; c.w. is used 95 per cent of the time. Have done my share of experimenting with early equipment; Ford coils, crystal detectors, rotary and quenched gaps, etc. Once made WAC in one day using eight watts to a single 46. Try to do it today!

“Have on hand approximately 35,000 unclaimed DX cards. Between 500 and 700 envelopes are mailed each month. Approximately 7000 cards are received each month. Pet poeves: guys who don’t send for their cards and those who make much extra work for me by incorrect procedure when they do send.

“Married, have two married daughters, four grandchildren — was grandpa at 36! My job — a postman’s holiday from hamming; foreman of communications and radio for the City of Tacoma Light and Water Departments, and also in charge of radio equipment for the Peninsula Light Co. We have five fixed f.m. stations and considerable carrier-current, telemetering, metallic-telephone and other allied equipment. Other

(Continued on page 44)
A 28-Mc. Installation for the Car

Simple Equipment for the Mobile Ham

BY G. P. McGINNIS,* W3ENR

Mobile operation is becoming increasingly popular, not only among those hams to whom it is a diversion from home-station operation, but also within a growing group of apartment-house dwellers who find a car station the only feasible means of getting on the air. The complete installation described here by W3ENR can be duplicated quite easily without marring the car so as to reduce its resale value.

This article describes a simple 10-meter mobile station, including the constructional details of the transmitter as well as several hints on mobile installations in general. The transmitter, which runs at an input of 17 watts, is sufficiently compact to mount in the glove compartment of an automobile. Long-distance contacts on ten meters do not require the high power often found necessary on lower frequencies. Under good band conditions 10-meter DX contacts are common with quite low power. Comparative tests have been run between this transmitter and transmitters running as high as 50 watts input; the signal strength difference, as noted by a distant receiver, is normally less than one "S" unit.

The Transmitter

The transmitter utilizes the increasingly-popular tubes with instant-heating filaments. They make possible a decreased average drain on the automobile battery. Referring to Fig. 1 for the transmitter diagram, a 2E30 tube is used as a regenerative harmonic oscillator, quadrupling, with 40-meter crystals, to 10 meters. The oscillator drives the 2E24 final amplifier directly. The modulator consists of a pair of 2E30 tubes in Class AB2, driven simply from a carbon microphone and push-pull input transformer. This modulator stage provides more than sufficient audio with normal-volume close talking.

The transmitter is constructed on a 5½ X 10 X 3-inch aluminum chassis. The photographs show the general layout. The microphone and modulation transformers are mounted on the right side of the chassis with the modulator tubes between them. The oscillator tube is slightly to the left of the modulator, the final amplifier is to the rear of the chassis, submounted for better shielding. Six 40-meter crystals are mounted between the oscillator tube and final amplifier. Miniature parts are used throughout. For example, miniature coils mounted directly on trimmer-type variable condensers are used in the oscillator, final and antenna circuits.

The under-chassis space is divided into two compartments by an aluminum shield; the oscillator and modulator on one side, the final amplifier and antenna-tuning assembly on the other. A coaxial relay is used to switch the antenna from the transmitter to the receiver.

The transmitter is built on a 5½ X 10 X 3-inch aluminum chassis. Only the tubes, crystals and audio transformers appear on top. Power and control cables enter at the left-hand end. The switch at the right is for the milliammeter.

The antenna loading coil is cemented to a short length of ½-inch diameter plastic tubing and this tubing is inserted in the final tank coil. The antenna loading can be adjusted by varying the spacing of these two coils and, at the same time, adjusting the antenna tuning condenser, C13, for maximum output. When this optimum con-
Fig. 1 — Circuit diagram of the 28-Mc. mobile transmitter.

C1 — 200-µfd. mica.
C2, C3, C4, C6, C10, C12 — 0.002-µfd. mica.
C7 — 15-µfd. air trimmer.
C8 — 100-µfd. mica.
C9 — 15-µfd. air trimmer, double spaced.
C11 — 8-µfd. 450-volt electrolytic.
C13 — 100-µfd. air trimmer.
C14 — 0.1 megohm, ½ watt.
R1 — 0.1 megohm, ½ watt.
R2, R3, R10 — 10 ohms, ½ watt.
R4 — 5000 ohms, 10 watts.
R5 — 5000 ohms, 10 watts.
R6 — 300 ohms, 0.5 watt.
R7 — 300 ohms, 0.5 watt.
R8 — 20,000 ohms, 10 watts, wire-wound.
R9 — 30 ohms, 0.5 watt.
R11 — 1200 ohms, ½ watt.
R12 — 30 ohms, 0.5 watt.
R13 — 470 ohms, ½ watt.
R14 — 10,000 ohms, 10 watts, wire-wound.
Lt, L2 — 9 turns, 3/16-inch diameter, 1/2 inch long. (H & W 3010 Miniductor.)
L3 — 4 turns, 3/16-inch diameter, 1/4 inch long (B & W 3011 Miniductor).
B1 — Bias battery — 33 volts (Burgess XX22E hearing-aid battery).
I1 — Indicator lamp.
MA1 — Miniature milliammeter, 1-ma. scale.
RFC1 — Parasitic choke — 8 turns No. 18 enameled wire, wound around a 200,000-ohm ½-watt carbon resistor.
RFC2, RFCa — 28-Mc. r.f. choke (Ohmite Z28).
RY1 — Stepping relay to control crystals (Philco part number 77-0257 — see text).
RY2 — Miniature coaxial relay (Advance Electric).
RY3 — Miniature plate-voltage control relay.
RY4 — Starting solenoid.
S1 — Single-pole 12-position rotary switch (Mallory 32112-J — see text).
S2 — Push-button switch on microphone.
S3 — Single-section 2-pole 6-position rotary switch (Mallory 3226-3 — see text).
T1 — Single-button microphone transformer (Thordarson T20{A02).
T2 — 10-watt modulation transformer; pri.: 10,000 ohms, c.t.; sec.: 4500 ohms (Thordarson T21M52).
which crystal is in the circuit. This is accomplished with a 12-position rotary switch, S1, and a pilot lamp. Alternate contacts of the 12-position switch are wired together, the switch being wired to control the stepping relay as shown in Fig. 1. As S1 is rotated through 360 degrees, six pulses are applied to the relay. It is therefore necessary only to number “off” the positions on the face plate of the rotary switch for the proper crystals and remember always to turn the switch in the same direction. The synchronization problem thus is solved. As an added precautionary measure, the extra set of contacts on the stepping relay is wired to a pilot-lamp indicator, mounted on the control box, so that the indicator will light when the first position is reached. Although this relay may appear operationally complicated, actually it is very simple. In six months of operation the stepping relay has never failed to follow the switch perfectly. This system provides a rapid means of QSY not otherwise possible without manually switching crystals. Crystals differing in frequency as much as 600 kc. may be used without retuning with no appreciable drop in output.

A miniature milliammeter, MA1, supplied with the necessary shunts, is provided to monitor oscillator plate current, final grid current, final plate current, modulator plate current and combined final and modulator plate voltage. The meter is switched by a six-position double-pole switch. S3, with the first position open. Typical circuit readings for the transmitter are as follows:

<table>
<thead>
<tr>
<th>unloaded</th>
<th>loaded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscillator plate current</td>
<td>25 ma.</td>
</tr>
<tr>
<td>Oscillator plate voltage</td>
<td>205 volts</td>
</tr>
<tr>
<td>Final grid current</td>
<td>4.5 ma.</td>
</tr>
<tr>
<td>Final plate current</td>
<td>20 ma.</td>
</tr>
<tr>
<td>Final plate voltage</td>
<td>325 volts</td>
</tr>
<tr>
<td>Modulator plate current</td>
<td>30 ma.</td>
</tr>
<tr>
<td>Modulator plate voltage</td>
<td>325 volts</td>
</tr>
</tbody>
</table>

* This reading cannot be made with the milliammeter; a separate voltmeter is required.

* Includes screen current.

* With modulation.

### Power and Control

The diagram of the power and control system is included in Fig. 1. All circuit controls terminate in a 2 × 4 × 4-inch box, shown in the photograph of the receiving installation. S1 is to the right, the microphone plug and stepping-relay pilot-lamp indicator to the left. The push-to-talk switch on the microphone controls all power circuits. When this switch is closed the following occurs:

1) The dynamotor solenoid, Rya, closes, starting the dynamotor, and applying voltage to the filaments of the tubes.

2) Rya closes, connecting plate voltage to the transmitter. This relay is necessary in order to work quick break-in; otherwise the transmitter will remain operative for a short time, blocking out the receiver until the 8-µfd. filter condenser is discharged.

3) The antenna change-over relay closes.

4) Voltage is applied to S1. The stepping relay will not change position unless S1 is rotated.

Bottom view of the mobile transmitter. A small baffle shield separates the oscillator tank coil to the right and the amplifier inductance to the left. The large variable in the upper left-hand corner is in the antenna circuit. The stepping relay that selects crystals is below the oscillator tank coil; the antenna change-over relay is in the lower left-hand corner.

The dynamotor power supply is mounted under the hood in a steel box close to the car battery.

August 1949
5) Voltage is applied to the microphone.

The installation draws the following current from the automobile battery:

- Receiver and converter ......... 8.0 amp.
- Transmitter filaments .......... 2.6 amp.
- Dynamotor (loaded) ........... 13.0 amp.
- Starting solenoid ............. 0.5 amp.
- Relay $R_{y1}$ .................. 0.2 amp.
- Antenna relay $R_{y2}$ .......... 0.3 amp.
- Total .......................... 24.6 amp.

**Power Supply**

Approximately 300 volts at 160 ma. is required to operate the transmitter. A surplus 12-volt dynamotor operating at 6-volt input is used. The dynamotor, together with its starting solenoid and filter condenser, is mounted in a metal cabinet bolted to the fender of the automobile, inside the motor compartment, as shown in one of the photographs. By mounting the dynamotor inside the motor compartment near the battery, voltage drop is held at less than 0.1 volt. Both positive and negative leads are run from the battery because the automobile chassis cannot be depended upon as a good ground return. No provision has been made for additional charging of the automobile battery beyond that supplied by the car generator. The installation has been used throughout an entire day without discharging the battery. During this time the automobile motor was not run to charge the battery. It must be understood that only the receiver, representing a drain of 8 amperes, was operating during most of this period. The additional current required by the transmitter was drawn only when actually transmitting. The instant-heating filament tubes thus save considerable battery current.

**The Receiver**

The receiver consists of a Gonset converter operated in conjunction with a Philco model CR-12 automobile receiver. On the lower right side of the converter a slide-type switch for operating the noise limiter can be seen. Voltages to operate the converter are obtained from the CR-12 receiver. A 5-prong tube socket is mounted on one side of the receiver housing. This acts as the terminal for B positive, B negative, A positive, and the two noise-limiter leads. A 5-conductor shielded cable connects the Gonset converter and the automobile receiver.

**Noise Limiter**

Man-made electrical noises are the mobile enthusiast's greatest enemy. With every automobile (including your own) a potential all-wave transmitter, the problems are greatly multiplied. A noise limiter will go a long way toward eliminating this difficulty. Several types of commercial noise limiters are available. These, however, can be duplicated at little cost and effort.

---

![Fig. 2](image-url)

Fig. 2 — Diagrams showing the addition of noise limiter to the receiver.

- $R_{a}$, $R_{b}$ — 0.001 µfd. mica.
- $C_{1}$, $C_{2}$, $C_{3}$ — 0.01 µfd. paper.
- $C_{4}$ — 0.1 µfd. paper.
- $R_{1}$ — 57,000 ohms.
- $R_{2}$, $R_{10}$ — 1 megohm.
- $R_{3}$ — ½ megohm.
- $R_{4}$, $R_{5}$, $R_{6}$ — 0.47 megohm.
- $R_{7}$ — 10 megohms.
- $R_{8}$ — ½ megohm.
- $R_{9}$ — 0.1 megohm.
- $T_{1}$ — 1:1 transformer.
- $V_{1}$ — Second detector.

Fig. 2 shows the circuit of the limiter used with this installation, together with the necessary changes in the original receiver circuit for its addition. The second detector in the receiver was replaced with a miniature Type 6T8 tube. This tube contains an extra diode which serves as the noise limiter. The second-detector circuit of some automobile receivers may differ slightly from that shown. With little difficulty or change in receiver performance, those desiring to employ this circuit can rewire the second detector to agree with this. A 6SGGT tube can be used instead of the 6T8 if the receiver uses octal instead of miniature tubes.

As mentioned above, the switch for removing the limiter from the circuit is mounted inside the Gonset converter. The wires leading to this switch, regardless of its location, must be
shielded to prevent excessive hum pick-up. The noise limiter effectively removes most man-made electrical noises, particularly those generated by other automobiles. Most of the electrical noises generated by my own car motor were removed by other means.

The Antenna

Several types of commercial antennas are available. The standard police-type "whip" antenna is excellent, but is fairly expensive and requires a large mounting hole in the body of the automobile. Additionally, it is awkward in appearance and presents a problem when the time comes to dispose of the automobile. Used-car dealers have an aversion to automobiles with holes in them. They claim, with good cause, that they cannot explain the reason for the holes to prospective buyers.

Several extra-long receiving-type antennas, intended for mounting on the front cowl of an automobile, are on the market. These are adequate for transmitting and can be sold with the automobile. A Ward model DCF4 receiving antenna is used with this transmitter. This antenna extends to 100 inches, yet collapses to 9 inches when not in use. It is equipped with a coaxial lead and is electrically insulated with heavy bakelite washers. These insulating washers appear to offer adequate insulation for the low power involved, especially since the bakelite insulating washers are located at a voltage node on the antenna.

There are some tricks with coaxial cable which can be applied here to good advantage. The cable between the antenna and the coaxial relay is made an electrical half wavelength long. A half wavelength of coaxial cable is an effective 1-to-1 transformer, hence the transmitter and antenna base, although several feet apart, are automatically placed at the same effective r.f. potential. A quarter wavelength of coaxial cable is used between the antenna relay and the converter. This acts as an inverting transformer, i.e., the effect at one end is reversed at the other. Thus, when the transmitter is operating, the coaxial-relay contact is disconnected from the converter. A quarter wavelength away at the converter input, this appears as a direct short, preventing r.f. picked up by the coaxial cable from burning out or overloading the converter r.f. stage. The formula for calculating a quarter wavelength of coaxial cable is as follows:

\[
L (\text{inches}) = \frac{2802 \times 0.65}{\text{frequency (Mc.)}}
\]

This value should be multiplied by two in order to obtain the half-wavelength value.

Noise Elimination

A thorough study of noise elimination was given in a previous issue of QST.\(^1\) Postwar auto-


The receiving equipment and the transmitter control unit are mounted in a convenient spot below the dashboard. The switch remotely controls selection of crystal frequencies.

August 1949
The glove compartment provides more than ample room for the 17-watt transmitter. In operation, adjustment is required only for large frequency changes.

Mobiles are relatively simple to "delouse" for noise. The following measures were adequate in my case:

1) 10,000-ohm carbon suppressors were installed on each spark plug. Wire-wound suppressors are not effective against 10-meter ignition noise.

2) A 20,000-ohm carbon suppressor was installed on the distributor.

3) A wavetrap, tuned to 10 meters, was placed in series with the generator lead. The coil consists of 5 turns of No. 12 enameled wire wound on a flat Lucite strip ¼ × 2 × 5 inches. Slots were cut in the edges of the Lucite strip to hold the windings in place. The 100-µfd. ceramic variable condenser, used to tune the coil, was mounted on one end of the Lucite strip. The wavetrap was adjusted by placing it near a 10-meter transmitter tank circuit, and tuning the variable condenser for maximum absorption. After the unit was installed in the generator lead it required no further adjustment.

4) By-pass condensers of 0.5 µfd. were installed at the ignition switch, gas gauge, and ammeter terminals.

**Location of Equipment**

The location of the various items of equipment in the automobile contributes materially to their efficient operation. There are many alternative locations for each piece of equipment. Table 1 shows the preferred placement, together with acceptable alternatives.

A mobile installation admittedly requires more work than the usual low-power home station, but the fun it provides is correspondingly greater.

**Receivers** — their circuits, construction and power supplies — continue to hold the limelight in August, 1924, QST. Continuing his voluminous symposium on "Building Superheterodynes That Work," Technical Editor Kruse delves into the practical aspects of the receiver art, drawing on the talents of such additional contributors as Henry A. Rand, R. B. Bourne, Don Canady, H. A. Snow, H. S. Bixby, Raymond Moore, R. T. St. James and Brent Daniel. Eyebrows are expected to be raised at the announcement of a vacuum-type air-core radio-frequency transformer. Of equally revolutionary design is J. L. A. McLaughlin's "Super Calamityplex," a neutrodyne set featuring ganged tuning condensers for one-control tuning. Exponents of the "blooper" will be especially interested in Dr. Lewis M. Hull's discussion of methods of preventing receiver radiation; a non-regenerative r.f. stage or "radiation muffler" is prescribed. An Audubon, N. J., amateur, George Grammer, 3AIH, describes a simple method of calibrating receivers using broadcast station harmonics. His curves check within 1 meter of WWV!

How many volts per rectifier jar? What are the specs for a good homebuilt filter condenser? How should a fellow go about winding a low-loss coil? These commonplace questions are adequately answered in this issue to assist the gang in their quest for better signals on the shorter waves. And to help put these improved signals into rapidly-expanding DX frontiers, we have a pair of timely antenna articles, Dawson Bliley's discussion of how to operate a 150-meter aerial on its third harmonic and Don C. Wallace's explanation of a one-man method of raising a mast.

An all-out effort to work two-way with Australia and New Zealand is planned for the coming season. President C. D. Macluran, 2CM, of the Australasian Radio Relay League, has ironed out details of the test with Traffic Manager F. E. Schnell. Meanwhile, the Pan-American tests continue at a profitable pace, with long lists of U. S. and Canadian calls being logged by Argentine amateurs. With only a meager "all's well" to go on, speculation is rampant here at home as to whether or not the MacMillan Arctic Expedition Bowdoin, with ARRL operator Don Mix aboard, has started home.

Gleanings! Amateur radio has been born in Sweden, with the issuance of thirty transmitting licenses. . . . RCA has adopted a policy of selling power tubes direct to hams. . . . A new fad, SWL cards, is catching on with radiophone listeners.
A Super Interlaced Beam for 10 and 20 Meters

BY ARLAND USSHER, ZS6Z

The author has been a ham for over 21 years, but it would be a mistake to assume that he is an authority on beams. This is a brief description of some months of work in an endeavor to achieve what now seems to be impossible — viz., a 10-, 15- and 20-meter beam on the same boom — but which resulted in an outstanding dual beam being constructed the hard way.

The first introduction to beams was about two years ago, when a visiting ham from England was due in a few days and reliable 10-meter contact with the Gs was a "must."

An enthusiastic and expert friend produced a formula for a wide-band beam that could be fed directly from 52-ohm coax cable, and in a couple of hours this was translated into a few bits of wire about 7 feet above a flat iron roof. This makeshift fixed beam worked exceedingly well. The formula was derived by the U. S. Signal Corps to meet their requirements of a simple beam that could be cut and put up without any tuning.

The Bug Bites

The forced introduction to a beam and the surprisingly good signal reports were fatal, and the idea of putting up a super triple beam began to receive consideration. But, not knowing much about beams, it was necessary to consult the expert. "The matter is easy," he said. "Just allow at least a tenth wavelength between the elements of one beam and another, and stick it up about 65 feet in the air." What could be simpler?

A young edition of the Eiffel Tower was designed and built, and on the top a welded tubular steel boom 32 feet long was added, with a suitable rotating mechanism.

A 10-meter 4-element beam occupied one-half of the boom, a 15-meter 3-element beam the other, and a 20-meter 3-element array was supported on light steel trestles 42 inches above the lot. The coaxial feed line went to a relay box on the boom, and switches in the shack selected the desired beam, leaving the others earthed.

On test the 10-meter beam gave wonderful reports from England and U. S. A., but the 20 was not so hot and would not load properly.

Tuning the Beams

Then a "W" was heard laying down the law on beams and saying most emphatically, "You gotter toon 'em." So, if you must tune one — what price two or three? In any event, the mechanical gear was not quite robust enough, so the boom and mechanism were taken down at the end of the last DX season.

The boom was "temporarily" erected on the front lawn, with the lowest elements about 8 feet off the ground. The XYL was told it would be there over the week end only, as a gang of willing helpers was coming out on Sunday to help tune the arrays. (Actually it remained on the lawn for four months.)

A field-strength meter was fixed up about 200 feet in front of and somewhat below the beams, and all three were tuned, retuned and tested. They appeared to work OK, although the final lengths of the various elements were definitely much longer than the textbooks said they should be. The general arrangement now was a wide-spaced 3-element 20-meter on the boom, with a wide-spaced 4-element 10 interlaced with it in the same plane.

The 1OA1 was 39 inches behind the 20A.

The 15-meter beam was a wide-spaced 4-element about 42 inches above the other two. All fired in the same direction, the frequency on twenty was 14,120 kc. and 28,240 on ten (i.e., harmonically related) and the 15 was put in the middle of the new 21-Mc. band.

As the sun went down everything seemed to be tuned on the nose and, after consuming r.f. and other beverages, the gang of helpers dispersed and it only remained to hoist the lot up again. But next Sunday it was stated on the SARL Headquarters Bulletin that for DX we should, if possible, operate above 14,350, so it was decided to retune the 20-meter beam to this frequency.

The elements had to be shortened considerably, and when this beam was finally retuned it was found that the lengths of the elements coincided

* Sauer St. Extension. P.O. Box 3450, Johannesburg, Union of South Africa.

1 10A is the abbreviation for 10-meter antenna, 10R for 10-meter reflector, 10D for 10-meter director, and so on.
almost exactly with the table in the *Handbook*!

A quick check on the 10-meter beam indicated that it was now shooting about 30° off to the right! All 10-meter elements were then moved one-tenth wavelength to the rear, in an effort to reduce the interaction, but this merely shifted the 10-meter lobe around another 10°. The 20-meter elements were then removed one by one but that did not correct the pattern on 10.

Then the gray matter began to work, and the field-strength dipole was moved to the highest available position, where it was about 5° above the beams. Another check on 10 showed that this beam was now firing straight ahead! Moral — have your f.s. dipole above the beam. The 20A was then replaced and the 10-meter field strength dropped 10%. Replacing 20D and 20R dropped the strength on 10 another 10%. Earthing and unearthing the unused radiators affected the results, indicating interaction.

The f.s. meter was of the remote-indicating type, so that the meter could be observed at the beam position, but in spite of r.f. chokes and bypass condensers it seemed to be very temperamental. Using the highest possible meter current ironed out a lot of small differences, but it was still found that the beam was definitely "off" in the direction of the cable connecting the f.s. pick-up and the meter. This was brought home forcefully when the baby and cat were found to be playing with this cable and upsetting the meter readings.

Accordingly, the indicating meter was left at the pick-up dipole, and much running back and forth to observe it reduced the weight of the one-man gang by 4 pounds in a day! (It all came back overnight.) Then a telescope was used for reading the meter and this reduced the wear and tear considerably. The tuning went on week ends for about four months, during which period almost every practical arrangement of the 10-, 15- and 20-meter beams was tried, but always there was a drop in f.s. from the 10-meter beam when the others were added, even after returning the 10 for maximum field strength. Some results seemed to be so crazy that much time was spent on a study of the placing of the various radiators, and it would appear that when interlacing beams the short radiator must be in front of the longer ones — i.e., 10 must be in front of both 15 and 20, and 15 in front of 20. Up to this stage an endeavor had been made to maintain a spacing of one-tenth wavelength (on ten) between any 10-meter element and any other but, as no success had been obtained, this theory was discarded and the idea of having the 10 and 20 radiators very close together was tried. It was also becoming obvious that a 10-, 15-, and 20-meter beam on the same boom was something to be dreamed about — or left to the experts to develop. Consequently, the self-imposed assignment was altered to finding an efficient arrangement for 10 and 20 only. If that was achieved, 15 could be added later.

One of the local DX merchants has a commercial dual 10 and 20 beam with which he gets good DX results, but he put out a terrific local 10-meter signal to the back, which is assumed to come from shock excitation of the 20-meter beam that is arranged to fire in the opposite direction to the 10. Hence it was logical to assume that if the 10-meter power wasted in the 20 beam could be made to assist the 10 it would be a distinct step forward. After many more tests an arrangement was found where, for the first time, the f.s. on 10 of the twin beam was actually higher than for the 10-meter beam by itself. The position of the 10A was then experimented with. It was tried 6 inches and 9 inches above, behind and in front of the 20A. At 9 inches in front it gave the best results. Then the separation was gradually increased until the peak position was found to be from 21 to 28 inches in front of 20A. As 25 inches was the most practical arrangement, the 10-meter beam was retuned in this position and the field-strength meter showed that on 10 the twin beam was just twice as good as the 10-meter beam alone.

The 10-meter beam gave a front-to-back ratio of about 40:1 and the 20-meter beam 26:1, expressed in field-strength meter current readings. The 15-meter beam was then tried in several positions on or near the boom but, since the "best" position resulted in about a 50% loss of field strength from the 10-meter beam, it was reluctantly decided to scrap 15.

The final arrangement of the 10 and 20 beams is shown in the photograph. The two beams are practically in the same plane but each set of ele-

![Image of antenna]

The dual 10- and 20-meter beam at ZS6Z, the result of many months of careful work.

*QST* for
ments can be sighted through without the other set interfering.

All parasitic elements are earthed to the boom at their centers, and the radiator not in use is earthed in the relay box that is mounted on the side of the center section of the boom.

The 10-meter elements are made of 1$rac{3}{4}$-inch o.d. dural tube. The 20-meter elements are commercial corrugated-steel telescoping tubes that, since they showed signs of rust after a few months, were all zinc plated again. After tuning, the joints were taped and the whole painted with aluminum paint. The feed from the transmitter is RG-8/U 52-ohm coax cable about 200 feet long.

The gap at the center of the radiators is about 1$rac{1}{4}$ inch, so that the coax can be connected without any appreciable fanning out of the leads. Experiments were made with a "T" match but the best standing-wave ratio that could be obtained was 3.5:1. With the coax directly connected the s.w.r. on 10 was 1.5:1 and on 20, 1.75:1, which is considered to be highly satisfactory.

During the tune-up process various combinations were tried out on DX with surprising results, and the final arrangement at 8 feet high brought in some S9-plus reports from England and the U.S., after which it was decided that the tuning job was done.

After installing the beam at a height of 70 feet, a short "CQ 10" on 'phone seemed to bring back all the Ws at once. Reports of "9 plus," "An outstanding signal," "The strongest ZS," "Rarely heard a ZS so late," etc., became commonplace. One ham in Detroit said he had been on 10 meters exclusively for 11 years and had never heard such a loud DX signal. Local tests indicate a front-to-back ratio of about 35 db.

The 20-meter beam also performs very well and evokes similar reports to those obtained on 10. At 800 miles the pattern is reported as very sharp and inaudible off the back and sides, and it regularly puts an S9 signal into W6 the long way 'round. And all that with exactly 100 watts input. This beam was made the "hard way," but it was worth it and it all goes to confirm what that W said — "You gotter toon 'em!"

The author wishes to thank his many ham friends who lent physical and theoretical assistance, and even if their pet theories did not give the desired results at this location they at least gave fresh starting points when the author had exhausted his very limited knowledge of beams and wasn't quite sure what to try next.

**Support and Rotation**

The tower for supporting the beam is an engineering job that is beyond the scope of the average ham, but a brief description may be of interest. The height to the top of the elements is 70 feet above ground. The base is 18 feet square and the top 14 inches square. The tower is made of mild steel angles and is self-supporting on four concrete bases (which between them weigh 14 tons). The boom can be tilted into a vertical position for painting or moving the beam elements. The circular platform at the top is 6 feet in diameter, and is extremely useful when servicing or adjusting the mechanism.

Rotation is provided by a 1$rac{1}{4}$ h.p. 1440-r.p.m. motor, direct coupled to a double reduction worm gear that rotates the boom once in 68 seconds. The motor is controlled by push buttons in the shack and on the top platform.

A motor of this type operating through a speed-reducing gear of 1000:1 gets up to full speed almost instantly and when the power is cut off it stops almost as fast, with the result that tremendous stresses are developed in starting and stopping the boom (which, with its elements and center section, weighs about 500 lbs.). The final worm-reduction gear of 50:1 will not overrun like the back axle of a car, and when the motor stops suddenly the effect is rather akin to blocking a spoke in a wheel. The reaction would tend to "wring the neck" of the tower.

Friendly consulting engineers were asked for ideas but the only practical ones were for some sort of slipping clutch which would start and stop the boom slowly, but this did not appeal as the construction would be expensive and maintenance a problem.

Finally the author hit on the idea of a simple flywheel on the motor shaft and this worked like a charm. The motor takes about 1$rac{1}{2}$ seconds to reach full speed and the starting current is within the capacity of the starting winding. When switched off, the motor gradually comes to a standstill in about 5 seconds. There is no trace of overswing of the boom. The flywheel dimensions were found by trial and much error, but ended up as a steel disk 6 inches in diameter by 3$rac{3}{8}$ inch thick. A Selsyn motor is driven by a cycle chain from the final shaft, and the shack indicator is a clear plastic pointer that rotates over a great circle map of the world.

Limit switches were tried in the first arrangement, but were discarded as an unnecessary complication. Instead, the pointer engages with a toothed wheel each time it passes and the wheel indicates by colored arrows which push button should be pressed to restore the boom to its central position. Two revolutions in each direction are allowed, but on one occasion when the Selsyns were disconnected the boom rotated unnoticed for 20 minutes without doing any damage, but one more revolution and the cables would have parted. This RG-8/U coax is great stuff for the amateur!

One more refinement is an illuminated sign above the map that shows the figures 14 or 28 according to which relay has been switched on. The figure 21 can also be shown, but that one must remain dark until some expert can devise a simple triple beam.
Noise-Generator Technique for the
V.H.F. Man

A Simple Way to Improved Receiver Performance at 50 and 144 Mc.

BY EDWARD P. TILTON, * WIHDQ

As new techniques are developed, the men responsible for them tend to develop a special language for talking about their work. This specialization, in both the nature of the work and the talk about it, often leaves those of us who are most in need of its beneficial results completely in the dark. A typical example is the use of the noise generator for receiver testing.

For some time most amateurs whose interest in their receivers extends beyond the bandswitch and turning the bandspread dial have known that there was a new way of checking receiver performance which differed radically from previous practice. They knew that technical literature had featured considerable mathematical mumbo-jumbo concerning "noise figure," "equivalent noise resistance," and "Johnson noise," but as these articles were usually full of equations and abstruse technical language most of us decided that this technique was not for us. This was a bad mistake, for, as we shall see, the noise generator is actually a real step forward in the simplification of receiver testing.

The first popular treatment of the idea was presented in QST by Goodman in the fall of '47. He described a practical noise generator, and explained its use in low-pressure language. We suggest that you dig that article out of your QST file right now and give it a careful reading. It tells all you need to know about the noise generator — material we do not intend to repeat here.

The noise generator pictured in the QST story was designed primarily for use at 28 Mc., but the idea behind it is a natural for the v.h.f. worker. As we go higher in frequency from 28 Mc., noise developed within the receiver becomes an ever greater problem. Signal-to-noise ratio is determined almost entirely by the receiver itself, and small variations in receiver design may make tremendous differences in performance. The noise generator provides the only simple means of telling how we are making out in our attempts to improve receiver performance.

In an attempt to adapt the Goodman noise generator to v.h.f. work we soon found that even 50 Mc. was near the top limit of its usefulness. By shorting out $R_{CI}$, removing $C_{1}$, and plugging in a 50-Mc. tuned circuit across the output terminals (Fig. 2 in the article referred to), we were able to get satisfactory operation, but the output circuit could not be resonated at 144 Mc. The next step was the installation of a 316A "door-knob" tube in place of the 801A originally used. The use of plug-in resonant circuits then permitted use of the generator for either 50 or 144 Mc. Results were not completely uniform from day to day, however, indicating that the 316A was not the best tube for the job.

Hearing that a diode had been developed by Sylvania especially for noise-generator use, one of these was obtained, and the generator was rewired in accordance with the manufacturer's recommendations for his Type 5722. The result is shown in the accompanying photograph and circuit diagram. This arrangement worked nicely at 28 and 50 Mc., without any external tuning, but a plug-in tuned circuit was needed for best results at 144 Mc.

* V.H.F. Editor, QST.

Revised version of the QST noise generator. The 801A originally used has been replaced with a Type 5722 noise diode, and the circuit altered as shown in Fig. 1. It is usable on 28, 50, or 144 Mc.

2 Other v.h.f. workers have reported reliable results with the 15E and 24G in v.h.f. noise-generator work.
Using the Noise Generator

The beauty of the noise generator is its utter simplicity in both design and use; yet it will tell you more about your receiver in five minutes than could be obtained in hours of work with the most expensive laboratory signal generator. Every operation in receiver adjustment and testing can be done with it, with the exception of calibrating the dial, and when you are through you will know exactly where you stand.

Here's how you do it: Put a noninductive resistor across the generator output terminals, the value to be determined by the type of transmission line you have on your antenna (50, 75, 300 ohms, etc.), and connect the generator to your receiver or converter antenna terminals by the shortest possible leads. Hook up an a.c. voltmeter (or db. meter, or milliwatt meter, if available) across the receiver output terminals. The earphone jack is a good place on some receivers, or the meter can be connected across the speaker terminals. Adjust the receiver volume or r.f. gain control to some level which gives a convenient reading on the output meter. The a.v.c., b.f.o., and noise limiter should be off. Now turn up the diode filament voltage, by means of a Variac or a variable resistor in the filament-transformer primary, until the noise power output of the receiver is doubled, as indicated by an increase of 41 per cent in the a.c. voltmeter, 3 db. on a db. meter, or double the reading on an indicator which reads directly in milliwatts. Read the diode plate current, which is a direct indication of the performance of your receiver. The lower the current required to double the noise output, the better your receiver works. That's all there is to it.

If you want to talk about your receiver's "noise figure," substitute the current reading in the formula $F = 20 \log I$ where $I$ is the diode current in amperes and $R$ is the value of $R_1$. The noise figure in db. is 10 times the common logarithm of $P$, or the value may be obtained from various decibel conversion tables. If you come out under 5 db. for 50 Mc. or 7 db. at 144 Mc., you have quite a good receiver.

The value of noise figure arrived at by amateur technique may not be strictly accurate, but the important fact is that it provides a reference with which to work. When you lower that reference by a receiver adjustment you have made an improvement. If the diode current required for doubling the noise output goes up after a change you're going in the wrong direction.

This reference can be put to work in many ways. Anyone who has played with receivers knows how confusing the results can be when one tries to adjust mixer injection, antenna coupling, and other variables, by listening to a test signal. When the signal gets louder after an adjustment it often appears that the receiver noise has increased along with it. Just working for maximum signal alone is almost certain to result in inferior performance, except in alignment adjustments.

As a typical example, let's take the case of the 6AK5-12AT7 converter described in the 1949 Handbook, and currently used in 50-Mc. work at W1HDQ. Though considerable time had been spent tinkering with the antenna coupling when the converter was first put to use, application of the noise generator made it possible to effect a real improvement in performance by adjusting the position of the antenna coupling coil. Less than five minutes was required, yet the noise figure of the converter was dropped from 8 to 5 db. by that one simple adjustment. Reason: too-loose antenna coupling introduced regeneration, which whooped up the S-meter readings and made loud signals seem louder, but actually reduced the signal-to-noise ratio. It fooled the ear and eye, but not the noise generator.

The Best Receivers Are Home-Built

There is an increasing tendency on the part of many amateurs to leave the receiver work to the manufacturers. While a good many of us have continued to build our own converters for 50 and 144 Mc., even that field is now receiving com-
THE COFFEE-CAN VFO

An Inexpensive Easily-Built Crystal Substitute

BY EDWARD HAYWARD, WIPH

Fortunately some of us don't have the cash, the time or perhaps the ability to build the commercial-looking gear that so often is considered a necessity in these days of chromium grilles and plastic dashboards. We have to be content with something we can toss together with simple tools over a week end from whatever parts we may find in the junk box. This doesn't necessarily mean, however, that the stuff we manage to eke out under such circumstances can't work much better than it looks.

The rather strange-looking object in the photographs may not be recognized readily as a Clapp VFO, but you can start building it from scratch on a Saturday afternoon and have it driving your rig by Sunday night — maybe earlier. And you won't have to apologize for the signal it can put out. All reports we've had have been of crystal quality. Even though the coil is confined in a tight enclosure with the tube, frequency drift is amazingly low. Checks against a GR standard over a period of four hours on 80 meters show a maximum drift of 80 cycles from a cold start, most of the drift taking place within the first twenty minutes. I have tried keying the oscillator and also my 807 final and there is little to choose so far as chirp is concerned. Both methods give equally clean-cut keying.

The circuit diagram is shown in Fig. 1. It adheres quite closely to similar arrangements shown in previous QST articles. A 6V6 is connected as a triode in the oscillator. The untuned amplifier, also using a 6V6, is capacity coupled at the cathode of the oscillator. A regulated voltage of 150 is used on the plate of the oscillator and also on the screen and plate of the amplifier. C1 in parallel with C2 spreads out the 80-meter band over about half of the dial scale. While personally I have found this spreading entirely adequate for tuning to the desired frequency with a straight 3-inch dial — even on 40 and 20 meters — there are doubtless those who would prefer a dial with vernier reduction. A National type BM or one of the miniature square-frame dials can be easily substituted for the straight dial if desired.

Construction

There isn't a great lot that can be said about the construction that isn't evident from the photographs. The two stages are built in a pair of vacuum-pack coffee cans fastened to a wood base that can be used to house the power supply. These cans don't look half bad after they have been given a couple of coats of enamel in your favorite color. You will find too that parts are quickly mounted, since holes are easily made, the drill leaving a nice clean hole. Both covers are perforated with several holes to provide a measure of ventilation.

The oscillator components are placed in one of the cans. The tuning condenser is single hole-mounted in what will be the front of the can. Then the tube and coil are placed so as to leave...
The oscillator is in the can to the right, the buffer amplifier in the one to the left.

**Fig. 1 — Circuit diagram of the "coffee-can VFO."**

- **C1, C3, C1, C10** — 100-µfd. silver mica.
- **C2** — 75-µfd. midget variable.
- **C4, C5, C6** — 0.001-µfd. silver mica.
- **C6, C8, C9** — 0.01-µfd. mica or paper.
- **R1** — 0.1 megohm, ¼ watt.
- **R2** — 47,000 ohms, ½ watt.
- **L1** — 3.5 Mc. — 27 turns No. 18, 2 inches diam., 2¾ inches long (B & W 3907 strip coil) (inductance 20 µh).
- **RFC1, RFC2** — 2.5-mh. r.f. choke.

as much space as possible around the coil (obviously not too much in any event). The coil I used is a section of B & W 3907 strip coil, 2 inches in diameter, 10 turns per inch. A small strip of wood is screwed to the bottom of the can and the coil is then cemented to the wood strip. The socket is wired up with loose leads and then mounted on ¾-inch spacers.

The few parts needed for the buffer stage are assembled in the second can and the two cans are bonded together with a wire connected to the negative high-voltage terminal.

Almost any small power supply delivering around 250 or 300 volts with a rating of 75 ma. or more should be satisfactory for use with this unit. A VR-150 and the usual dropping resistor are connected across the output of the supply to obtain the regulated voltage. The resistor is adjusted until the VR tube just stays ignited with the key closed.

If the signal shows any evidence of mechanical vibration, the unit can be mounted on a sponge-rubber pad. I haven't found this necessary.

I've been using this VFO for some time now, driving the 6V6 crystal-oscillator stage in my rig. I use a length of coaxial cable fitted with a plug that fits the crystal socket. Although it cost me practically nothing to build, since the parts were mostly from the junk box, I couldn't be more satisfied with it had I paid a good price for it. Several other hams around here have built similar units with equally good results.
TVI Reduction—Western Style

Eliminating QRM from a Kilowatt

BY CLAYTON E. MURDOCK,* W60MC

There have been many good articles written on TVI and another may seem superfluous. But instead of just going off the air, read on—maybe a new idea will be found to help cure your TVI. There are many causes of TVI, and this article is not meant to be comprehensive, but to describe the details of how one severe case of TVI was completely cured.

The transmitter runs a "brimful gallon" on 10, 11, 20, 40 and 80 c.w., using push-pull 4-250As in the final. The transmitter is just 40 feet from the TV receiver. The TV antenna is the same height as the 3-element 10 and 20 rotary and just 50 feet away. There is also a 60-foot vertical just 50 feet away from the 30-foot-high TV antenna. The TV signals are average suburban signals on Channels 5 and 7.

The TV antenna and receiver are in the direct field of the transmitting antenna and one can pull a quarter-inch arc off the TV antenna feeder where it enters the TV receiver. An indication of the intense field is that lamps light up in the neighbor's house, both upstairs and downstairs, when transmitting on 40 and 20 meters.

Several tests have been made to prove that the TVI elimination has been positive and complete. This station was operated in the last ARRL DX test and made 259 contacts during the two week ends while the neighbors watched the afternoon ball games and the regular nightly programs, never knowing the transmitter was on the air.

The television set was installed two weeks before the start of the DX test and initial testing showed that operation on any band caused serious interference—the screen going white, cross-hatching appearing on the picture, black parallel bars blanking part of the screen, etc. Disconnecting the antenna from the transmitter removed most of the interference. The problem then seemed simplified, in that the interference was probably associated with blocking of the receiver because of the intensity of the radiated power, plus probable high-order harmonics falling in or near the TV channels. It also showed that there probably was no direct connection via the house wiring, or direct radiation from the exciter.

It was then decided to attack the problem by reducing the higher-order harmonics in the transmitter output and to do something to reduce the fundamental voltage appearing at the receiver input.

Tackling the Harmonics

The first thing to do is to make up a sensitive wavemeter. The one used was simply a 1N21 crystal and a 50-microamp. meter coupled to a coil and variable condenser. With this meter on the operating table in front of the exciter, indications of harmonic output on 28, 35, 42, 49 and 56 Mc. were found. This was the range of the tuned circuit in the wavemeter. These harmonics were found in various degrees in the grid circuit of the final as well as at the antenna. It was thought that the harmonics should be reduced or eliminated in the grid drive so that the harmonic suppression added after the final would only have to deal with the power levels of harmonics generated in the final itself. That is, it was hoped that a pure fundamental driving frequency could be obtained for the final.

The harmonic reduction was accomplished simply by using high-C tank circuits in the plate of the driver tube and using single-turn coax pick-up loops and high-C grid circuits in the final. The exciter is a 6SK7 VFO and a string of three 6V6 frequency doublers capacitance-coupled to the grid of a 4-65A tetrode. The 4-65A plate

*209 Elder Ave., Millbrae, Cali.
uses a B&W 50-watt bandswitching turret, end-linked, and a 50-µfd. tuning condenser. The appropriate 6V6 is capacitance-coupled to the grid of the 4-65A by a gang switch. The B&W 10-meter coil was removed and replaced by a 7-turn ½-inch diameter coil that tunes with about 35 µfd. The B&W 15-meter coil is used on 20 meters, the 20-meter coil on 40 meters and the 40-meter coil on 80 meters. Additional capacitance must be added on 40 and 80 meters to make the 20- and 40-meter coils resonate; 100-µfd. variables were added, set in capacitance so that the 50-µfd. condenser tuned at approximately the same setting on 40 and 80 as on 20. After increasing the C in the 4-65A tank condenser, it was necessary to add a 6-inch antenna to the wavemeter to find indications of higher-order harmonics. There are three separate finals, each using push-pull 4-250A tetrodes. The 40-80 final uses a B&W 50-watt center-linked turret in the grid and a B&W 1-kw. plug-in center-linked coil in the plate, tuned by a Johnson 200-µfd. split-stator variable condenser. The 20- and 40-meter grid coils in the turret are used on 40 and 80 meters, respectively. The regular center links were removed and replaced by single-turn coax loops. Additional tuning capacitance was needed to make the coils resonate, and 100-µfd. APC-type padders were added from each grid to ground and set so that the regular grid tuning condenser hits resonance at the same setting on both 40 and 80 meters. The plate circuit was also made high-C by using the regular 20-meter coil on 40 and the 40-meter coil on 80. For the necessary additional capacitance across the plate tank coil an Eimac 50-µfd. fixed vacuum condenser was connected from plate to plate. The 10- and 20-meter finals use small 50-µfd.-per-section split-stator condensers in the grid and Eimac fixed vacuum condensers in the plate, with tuning accomplished by turning a ring or flipper inside the plate coil. The 10- and 20-meter grid coils were pruned so that nearly all the capacitance of the 50-µfd. condenser was used, the 10-meter coil being adjusted so that it hits 11 meters with the condenser all the way in. The plate coils were pruned so that the 20-meter coil tunes with two 50-µfd. fixed vacuum condensers (one from each plate to ground) and the 10-meter coil with two 25-µfd. fixed vacuum condensers. Four separate RG-58/U coax links were used between each of the 4-65A plate coils in the turret and the appropriate final grid coil, each with a single-turn shielded coax loop at each end; that is, one turn around the 4-65A plate tank coil and one turn around the center of the grid coil. With grid drive on the final, it is now impossible to find any harmonics with the sensitive indicator on any of the four grids. There is plenty of grid drive with one-turn loops because with a high-C circuit fewer turns are needed in the pick-up loop. It is easy to overcouple and have broad bandpass characteristics by sliding the single turn loop up on the 4-65A plate tank coil. When properly overcoupled, there is no need to retune the grid circuits of the finals or the plate circuit of the 4-65A to cover 100 kc. on any band.

**Antenna Couplers**

The next step was to prevent the now-reduced harmonic output from getting to the antenna. Antenna tuners were built for each band, again coupling with shielded coax links, this time using RG-8/U because of its higher power rating.

There are three antenna tuners. The 20-meter antenna uses a pair of RG-8/U coax feeders, and the antenna tuned circuit for 20 consists of a 50-µfd. single-section 7000-volt condenser and a coil of 7 turns, 4 inches in diameter, 7 inches long, of ½-inch copper tubing. A one-turn coax link loose-coupled around the final coil, and a single turn tight-coupled around the antenna coil, give adequate coupling. Each of the feeder coaxes terminates in a one-turn loop around the antenna coil. This makes three shielded coax loops around the antenna tuning coil, two for the feeders and one for the link to the final, as shown in Fig. 1. Variation in antenna coupling is accomplished by varying the diameter of the shielded loop around the final tank coil. The coupling is easily varied by soldering an extension of 3 or 4 inches of small-diameter wire between the center conductor of the pick-up loop and the point of ground connection on the pick-up loop. By varying the length of this wire, thus varying the diameter of the pick-up loop, a wide variation in the degree of coupling is easily accomplished.

The 10-meter rotary uses 300-ohm Twin-Lead as feeders. Again a single-turn shielded loop is used around the final and one around the antenna tuner coil. The Twin-Lead is simply clamped on the antenna tuner coil across the center turn. The 10-meter antenna tuner uses a 50-µfd. split-stator condenser with the rotor grounded and a coil of 6 turns, 3½ inches in diameter and 6 inches long.

The 40-80 meter final uses a single-turn coax pick-up loop mounted on the link arm of the
B&W tank coil. The old link was removed and the coax link simply strapped on to the bakelite arm, allowing normal variable coupling with the pick-up loop. RG-8/U is run 50 feet to the base of the 66-foot vertical antenna. On 40 meters the coax is clipped on to one turn of the 40-meter antenna tuner. This tuned circuit uses a 60-µfd. variable condenser and 9 turns, 5 inches in diameter, 9 inches long, of 3/8-inch copper tubing. The 66-foot vertical is clipped to the coil about halfway up and the bottom end of the coil is run direct to ground with 4 feet of heavy wire. On 80 meters the center of the coax goes directly to the bottom of the 66-foot vertical and the outside shield of the coax direct to ground. With these changes — that is, high-C circuits and shielded coax loops — no harmonics can be found on any antenna with the sensitive wavemeter when running full power input.

Fixing the Receiver Input

However, there was still some occasional TV interference, generally when it was raining. The television antenna seemed to be poor when it was wet. It was found that the input of the TV set (marked 300 ohms) actually was a piece of 100-ohm coax, 18 inches long. The receiving feeder was 300-ohm Twin-Lead, and when coupled to the TV input made a bad unbalance — one side of the Twin-Lead was grounded. A "balun" to couple from the balanced 300-ohm Twin-Lead to the coax input circuit of the receiver was made using a split-stator 15-µfd. condenser and 6 turns, ½ inch in diameter, ¾ inch long, of No. 18 wire. A single turn of RG-58/U around the center of the coil goes to the television-receiver input, as shown in Fig. 2. The 300-ohm Twin-Lead is clipped across the center 3 turns of the coil. The rotor of the condenser is grounded to the shield of the coax. This not only removed completely any traces of transmitter interference, but improved the TV signal as well. The balun also removed the high r.f. voltage from the input of the TV receiver.

Transmitter Notes

There are several significant design factors incorporated in the transmitter that contribute to the satisfactory operation of this installation. During the course of experimenting, it was found that key clicks, oscillation in the final, line voltage fluctuations, etc., could still cause rather severe interference with TV reception. Very soft keying is used in the cathode of the 4-45A stage, using a vacuum-tube keyer. Great care should be used in adjusting the v.t. keyer to keep on the side of soft make and break keying (anyway, it will be more pleasant to listen to on the air). It was found that by simply sharpening the keying to a faint trace of a tick on the make caused a few random black bugs to run across the television screen, similar to some types of automobile ignition interference.

It was also found that under some conditions of transmitter adjustment, occasionally one of the finals would oscillate near the fundamental frequency under key-up conditions. Several corrective steps were taken. All finals were cross-neutralized with a small wire protruding through the chassis alongside the 4-250A tubes. The wires are crossed over under the chassis and connected to the grid leads at the sockets. Neutralization is accomplished by varying the height of the wires or by changing their length by nipping off the protruding ends. Any common neutralizing procedure may be used. It has been found that a quick and easy method is to watch the grid meter of the final when tuning the plate circuit through resonance with full plate voltage on. The amplifier is neutralized when the maximum grid current occurs exactly at the minimum plate current setting, and the grid current falls away uniformly on either side of plate-circuit resonance. Neutralization is easy and very worth while.

There were, however, occasional traces of random oscillation, which could only be detected
by a click in the receiver on the make and break of
to eliminate this condition completely.

It should be added that the screens of the 4-250A grids. It should be added that the screens receive their voltage from the plate supply through a 50,000-ohm screen.

In order to keep the key-up plate current and screen voltage to a low value, two 2A3 triodes are used as protective tubes as shown in Fig. 3 to reduce the key-up screen voltage. When the key is up and no grid current flows in the 4-250A grid leak, the screen voltage is below 50 volts. With 90 volts of battery bias, 50 volts on the screen and as much as 5000 volts on the plates of the 4-250As, no plate current flows, no grid current is indicated and the stage is perfectly tame.

Besides the neutralization and the screen voltage clipping, parasitic suppressors are used in all 4-250A plate leads. Each suppressor is made up of an 80-ohm noninductive resistor with 6 turns of No. 18 wire wrapped around the outside. These suppressors are placed directly at the plate of each 4-250A.

One other thing was found to cause annoying interference to TV reception and that was those minor line-voltage fluctuations resulting from keying. With only a 2-volt variation in line voltage when keying, the picture would move around and change intensity. This phenomenon could be demonstrated by turning on the refrigerator and other loads having a high current surge in the home of the TV set owner. The transmitter line-voltage fluctuations were minimized by increasing the key-up current on the final power supply. This was done by using a 450TH with the grid connected to the 4-250A grid leak and the plate connected to the final power supply. A variable cathode resistor is used between filament and ground to adjust the key-up current through the 450TH. The operation of this tube is similar to the 2A3s in the screen circuit. It should be noted that in using both the 2A3s and the 450TH any fixed bias must be connected between the grid of the final and the point where the grids of the 450TH and 2A3s are connected. That is, one side of the bias resistor must go directly to ground; the bias pack or bias battery must not have the positive grounded. This imposes no major problem since the voltage built up across the final grid leak should not be more than about 200 volts.

Since the DX Test checks have been made with two other neighbors less than a block away who have TV sets, and they are not bothered by the transmitter. One of them did have bothersome interference and it was traced to his own refrigerator. An electric blanket in the same house was also very noisy. Helping to clear their TVI, incidentally, made my receiving conditions quieter. These TV friends can be militant emissaries tracking down noisy vacuum cleaners, loose light bulbs, bad wall switches, and other

(Continued on page 82)

A rear view of the final amplifiers. The 28- and 14-Mc. finals are on the top deck, the 3.5-7 job below. The antenna tuners are mounted outside the cabinet at the top right. Note the 20-meter tuner with its three coax links.
ELECTION NOTICE

To All Full Members of the American Radio Relay League residing in the Dominion of Canada, and in the Atlantic, Dakota, Delta, Great Lakes, Midwest, Pacific and South-eastern Divisions:

An election is about to be held in Canada and in the above-mentioned divisions to choose both a director and an alternate director (in Canada, a Canadian General Manager and his alternate) for the 1950-1951 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 Constitution & By-Laws will be mailed to any member upon request.

Nomination is by petition, which must reach the Headquarters by 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 alternate director therefrom. No person may simultaneously be a candidate for both offices. Inasmuch as all the powers of the director are transferred to the alternate in the event of the director’s death or inability to perform his duties, it is of as great importance to name a candidate for alternate as it is for director.

The following form for nomination is suggested:

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

We, the undersigned Full Members of the ARRL residing in the Division (or in the Dominion of Canada), hereby nominate: of, as a candidate for director (or Canadian General Manager); and we also nominate, of, as a candidate for alternate director (or alternate Canadian General Manager); from this division for the 1950-1951 term.

(Signatures and addresses)

The signers must be Full Members in good standing. The nominee must be a Full Member and must have been both a member of the League and a licensed radio amateur operator for a continuous term of at least four years immediately preceding receipt by the Secretary of his petition of nomination, except that a lapse of not to exceed ninety days in the renewal of the operator’s license and a lapse of not to exceed thirty days in the renewal of membership in the League, at any expiration of either during the four-year period, will not disqualify the candidate; provided that if a candidate’s membership was interrupted by reason of service in the armed forces of the United States or Canada between September 1, 1939, and May 2, 1947, he shall not be deemed to be disqualified so far as concerns continuity of membership if within those dates he resumed his League membership within the 90 days following his release from active military duty. He must be without commercial radio connections: he may not be commercially engaged in the manufacture, selling or renting of radio apparatus normally capable of being used in radio communication or experimentation, nor commercially engaged in the publication of radio literature intended, in whole or part, for consumption by licensed radio amateurs. Further details concerning eligibility are given in By-Law 12. His complete name and address should be stated. The same requirements obtain for alternate as for director. 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, 1949. 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 alternate. 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 nominators 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 alternate 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.

Present directors and alternates for these divisions are as follows: Canadian General Manager, Alex Reid, VE2BE; Alternate Canadian General Manager, Leonard W. Mitchell, VE3AZ. Atlantic Division: director, Walter Bradley Martin, W3QV; alternate, Henry W. Wickenhiser, jr., W3KWA. Dakota Division: director, Goodwin L. Dowland, W8TSN; alternate, Robert A. Kimber, W0BLR. Delta Division: director, Viator Canfield, W8SSR; alternate, James W. Walton, W4FLS. Great Lakes Division: director, Harold C. Bird, W9FPE; alternate, John H. Brabb, W0TSN. Midwest Division: director, William P. Sides, W4AUP; alternate, Alvin G. Keyes, W8KTAQ. Pacific Division: director, William A. Ladley, W6RBJ; alternate, Kenneth E. Hughes, W6CS. Southeastern Division: director, William C. Shelton, W4AGR; alternate, William P. Martin, W4AUP.

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

For the Board of Directors:

A. L. BULDONG
Secretary

BULDONG NEW SECRETARY

For the first time since World War I, ARRL has a new Secretary and General Manager. When the Board of Directors chose a successor to the late Kenneth B. Warner, they picked a man with a thorough background of service to the League: Arthur Lyde Buldong, W1BUD, who this past February rounded out 25 years on the Hq. staff.
In 1911, as a young native of Washington, D.C., "Bud" had become interested in a magazine article concerning ham radio; he promptly scraped up enough money to buy a crystal detector, a single headphone and to build a single-slide tuner. With this gear he listened faithfully in spare time, and finally was rewarded when NAA began putting out a whopping signal from nearby Arlington. Later he built a Ford spark-coil rig and went on the air signing "AB." In March of 1917 he was finally persuaded by a friendly Department of Commerce official to take the amateur exam; his operator license came through promptly, but War I was declared while his application for a station license was being processed.

Bud came to Hq. from Washington in 1924 to become editor of ARRL's syndicated newspaper column, "Current Radio." During his first year in Hartford he also organized the PRR Emergency Net—probably the first amateur net devoted solely to emergency communications preparedness, and from whose activities was born the amateur's land-SOS signal QRR (now QRRR). Subsequently he became assistant traffic (communications) manager for a brief period and then, when Charles Service resigned in 1926 to become a Floridian, Secretary Warner picked this young Washingtonian as his new assistant and right-hand man, which post he held until KBW's untimely passing last September and Bud's appointment by the Executive Committee as Acting Secretary.

In recent years frequency allocations have been his specialty, wartime service as chief of that work in the U.S. Coast Guard, as a Lieutenant-Commander, contributing to his background on such matters—and, of course, frequency allocations and conference work rate A-1 priority in the responsibilities of the Secretary. Besides regular trips to Washington, his travels to represent the amateur at international conferences, while Senior Assistant Secretary, have taken him to Santiago, Chile; Rio de Janeiro, Brazil; Moscow; and of course Atlantic City. The late Secretary Warner, in the postwar structure of the Hq., in fact had turned over to Bud practically all the legislative and regulatory matters in which the League participates. Currently, he has just ended a two-month mission in Washington representing the amateur service on the U.S. delegation to the Fourth Inter-American Radio Conference.

Budlong is perhaps as well known personally to as many amateurs as W1BUD is on the air, since he is without question the most-traveled staff member. Over the years he's made numerous field trips to conventions and affiliated clubs, climaxing perhaps by a recent country-wide journey which in 91 days on the road included 62 club and convention meetings. Feeling that the position of Secretary requires an appreciable amount of membership-contact travel, Bud plans to continue, and in fact at the moment contemplates as a starter an autumn journey covering as much of the Western half of the country as time permits. So, perhaps you'll be seeing him in person soon.

V.O.A. BROADCASTS FOR HAMS

The Voice of America, the international broadcast division of the Department of State, has started a series of programs, with the cooperation of ARRL, devoted entirely to amateur radio and directed to hams all over the world. Program material consists of interviews with prominent amateurs, technical tidbits, propagation predictions, contest announcements and results, and

(Continued on page 88)
A Power-Distribution Panel

Improving the 115-Volt Side of the Rig

BY BENSON B. BOSS,* W3DAZ

The 115-volt wiring of amateur transmitters consisting of a number of units is often complicated and messy. Here described is a piece of apparatus that has simplified the wiring and control of the author’s rig.

As indicated in the photographs, it is a 5 1/2 inch relay-rack unit. Two switches and four pilot lights are on the panel. The 4 × 4 × 17-inch chassis mounted on the back of the panel has a plug for the incoming power, fuses and numerous receptacles for separate circuits to each relay-rack unit requiring a.c. The end of the typical cable shown terminates in a receptacle. This attaches to a plug on one of the units.

As shown in Fig. 1, the heart of the idea is the use of three-pole receptacles and plugs. Terminal 1 of the receptacles is energized by closing the filament switch, S₁, Terminal 2 is energized by closing the plate switch, S₂, and Terminal 3 is connected directly to the grounded service conductor.

This power-distribution panel has the following advantages:

1) Only one cable and plug are required for each unit that has both filament and plate transformers, instead of the usual two cables. No additional wires are required for switching.

2) Once this unit and the connecting cables are made up, the 115-volt wiring will never again have to be changed, no matter to what extent other units are added, removed or changed.

3) No separate ground wire is required to each unit, or even to the frame of the entire rig. Each chassis may be connected to Terminal 3 of its plug, which can only be connected to the neutral-

---

Fig. 1 — Wiring diagram of the power-distribution panel. The insets show connections to typical r.f. and power units. A, B and C are interconnecting cables. S₁ and S₂ are d.p.s.t. switches. S₁ controls all filaments, S₂ all plate-voltage transformers.
service conductor, which, in turn, is always grounded at the entrance switch to the building.

4) No separate wire for negative high voltage is required to each unit. By connecting the negative h.v. wiring of the unit to the chassis (as should be done for safety considerations), use is made of the 115-volt neutral. Thus the power-distribution panel is the point at which the negative h.v. leads for all units are tied together. This arrangement has the disadvantage that separate filament and plate transformers are required throughout; the negative-h.v. lead cannot be switched. A third switch for c.w.-phone operation could well be added.

In order to keep the load reasonably balanced between the two ungrounded service conductors, each supplies both filament and plate power. Although designed for three-wire 115-0-115-volt service, this panel could be used on two-wire service by connecting together Terminals 1 and 2 of the receptacle on the incoming power cord.

One three-pole receptacle is not plate-switched, in case it is desired to have some plate voltage during stand-by periods. A pair of two-pole receptacles is provided for use of a receiver, soldering iron or work light.

The switches are two-pole snap switches of the type used in building wiring. The four-inch chassis is just the right width to hold them. The switches are fastened to the chassis and then the panel is attached to the switches—not to the chassis; the threaded holes in the switches ordinarily used for switch plates provide a means for fastening the panel. To eliminate noise, a mercury switch is used as the plate switch. The fuse receptacles are the porcelain sockets for use in electric heaters with cone elements. Both switches and fuse receptacles as well as No. 14 rubber-covered wire (which should certainly be used rather than hook-up wire), may be obtained from any distributor of electrical-wiring devices. The pilot lights are connected with flexible wire.

With a light bulb and a waterpipe, the house wiring system should be checked to make sure there is a good ground at the entrance switch. An additional ground should not be used at the rig. The National Electric Code (the standard used by the Fire Underwriters) prohibits additional grounds to the neutral service conductor, because they make it possible for current to reach the load by routes other than the wire.

Now, the N.E.C. prohibits using the neutral service conductor for grounding equipment (as has been done in this panel), except in the case of electric ranges or by special permission. Ranges are exempted because they always employ three-pole polarized receptacles and plugs, which prevent any possibility of reversed connections making the frame hot. Since this power-distribution panel uses the same type of receptacles and plugs, it appears that the N.E.C. would permit using the neutral service conductor as a ground for the rig.

A pair of two-pole receptacles is provided for use of a receiver, soldering iron or work light.

The switches are two-pole snap switches of the type used in building wiring. The four-inch chassis is just the right width to hold them. The switches are fastened to the chassis and then the panel is attached to the switches—not to the chassis; the threaded holes in the switches ordinarily used for switch plates provide a means for fastening the panel. To eliminate noise, a mercury switch is used as the plate switch. The fuse receptacles are the porcelain sockets for use in electric heaters with cone elements. Both switches and fuse receptacles as well as No. 14 rubber-covered wire (which should certainly be used rather than hook-up wire), may be obtained from any distributor of electrical-wiring devices. The pilot lights are connected with flexible wire.

With a light bulb and a waterpipe, the house wiring system should be checked to make sure there is a good ground at the entrance switch. An additional ground should not be used at the rig. The National Electric Code (the standard used by the Fire Underwriters) prohibits additional grounds to the neutral service conductor, because they make it possible for current to reach the load by routes other than the wire.

Now, the N.E.C. prohibits using the neutral service conductor for grounding equipment (as has been done in this panel), except in the case of electric ranges or by special permission. Ranges are exempted because they always employ three-pole polarized receptacles and plugs, which prevent any possibility of reversed connections making the frame hot. Since this power-distribution panel uses the same type of receptacles and plugs, it appears that the N.E.C. would permit using the neutral service conductor as a ground for the rig.

Silent Keys

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

W1PLS, Kenneth Callahan, Sharon, Mass.
W2YXC, Ralph R. Berckmuller, Rochester, N. Y.
W3CUU, Paul S. Atkins, Pottstown, Pa.
W3GUR, Roy K. Reifsnnyder, Pottstown, Pa.
W3UG, Edward E. Sly, South Connellsville, Pa.
W5EAT, C. W. Smith, Van Buren, Ark.
W5KRY, Sam Paola, Winnsboro, La.
W6SSN, Milton R. Winsby, Oakland, Calif.
W7FQH, ex-7KV, James R. Howerton, Ilwaco, Wash.
W7IO, Charles Middleton, Phoenix, Ariz.
Ex-W8COT, Charles E. Just, Syracuse, N. Y.
W9CAH, Robert W. Bentley, Evanston, III.
W9NKJ, Edward M. Kulpa, Chicago, Ill.
W8EYF, Ward D. McIntyre, Chadron, Nebr.
W9VJH, Ashley Ingerson, Browns Valley, Minn.
H1BHN, Gigi Bossi, Udine
OK1WA, Alex Schaeferling, Harachov
VE3ARG, E. J. Millet, Sudbury, Ont.
VE5BF, A. C. Cox, Saskatoon, Sask.
Adjusting the Antenna Coupler and Harmonic Filter

In the article on harmonic reduction in April QST space did not permit including a detailed description of the method of adjusting a link-coupled antenna tuner with a harmonic filter in the coax link. There is nothing highly complicated about it, but for best results it does require treating the link as something more than just a means for obtaining inductive coupling between two physically-separated tuned circuits.

For optimum operation, the coax link between the transmitter and antenna tuner should be handled exactly like any other transmission line that is to be terminated in its characteristic impedance. A good set-up for doing it is shown in Fig. 1. The s.w.r. indicator can be any of the coax types described in the Handbook or Antenna Book; if you don’t have one already you’ll find either the resistance-bridge or the Maxwell-bridge type easy to build and adjust; the cost of either type is little more than the cost of the d.c. current-indicating instrument used.

Fig. 1 suggests using a dummy antenna, in the interests of avoiding radiation while making adjustments. However, with either of the s.w.r. indicators mentioned above the power must be reduced to a rather low level, to avoid overloading the instrument, and in this case the regular feeders can be substituted for the dummy antenna. Testing at a power level of a watt or two will give results that are just as valid as with a kilowatt, and there isn’t much likelihood of causing serious QRM to anybody. The power reduction can usually be brought about temporarily by using a low-voltage supply (from the oscillator, for example) and loosening the coupling between the final tank and \( L_3 \) until the s.w.r. indicator shows the proper deflection.

The object is to maintain reasonably high Q in the antenna tank and at the same time eliminate standing waves on the coupling line. For a first trial, use a moderate degree of coupling between \( L_1 \) and \( L_2 \), and then try various settings for the antenna taps on \( L_1 \) until the indicator shows the lowest possible s.w.r. If the s.w.r. cannot be brought down near 1, tighten the coupling a bit and try again. After satisfactory settings are reached, remove the s.w.r. indicator (if it is the sensitive type), bring the power input up to normal, by raising the final plate voltage and by tightening the coupling between the final tank and \( L_3 \), and then let the transmitter run awhile to see if any part of the antenna tank coil gets unduly warm. The best adjustment is the one that gives, with the loosest possible coupling between the coils, normal power output and a low s.w.r., and does not cause excessive heating of the antenna tank coil. After a suitable set of adjustments has been obtained the coupling between \( L_1 \) and \( L_3 \) should be left permanently at the value so determined.

Once the antenna-tank coupling and loading have been adjusted for the lowest s.w.r., the filter may be inserted in the line and the s.w.r. indicator placed between it and the transmitter, as in the lower drawing of Fig. 1. The shunt condenser of the filter (\( C_2 \), Fig. 8, p. 19, April QST) is then adjusted for the lowest s.w.r. and the series-trap condenser adjusted to minimize the given harmonic. The two condenser adjustments may interlock somewhat, but once the proper settings are reached the shunt condenser in the filter need not be touched again. The trap condenser may need readjustment when the operating frequency is changed within the band, since the tuning for maximum attenuation is rather critical, as shown by Fig. 9 of the April article.

If the testing has been done on a dummy antenna, the coupling between the final tank and \( L_3 \) should be left fixed at the full-power value. Then when an actual antenna replaces the dummy, the taps on the antenna tank should be adjusted to load the transmitter to the same input (the antenna tank being kept at resonance, of course); this automatically brings about an impedance match between the antenna tank and the coupling line. This same tune-up procedure should be used when changing bands during regular operation.

---

It will be realized that the method of setting up the antenna-tuner circuit outlined above amounts to impedance matching. So long as this procedure is followed the matching will be quite good over most amateur bands.

**Adjustment Details**

So much for the basic method of adjustment. A few additional details may require attention. At 28 Mc. sufficient coupling usually can be obtained with a link of one or two turns, but on lower frequencies this may not be the case. Increasing the number of turns in the link will generally tighten the coupling, but at the expense of added reactance in the link circuit. This tends to reduce the current and so reduces the energy transfer. It can be overcome by tuning out some or all of the reactance, by inserting a series variable condenser as shown in Fig. 2. The condenser should have a capacitance of 250 µfd. or more, but the voltage across it is small and so receiver spacing is adequate for moderately high power.

A satisfactory method of adjustment is to start with full capacitance at C₂, resonate the antenna tank, and then decrease the capacitance (while maintaining the antenna tank at resonance) until the transmitter loads normally. If L₂ has several turns, the same coil usually will work on several bands, providing C₂ is readjusted on each band to give the right degree of coupling. On any given band it will not usually be necessary to change the setting of the series condenser, if used, once it has been adjusted for the mid-frequency of the band.

Incidentally, if the coupling at the final tank end cannot be made tight enough to load the amplifier properly, when the antenna tank is adjusted to give an s.w.r. of 1 in the coupling line, this link circuit must also be partially resonated. While the use of series condensers at each end of the line may seem to be a nuisance, it is actually so only in the initial set-up. The Qs of the link circuits usually can be kept low enough so that little, if any, readjustment is required over a band.

---

**New Apparatus**

**TVI Filters**

The two filters shown in the accompanying photograph are designed for the reduction of interference to television reception. The upper unit is intended for installation at the antenna terminals of the receiver and is of the high-pass m-derived type having a 50-Mc. cut-off. While it will not reject amateur harmonics actually falling in a TV channel, it will help prevent receiver overload by the fundamental of a near-by amateur transmitter. The attenuation in the television channels themselves is negligible.

The lower unit is designed for preventing transmitter harmonics from getting into the antenna. It is an n-derived low-pass filter for use with 52-ohm coaxial line. The cut-off frequency is 40 Mc. and at frequencies above 56 Mc. the attenuation is greater than 40 db., increasing with frequency. It is conservatively rated to handle a kilowatt on a line having a low standing-wave ratio, and will not detune a line actually working at a low s.w.r. It may be used in the transmission line with antennas fed with 52-ohm cable, or may be used with any type of antenna and line when inserted in a 52-ohm link between the transmitter and an antenna tuner, as described in April QST, page 19.

The new filters are made by R. L. Drake Company, 11 Longworth St., Dayton 2, Ohio. The receiving type is known as the "TV-300-50HP" and the transmitting type bears the designation "TV-52-40LP."

---

2 Goodman, "Coupling to Flat Lines," QST, August, 1947.
Results, Seventh ARRL Party

The Seventh Annual ARRL-Member Party was the concluding event in the celebration of ARRL Week, a busy period of amateur operating activity that included the highly-successful Second V.II.F. Sweepstakes and the first postwar Governors-to-President Relay. League members in 67 ARRL sections were active in the competition for the special combination membership and call-letter pins. As usual, the old-time contest operators were in there pitching and many newcomers showed up to give the veterans a good run for their money. Special point credits were offered before multiplier for radio copy of President Bailey's ARRL Week Message and for the holding of a Code Proficiency Certificate. Many of the high-scoring participants took advantage of these bonuses, but others overlooked the opportunity to garner additional points. Entries were received from 344 League members.

Award Winners

The following members scored the greatest number of points in their respective sections and are being awarded the special pins:

W1BII W4FBJ W6FSF W6GJ
W1CH W4LE W6SRU W9HMM
W1CRW W4KFC W7BOH W9IIC
W1GKJ W1MCW W7BSU W9PR
W1JYH W1OX W7BMT W9RJF
W1KV W4TL W7FPY VE1PA
W1IOJ W6DEJ W7JQI VE2GN
W2BBK W5DRW W7UTY VE3AWE
W2CLO W5ID W6GJSJ VE4AM
W3IOP W5FC W5JM VE2GQ
W2QED W5KC W6WZ VE9DJ
W3EIS W5OA1 W9NII VE7SW
W3FUF W6GTM W9CYU W4L5W/KL7
W3LIW W9PH W9RQM KP1Q
W3NF/2 W6ESQ W8BQ KZ7B
W4BBT W8MP W9CAQ KH1J
W4CYC W8RBB W9DXY

For their consistently good performance in ARRL Member parties, W8WZ and W9RQM deserve special mention; each has won a section award in every Party thus far held! Heartly congratulations are extended to all members who came out on top.

High Scores

Battle-hardened contest veteran W4KFC was the leading operator in the Party. Vic worked 482 stations in 70 sections for 73,360 points. Only 6 contacts behind W4KFC, W8WZ also worked 70 sections and scored 72,170. In third place we find W9RQM with 65,240 points, 426 QSOs and 70 sections. Next in line were W2IOP 64,101, W2BBK 53,312, W9BRD 52,095, W1BII 50,895, W9LVR 49,956, W9CYU 48,888, W9VEN 48,576, W9STE 44,514, W5KC 44,352, W8MQR 43,676, W4CYC 43,112, W9NII 43,028, W1JYH 42,578, W5IUW 41,382, W3UFU 40,992, W2FGF 40,310.


The three top scorers, W4KFC, W8WZ and W9RQM, each worked 70 sections. Nine other members worked 65 or more: W2IOP 69, W9RBM 69, W9LVR 69, W4CYC 68, W5IUW 68, W1BII 68, W9IC 65.

A special letter of recognition from President Bailey was offered for what was considered to be the best report of constructive projects initiated in the direction of better or fuller League organization during ARRL Week. After careful examination of all such reports submitted, that of T. J. Rigby, W7COII, of Missoula, Montana, A.R.R.L. WEEK MESSAGE

In this week dedicated to participation in ARRL Membership Activities, it gives me pleasure to address my greetings to you. I hope each of you who has a station on the air will work at least one other member during the operating party planned for Saturday, Sunday, January 22nd and 23rd, and report results. In order to permit special recognition of constructive and unusual accomplishments in ARRL Week, I solicit reports of projects started or assisted by clubs or individuals in the direction of better or fuller ARRL organization. Every amateur, ARRL member or not, should join the Emergency Corps as a supporting if not a full member. The success of our public service and emergency communication plans requires the support of numbers. Ask our Headquarters office to send full information. We amateurs must constantly demonstrate our proficiency and skill as we do in working in Field Days, emergency tests and other operating activities and in striving individually for the awards offered in different fields of amateur interest. It is essential to our welfare that we remain strong in numbers as well as constantly strive to increase the skill for which we are traditionally famed. I suggest that sometime during this week each of us tell the story of our interesting communications work to some person or group that could benefit from this knowledge. Follow through by assisting in the study of radio techniques wherever we find interested persons. I am grateful for your interest and support which continues to make our ARRL organization able to meet every challenge.

George W. Bailey, W2KH
President, ARRL

QST for
was chosen as winner of the citation. Among W7COH’s activities during the week were: (1) speaking before a meeting of the Help Gate Amateur Radio Club on “Monitoring Stations and the Need for Keeping Amateur Signals Clean”; (2) the lining up of a station in Helena, Montana, to originate the GPR message and arranging schedules for transmission of the message from Helena via Trunk Line A to Washington; (3) he got two of the young boys in his neighborhood interested in amateur radio and started teaching them the code.

Special letters were also offered to each pair of League members who conducted a QSO over the longest distance on each amateur band from 3.5 through 144 Mc., the contacts to have been confirmed by submission of written confirmations to ARRL. Claims for these scores were received, but none was considered valid since in each case the necessary confirmations were not submitted.

### SCORES 1949 ARRL Member Party

(Scores are grouped by Divisions and Sections. The operator of the station first-listed in each Section is winner for that Section. Asterisks denote stations not entered in contest, reporting to assure that stations they worked get credit. Listing showscore, number of Sections worked, number of ARRL members worked.)

<table>
<thead>
<tr>
<th>Section</th>
<th>Scores</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic Division</td>
<td>W2FPP: 40,026-51-238</td>
<td>Pennsylvania</td>
</tr>
<tr>
<td></td>
<td>W3ADE: 27,284-50-392</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3DZ: 9114-31-017</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3AX: 5490-24-65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3YQ: 3709-26-73</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3OML: 2891-14-04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3GQ: 1824-16-32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3EU: 595-0</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>W3QGR: 39,800-39-279</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3BOU: 39,600-60-283</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3JHJ: 32,214-59-231</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3GCR: 23,744-55-187</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3MCQ: 23,829-59-173</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3ZGA: 18,144-18-140</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3JZY: 16,560-50-124</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3CFT: 11,884-16-114</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3LX: 10,125-45-95</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3MYM: 9326-26-55</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3JVM: 4828-4-51</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3CDZ/3: 4092-31-65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W3HTE: 3361-27-57</td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Scores</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2PTE: 1618-19-30</td>
<td>Pennsylvania</td>
</tr>
<tr>
<td>W3DQW: 32,901-59-239</td>
<td></td>
</tr>
<tr>
<td>W3VQ: 26,607-49-229</td>
<td></td>
</tr>
<tr>
<td>W3XK: 23,344-53-174</td>
<td></td>
</tr>
<tr>
<td>W3XHA: 21,884-55-206</td>
<td></td>
</tr>
<tr>
<td>W3AAV: 12,152-49-113</td>
<td></td>
</tr>
<tr>
<td>W3PA: 7080-16-30</td>
<td></td>
</tr>
</tbody>
</table>
| W3DJO: 9005-18-25 | 1

---

<table>
<thead>
<tr>
<th>Scores</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3C &lt;!</td>
<td>Illinois</td>
</tr>
<tr>
<td>W3D&lt;!</td>
<td>35,089-55-399</td>
</tr>
<tr>
<td>W3NH: 45,028-33-341</td>
<td></td>
</tr>
<tr>
<td>W3GF: 34,368-64-226</td>
<td></td>
</tr>
<tr>
<td>W3GML: 27,489-63-187</td>
<td></td>
</tr>
<tr>
<td>W3QOT: 18,355-65-154</td>
<td></td>
</tr>
<tr>
<td>W3ERX: 18,359-11-127</td>
<td></td>
</tr>
<tr>
<td>W3EHS: 9841-65-92</td>
<td></td>
</tr>
<tr>
<td>W3MWS: 8132-39-92</td>
<td></td>
</tr>
<tr>
<td>W3MIQ: 4258-39-92</td>
<td></td>
</tr>
<tr>
<td>W3AJO: 3410-22-10</td>
<td></td>
</tr>
<tr>
<td>W3TAL: 1804-22-31</td>
<td></td>
</tr>
<tr>
<td>W3WIF: 1207-127-23</td>
<td></td>
</tr>
<tr>
<td>W3PJC: 10-10-14</td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Scores</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3YU: 43,884-83-345</td>
<td>Indiana</td>
</tr>
<tr>
<td>W3YK: 23,088-23-208</td>
<td></td>
</tr>
<tr>
<td>W3SHE: 24,880-19-187</td>
<td></td>
</tr>
<tr>
<td>W3IIV: 17,512-19-184</td>
<td></td>
</tr>
<tr>
<td>W3WXU: 11,952-19-123</td>
<td></td>
</tr>
<tr>
<td>W3LJ: 7541-41-75</td>
<td></td>
</tr>
</tbody>
</table>
| W3AW: 7410-38-80 | 1
| W3QQ: 7040-30-72 | |

---

<table>
<thead>
<tr>
<th>Scores</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3MML: 14,089-18-17</td>
<td>Wisconsin</td>
</tr>
</tbody>
</table>
| W3WRM: 65,240-70-426 | 1

---

[^1]: HQ, staff member. Not eligible for awards.
NEVER, in the memory of the oldest inhabitant of the v.h.f. bands, has there been a month like June, 1949! On 50 Mc.: An almost continuous opening, with hour-long rag-chews over 1000-mile hops. . . . Double hop, a rarity in 1948, occurring again and again. . . . The first contacts between New England and Mexico; the first XE-VE 50-Mc. QSOs. . . . Idaho, Wyoming and New Mexico contacts with W1, 2 and 3. . . . Scores of operators in all sections of the country on the verge of 150-Mc. WAB. On 144: Florida and Texas linked crossband, 50-144 Mc. . . . Two-way work from Mississippi to Missouri, Illinois and Iowa at distances which may have exceeded the 1947 record. . . . The first VEl - W1 contacts, 220 to 235 Mc., and a new DX record for 1¼-meter work. Of such stuff are our June headlines made.

We need a new term to describe the skip conditions on 6 in June. How can a layer be called "sporadic" when it supports communication day after day for weeks on end, often practically around the clock? Operators who were fortunate enough to be able to work the band in daylight hours found 50 Mc. opening frequently by midmorning or earlier, and often the nighthawks quit from sheer exhaustion, with signals coming through as much as 18 hours later. High-density ionization, evidenced by skip as short as 350 miles, opened up paths that are seldom worked on 50 Mc. At times almost the whole country seemed to be audible at once, and double hop in the 1700-2000 mile region tapped other regions which have been stumbling blocks to WAS aspirants in sections other than the Middle West.

A new 2-meter record was missed by a narrow margin on June 14th, when W4QN, Orlando, Fla., heard W5JLY, San Antonio, Texas, at 7:20 p.m. EST. The two had been in contact on 50 Mc., with very strong signals, and when W5JLY changed to 144 Mc. he was heard at once, S7. Signals soon faded, however, and were gone by the time W4QN had changed to the higher band. Repeated attempts failed to provide 2-way 144-Mc. communication over this 1000-mile path.

The two-year-old record of W3GV and WØWJGZ may have been shaved slightly two nights later, when W5JTI, Jackson, Miss., and WØNFM, Solon, Iowa, worked on 144 Mc. The exact distances between all stations concerned are not known as we write, but map checks indicate that the two hops are almost identical.

Several firsts were made this evening. W4HHK, Collierville, Tenn., worked WØKYF, University City, Mo., W0HQA, Des Moines, Iowa, and W9UED, West Frankfort, Ill., in addition to WØNFM. It is believed that these were the first contacts with Iowa and Missouri from Tennessee on 144 Mc. DX worked by W5JTI included W2ZIS and WØBJL, St. Louis, Mo., WØKYF, W9UED and W0HQA, McLean, Ill., and WØNFM, also Mississippi firsts for each state. It all started for WØNFM when he worked W4HHK at 10 P.M. CST, and WBYN, Memphis, at 10:20. W5JTI was worked at 11 P.M., followed by W5NYII, Lexington, Miss., 10 minutes later. Signals between W5JTI and WØNFM were running about S7 at first, but they peaked far above S9 in the first turn just before midnight. Clair reports that Tim was still pounding in.

### 2-Meter Standings

<table>
<thead>
<tr>
<th>Call</th>
<th>States</th>
<th>Areas</th>
<th>Miles</th>
<th>Call</th>
<th>States</th>
<th>Areas</th>
<th>Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>W8UKS</td>
<td>14</td>
<td>7</td>
<td>600</td>
<td>W1BD/1</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8NFM</td>
<td>14</td>
<td>7</td>
<td>600</td>
<td>W1MJU</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8WJC</td>
<td>14</td>
<td>6</td>
<td>500</td>
<td>W1hue</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8QAM</td>
<td>13</td>
<td>5</td>
<td>500</td>
<td>W1QAM</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8AYB</td>
<td>13</td>
<td>5</td>
<td>500</td>
<td>W1JAM</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8XYY</td>
<td>13</td>
<td>5</td>
<td>500</td>
<td>W1KJU</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8CYE</td>
<td>12</td>
<td>6</td>
<td>500</td>
<td>W1RRE</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8KXU</td>
<td>12</td>
<td>5</td>
<td>500</td>
<td>W1RQG</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8RUIE</td>
<td>12</td>
<td>6</td>
<td>500</td>
<td>W1HRA</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8BGN</td>
<td>12</td>
<td>4</td>
<td>500</td>
<td>W1FUE</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8PV</td>
<td>12</td>
<td>4</td>
<td>500</td>
<td>W1FEK</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8KLY</td>
<td>12</td>
<td>4</td>
<td>500</td>
<td>W1FHE</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8WLS</td>
<td>12</td>
<td>4</td>
<td>500</td>
<td>W1FIV</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W4FBN</td>
<td>11</td>
<td>5</td>
<td>500</td>
<td>W1SBD</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8QAN</td>
<td>11</td>
<td>5</td>
<td>500</td>
<td>W1EBJ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8PDD</td>
<td>11</td>
<td>5</td>
<td>500</td>
<td>W1EEE</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8QZ</td>
<td>11</td>
<td>5</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8QK</td>
<td>11</td>
<td>4</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8QMS</td>
<td>10</td>
<td>5</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W4QJ</td>
<td>10</td>
<td>4</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W1HBR</td>
<td>10</td>
<td>4</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W9JMS</td>
<td>10</td>
<td>3</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W1QLY</td>
<td>10</td>
<td>3</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8QJ</td>
<td>10</td>
<td>4</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W1HDB</td>
<td>10</td>
<td>4</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W1JSM</td>
<td>10</td>
<td>3</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8FBR</td>
<td>9</td>
<td>6</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8BDF</td>
<td>9</td>
<td>5</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8HBE</td>
<td>9</td>
<td>5</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8BNQ</td>
<td>9</td>
<td>4</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W2PA</td>
<td>9</td>
<td>3</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>W8GV</td>
<td>9</td>
<td>3</td>
<td>500</td>
<td>W1EJZ</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

*V.H.F. Editor, QST.*
at 1 A.M. — another example of the possibility of greater DX on 144 Mc. if only there were well-equipped stations in the right places at the crucial moments. Surely someone north of Solon or south of Jackson could have made it that night!

Apparently only the difference between the Canadian and U. S. 1½-meter hands prevented a new record for 220-Mc. 2-way work before now. For some time VE1QY, Yarmouth, N. S., has been listening for W signals on 220, and on the night of June 2nd they began to roll in. While the 2-meter gang in eastern W1 listened in amazement, VE1QY retransmitted the 220-Mc. signals of W1MNF, East Orleans, Mass. The following evening the same trick was worked with W1O, Danvers, and W1PZA, Allston, Mass. None of these fellows had a receiver which would tune the 235-Mc. Canadian assignment, but this condition was soon corrected. Another opportunity, on the 29th, found W1O and W1CTW, Arlington, Mass., ready with receivers capable of tuning to 228 Mc., the frequency of VE1QY. Credit for the first two-way contact goes to W1O, but the record he set thereby, 260 miles, was his for only a few seconds. W1CTW heard VE1QY faintly while he was working W1O, and when he signed at 7:20 the signal had reached a partially-readable level. Contact was established, with some difficulty, and the 1½-meter record came back to W1CTW. It is 275 miles from Arlington, Mass., to Yarmouth, Nova Scotia. W1OOP, Boston, made a crossband contact, 220 to 114 Mc., shortly thereafter.

Here and There on 6 and 2

This has been a big season for the low-power boys on 6. Scores of fellows have demonstrated that skip can be worked with 15 watts or less. Converted 522s are popular, and the 6J6-832 rig described in November, 1948, QST is getting a big play. W6SPE, Los Angeles, Cal., has run up a total of 25 states, VE and XE in short order with one of the latter, and he has worked out with a 4-watt rig on 6. W7ILL with 3 watts on 6 made the first Wisconsin-W1 contact, with your conductor, who was running 150 times that power. W4NBR,4, Chattanooga, Tenn., is doing all right with 5 watts. W7ACD works his 6-meter DX with a converted 522. There is not much transmission loss when the E layer is running at top form!

When the normal skip signals (700-1200 miles) start to fade, work W9PKE, Phoenix, Ariz., has been a byword among the Wls. He's been listening for W9 or W0. Why is a v.h.f. contest a howling success in some places and a howling failure in others? It all depends on where you are. If you were in W4, 5, 6, 7 or VE3, you no doubt feel that the June V. H. F. Party was the best ever. The scores from these areas will bear you out, yet in the more than 100 reports listed at the end of this column there is not a single one from all of W4, 5, 6, 7 or VE3. Why was the West where the winning success in some sections and a dismal failure in others?

Good tropospheric conditions throughout the East made possible many fine extended-groundwave contacts on 6 and 2. Several outbreaks of aurora brought in hard-to-get DX, and he has worked out with a 4-watt rig on 6, W7ILL with 375 watts, ‘phone or c.w., so he should be able to make himself heard.

Essex, N. H. — This one is a bit old, but we just missed it last month. Just after 10 P.M. on the night of May 30th, W4LNN ran across the signal of an LU6 calling CQ. This was in the midst of an aurora session, and almost everyone but Jerry had his beam north. Jerry was aiming south, however, and the signal came in quite strong, with the fading characteristics usually associated with sporadic-E skip. Copied as LU6VF (probably LU6DO) it was also heard by WIDA, but his beam was north and the signal was less intelligible. Maybe north isn't always the best direction during 50-Mc. auroral conditions.

June v. H. F. Party Scores

Remember the old story about the blind men identifying an elephant by feel? Same with a v.h.f. contest—it all depends on where you are. If you were in W1, 2, 3 or parts of W4, 5, 6, 7 and VE3, you no doubt feel that the June V. H. F. Party was the best ever. The scores from these areas will bear you out, yet in the more than 100 reports listed at the end of this column there is not a single one from all of W4, 5, 6, 7 or VE3. Why was the West where the winning success in some sections and a dismal failure in others?

Good tropospheric conditions throughout the East made possible many fine extended-groundwave contacts on 6 and 2. Several outbreaks of aurora brought in hard-to-get DX. A short burst of sporadic-E Sunday morning added more, and section multipliers hit an all-time high as a result. With
50 W 420 Mc.

Standings as of June 25th

<table>
<thead>
<tr>
<th>Call</th>
<th>Callsign</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3JH</td>
<td>W4WMI/3 37 W7CAM/3 25</td>
</tr>
<tr>
<td>W2JS</td>
<td>W4FAR/0 38</td>
</tr>
<tr>
<td>W3QUV</td>
<td>W5MS/3 35 W8QYD/3 44</td>
</tr>
<tr>
<td>W8BV/3</td>
<td>W5V/3 33 W5QD/3 31</td>
</tr>
<tr>
<td>W1CIJ/3</td>
<td>W6AJ/3 47 W8BHI/3 30</td>
</tr>
<tr>
<td>W1CQY</td>
<td>W5T/3 43 W8RFW/3 25</td>
</tr>
<tr>
<td>W3LI/3</td>
<td>W5VL/3 42</td>
</tr>
<tr>
<td>W1HDQ</td>
<td>W5V/3 42 W9HGE/3 47</td>
</tr>
<tr>
<td>W1KEL</td>
<td>W5L/3 41 W5WGH/3 47</td>
</tr>
<tr>
<td>W1LZ/3</td>
<td>W5HLD/3 40 W9PK/3 47</td>
</tr>
<tr>
<td>W1MDS</td>
<td>W5FSC/3 37 W9QKM/3 45</td>
</tr>
<tr>
<td>W1WX/3</td>
<td>W6DXB/3 35 W8JMS/3 43</td>
</tr>
<tr>
<td>W1DP</td>
<td>W5ZSP/3 34 W8QKM/3 43</td>
</tr>
<tr>
<td>W1JO</td>
<td>W6QG/3 32 W8JUG/3 42</td>
</tr>
<tr>
<td>W1WI</td>
<td>W5BF/3 31 W8IUA/3 42</td>
</tr>
<tr>
<td>W1WH</td>
<td>W5IO/3 30</td>
</tr>
<tr>
<td>W1C6X</td>
<td>W5HD/3 30 W8US/3 47</td>
</tr>
<tr>
<td>W4P</td>
<td>W5XW/3 47 W9QH/3 47</td>
</tr>
<tr>
<td>W2RV</td>
<td>W5Q/3 40 W9QFM/3 47</td>
</tr>
<tr>
<td>W1DZ</td>
<td>W6ANN/3 38 W8GWS/3 45</td>
</tr>
<tr>
<td>W2BYM</td>
<td>W9WS/3 37 W8WJ/3 45</td>
</tr>
<tr>
<td>W2AM</td>
<td>W5DT/3 36 W9YJ/3 44</td>
</tr>
<tr>
<td>W2VNY</td>
<td>W5PY/3 31 W8SV/3 42</td>
</tr>
<tr>
<td>W2W/3</td>
<td>W5WBG/3 20 W8XLY/3 41</td>
</tr>
<tr>
<td>W3JU/3</td>
<td>W7BQX/3 47 W9XKD/3 36</td>
</tr>
<tr>
<td>W3OR</td>
<td>W7ERA/3 43</td>
</tr>
<tr>
<td>W2CTE</td>
<td>W7DL/3 41 W8AM/3 31</td>
</tr>
<tr>
<td>W3KLM</td>
<td>W7EZA/3 40 W9QEI/3 31</td>
</tr>
<tr>
<td>W3MQU</td>
<td>W7ED/3 36 W9YJ/3 26</td>
</tr>
<tr>
<td>W4ERK</td>
<td>W7TFE/3 35 W9EG/3 20</td>
</tr>
<tr>
<td>W2FBB/3</td>
<td>W7R/3 40 W8AE/3 16</td>
</tr>
<tr>
<td>W4LNG</td>
<td>W7JPA/3 35 W9CTC/3 16</td>
</tr>
<tr>
<td>W3QP</td>
<td>W7FAQ/3 40 W8QAP/3 14</td>
</tr>
<tr>
<td>W4GID</td>
<td>W7FQ/3 32 XE9EQ/3 10</td>
</tr>
<tr>
<td>W4DRZ/3</td>
<td>W3CIR/7 30</td>
</tr>
</tbody>
</table>

Scores are grouped by ARRL divisions and sections. These are claimed scores, in most cases as submitted. As they have not been completely checked the final standings may vary from those shown. Columns are as follows: total score, number of contacts, section multiplier, and band used. (A: 35 Mc., B: 144 Mc., C: 220 Mc., D: 420 Mc., E: 2400 Mc.)

The World Above 420 Mc.

Altitude works wonders for the operating range on 420 Mc., according to W2AW, Woodhaven, N. Y. With W2WQ/airborne, operating on flights into New York, it has been possible to maintain communication at distances up to 90 miles, at an altitude of 9000 feet. The airborne rig consisted of a 788 receiver and a single i66 oscillator, with a quarter-wave vertical, 1 stub antenna. Sample reports show 84 signals at the first contact, 9000 feet, 90 miles; 85 at 8000 feet, 70 miles; 88 at 7500 feet, 60 miles; and gradually increasing signals at intervals on in, despite decreasing altitude.

Were reports good ground conditions to W1PB and W1JFC coincidently with a stationary warm front extending from New Hampshire to West Virginia. Low rain clouds covered the New York area, with a haze about 1500 feet thick above.

The superiority of the superhet over the superregen extends even into the microwave region, according to W1BBM, North Harwich, Mass. Gates has a superregen that has been adjusted to peak performance. It is good enough to operate radar-fashion, bouncing its own output from trees 100 feet away, and detecting cars passing along the street. But a 1N23 mixer, with a cavity local oscillator, working into a 258 receiver produced strong signals from a test source which could not even be heard on the superregen.

W1BBM has a pulsed transmitter on 2400 Mc., with a parabola mounted above the treestops. He will be glad to conduct tests with any interested parties. How about the microwave specialists of the Ed Ray Radio Club in Walham, Mass.? W1ARC and W1JDK are also set up for operation on 2400 Mc.

CLAIMED SCORES

V.H.F. QSO Party, June 4th-Thith

Scores are grouped by ARRL divisions and sections. These are claimed scores, in most cases as submitted. As they have not been completely checked the final standings may vary from those shown. Columns are as follows: total score, number of contacts, section multiplier, and band used. (A: 50 Mc., B: 144 Mc., C: 220 Mc., D: 420 Mc., E: 2400 Mc.)

ARLINGTON DIVISION

<table>
<thead>
<tr>
<th>Call</th>
<th>Callsign</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3KEN</td>
<td>W3CYP/3 78- 41- 19-A-B</td>
</tr>
<tr>
<td>W3QY/3</td>
<td>W3V7/3 35- 35- 15-A</td>
</tr>
<tr>
<td>W3MQU</td>
<td>W3I5L/3 35- 35- 9-A-B</td>
</tr>
<tr>
<td>W3KBA</td>
<td>W3GQP/3 26- 35- 8-B</td>
</tr>
<tr>
<td>W3LVP</td>
<td>W3OM/3 19- 35- 5-A</td>
</tr>
</tbody>
</table>

the contest coming just two weeks ahead of the Field Day, a number of club groups used it as a dry run for their v.h.f. set-ups.

The national high score was posted by W1FZ/1, who operated from a fire tower atop Blue Job Mountain, in Farmington, N. H. Handling the entire operating schedule, but assisted in packing the gear up the mountain by W1QV and Fred Perkins. Jim piled up 140 contacts on 50, 144, 220 and 420 Mc. His section multiplier of 24 gave him 3230 points, the highest score ever run up in any v.h.f. competition. Another portable station, W2QQ/2, North Caldwell, N. J., made use of 4 bands to score 2035 points.

The highest 2-meter score was turned in by W1JC, Stratford, Conn., who worked 140 stations in 14 sections on 144 Mc. Three QSOs in two sections were added on 420, for a score of 2190 points. W1RMZ shared in the operating at W1JKC, ruling out this entry as the Connecticut Section winner. Top 6-meter score was that of W1C1S, Waltham, Mass., who worked 60 stations in 19 sections for 1254 points. W1MHL/1, operated by the Waltham Amateur Radio Association, atop Mount Monadnock Mountain, Peterboro,
August 1949

COMING A.R.R.L. CONVENTIONS

August 5th-6th-7th -- Vanalla Division, Vancouver
August 26th-27th-28th – West Gulf Division, Dallas
September 3rd-4th-5th -- Maritime Division, Halifax
September 17th -- New Hampshire State, Manchester
October 7th-9th -- Hudson Division, New York City
October 8th-9th -- Midwest Division, Omaha

A.R.R.L. WEST GULF DIVISION CONVENTION

Dallas, Texas, August 27th-28th

The idea of an "unofficial" day preceding the regular sessions at the West Gulf Convention last year that the Dallas Amateur Radio Club, sponsors of this year's event, have incorporated it into their plans for the coming 19th Annual West Gulf Division Convention, to be held at the Baker Hotel, Dallas, August 27th-28th. For those who want to come early and spend the day seeing old friends. mark your calendar for August 26th. An informal night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturday night of fun and frolic is promised for 11 Friday evening to Saturda
Simplicity on 6
75 Watts Output on 50 Mc. with Two Stages and Low-Cost Components

Though many 6-meter men use the same transmitter for that band as is used on lower or higher frequencies, the simplest solution is usually a completely separate r.f. section, designed for use on this one band. The little rig shown herewith is a good example of the simple and uncluttered layout that is possible through this approach. Since it is used on no other band it is always ready to go to work at a moment's notice, and its design is so simple that only a very small investment is required to make it part of your station.

There is nothing particularly new or novel about it, except that it uses a standard circuit which has been stripped of every nonessential. The few components are arranged for accessibility and ease of duplication. Its development began when a group of amateurs in the Boston area decided to move into the higher reaches of the 6-meter band, and use that almost virgin territory for essentially local rag-chewing purposes. The original model, built by Calvin Hadlock, W1CTW, has been duplicated by several other Eastern New England W1s with good results.

Only two tubes are used: a 6AG7 crystal oscillator at 25 to 27 Mc., doubling to 50 to 54 Mc., and driving an 829B amplifier. Crystals in the 25- to 27-Mc. range have been frowned on in the past because of their instability, but nearly all crystal manufacturers are now turning out rocks for this purpose which have little or no drift. Getting up to 25 Mc. or higher avoids much of the trouble with oscillator harmonics getting into neighboring television receivers. The lowest oscillator harmonic which can cause trouble in this case is the 7th, which falls in Channel 7 when crystals below 25.7 Mc. are used; hence the "26 Mc." on the schematic diagram. Such crystals cost somewhat more than the 6- or 8-Mc. crystals more commonly employed for v.h.f. work, but the simplicity of the resulting layout more than makes up for the difference in cost.

The oscillator cathode coil is untuned. The plate coil of this stage and the grid coil of the amplifier are inductively coupled, the spacing between them being adjusted for maximum energy transfer. Arranged as shown, with the amplifier plate coil above the chassis, and all other coils below, the amplifier was stable without neutralization. Not even screen by-pass condensers were found necessary, when the new Type 829B, having built-in screen by-passing, was used. If instability does show up, external by-passing of the screen may be required.
The simplicity and clean appearance of the W1CTW rig extend to the bottom view. Resistors shown in the grid leads were removed after the photograph was made. The screen by-pass was also found unnecessary.

Provision is made for external metering of the plate and grid current to the final, through binding posts on the rear wall of the chassis. With 300 volts or less of the oscillator there is no trouble in getting the necessary 12 ma. grid current in the 829B, if the position of the plate and grid coils is properly adjusted. Up to about 100 watts input may be run to the final when it is to be modulated, or as much as 150 watts with c.w. or f.m. Still more power may be run with forced-air cooling. — E. P. T.

**HAMFEST CALENDAR**

**ILLINOIS** — August 21st, at 112th Street and Avenue B, Chicago. Annual picnic sponsored by the Hamfesters. Games, contests, fun for all planned. Food, ice cream and soft drinks will be available. Tickets, $1.00 per person. May be secured in advance from Secy. W. Roberts, W2HOF, 7021 Woodlawn Ave., Chicago; also available at the gate. A true Hamfesters picnic — nuff sed!

**IOWA** — August 7th, at East Park, Mason City. Auspices North Iowa Radio Transmitting Association. Gala program arranged. Tickets $1.00 in advance or $1.50 at the gate. Advance registrations available through Secy. John C. Schultz, NRTTA, 17 River Heights Drive, Mason City, Iowa.

**MARYLAND** — August 14th, at Triton Beach, Mayo (follow Route 50 from Washington to Route 2; from Baltimore to Annapolis go west on Route 50 to Route 2, then follow signs marked “Hamfest Picnic”), Sponsored by the Baltimore Amateur Radio Communications Society. Tickets, $1.00 per person (children 6 to 12 fifty cents), include bathing privileges and use of bath house locker, picnic table, pavilion, parking lot, ball field. Bring your own picnic basket — beer and soft drinks will be on sale. Registration starts at 9 A.M. Further details available from Chairman William E. Cooke, Jr., W3GBB, 3019, The Alamedia, Baltimore 18, Md.

**OHIO** — August 28th, at Maple Shade Picnic Ground, Columbus. Arranged by Columbus Amateur Radio Assn. Swimming, games, contests; supervised activities for the youngsters. Bring picnic lunch — refreshments free! Admission twenty cents per person at the gate. No reservations needed. One thousand hams and friends of amateur radio expected!

**PENNA.** — August 14th, at Spreading Oaks Grove, South Park. Sponsored by South Hills Brass Pounders and Modulators. Prizes, entertainment, lunches. Admission $2.00 per person. All hams, XYLs, youngsters, YLs, SWLs invited. Make reservations through Secy. Clarence J. Lauer, W3KVL, 345 S. Millvale Ave., Pittsburgh 24, Penna.

---

**WWV Schedule**

Standard-frequency transmissions are made continuously, day and night, as a public service by the National Bureau of Standards over its standard-frequency station, WWV, on the following frequencies:

<table>
<thead>
<tr>
<th>Power</th>
<th>Audio Freq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(kw.)</td>
<td>(cycles)</td>
</tr>
<tr>
<td>2.5</td>
<td>0.7</td>
</tr>
<tr>
<td>5.0</td>
<td>8.0</td>
</tr>
<tr>
<td>10.0</td>
<td>9.0</td>
</tr>
<tr>
<td>15.0</td>
<td>9.0</td>
</tr>
<tr>
<td>20.0</td>
<td>8.5</td>
</tr>
<tr>
<td>25.0</td>
<td>0.1</td>
</tr>
<tr>
<td>30.0</td>
<td>0.1</td>
</tr>
<tr>
<td>35.0</td>
<td>0.1</td>
</tr>
</tbody>
</table>

A 0.005-second pulse may be heard as a faint tick every second, except the 50th second of each minute. These pulses may be used for accurate time signals, and their one-second spacing provides an accurate time interval for physical measurements.

The audio frequencies are interrupted at precisely one minute before each hour and each five minutes thereafter (59th minute; 4 minutes past hour, 9 minutes past hour, etc.), resuming after an interval of precisely one minute. This one-minute interval is provided to give Eastern Standard Time in telegraphic code and to afford an interval for the checking of radio-frequency measurements free from the presence of the audio frequencies. Ionospheric-disturbance warnings applicable to the North Atlantic path are given at 19 and 49 minutes past each hour. If a disturbance is in progress or is anticipated within 12 hours, the time announcement is followed by 6 Ws; if conditions are quiet or normal, the time announcement is followed by 8 Ns. The announcements of the station’s services and call are given by voice at the hour and half hour.

The accuracy of all the frequencies, audio and radio, as transmitted, is now better than a part in 50,000,000. Transmission effects in the medium may result in slight fluctuations in the audio frequencies as received at a particular place; the average frequency received, however, is as accurate as that transmitted. The time interval marked by the pulse every second is accurate to 0.000001 second. The beginnings of the periods when the audio frequencies are resumed are synchronized with the basic time service of the U. S. Naval Observatory.

---

**IS YOURS ON FILE WITH YOUR QSL MGR?**

![QSL Card Illustration]
CONDUCTED BY ROD NEWKIRK, W9BRD

How:

With the W/VE slack season at hand, various quarters recommend the present time to start thumping for an increased turnout of DX stations on the lower frequencies during the better months ahead.

Under our present regulations we are not going to emphasize the potentialities of 160-meter DX work; that can come later. But greater use of 80 and 40 for DX purposes certainly presents some advantages. Whether or not conditions approach the excellence of the past few seasons, it has been widely demonstrated through a multitude of WACs and impressive country totals that these bands can not only take a lot of pressure off the 14-Mc. band but can produce results comparable to the latter.

While many of us may feel uncomfortable without a rotary to swing around, some of the signals put out by stations utilizing mere old-fashioned pieces of wire really pay off.

So we urge all DX stations where regulations permit to give the lower frequencies a whirl during these coming months. Seasonal atmospherics in some areas may not be encouraging but a good try at the bands may bring some interesting and surprising contacts.

Activity is at low ebb at this writing, as might be expected, but Jeeves uncovered the following item or two. . . .

What:

While the QRN barrage may cause others to grow faint of heart, not so W4BRB. Gene squeezed HR2HZ and reached number 61 on this band. W4BRB's total of 17 DXCC members worked during the Round-up is the reported high at this writing. He's just moved to a hand-picked QTH ala W4BPD and is rebuilding on a large scale, we hear.

There is still something being worked on forty although catches are few and far between. W4MCN fished out KD3UB (7025), CT1HT (7050), FKSAB (7045) and KV4AA (7010), getting his DX start at the tender age of 15.

The Grants Pass boys in Oregon are in there pitching with some spirited rivalry. WTMQO dug up UABRO (7005), WCCH/KBO (7010), K6AF (7000) and W4DJ (7006) while WTMQY added JA2RO (7035) . . . . W6YJP's list is headed by UASFJ (7035) and he desires to compliment KH6VP/YR4 on his snappy QSL service . . . . W2WFP has regular chats with ZL3ACV that indicate good conditions but an absence of activity on the part of the more juicy specimens.

The QRO specialists can see little sense in hunting big game with a bow and arrow and the QRP enthusiasts consider it poor sport to go deep-sea fishing with a depth charge. We're neutral, of course. But KH6VP is getting a large charge out of running 10 watts to a longwire on twenty for a total of well over 80 countries. These include such

*DX Editor, QST. Please mail reports of DX activity to W9BRD's home QTH: 1517 Fargo Ave., Chicago 26, Ill.
hans the new beam was responsible. ... The tremendous signal being poured out by TA8KFD that is liable to pop through at any hour of the day or night has W80IC and others talking to themselves. Must be lots of room for coincidences up there. ... W3JUP (ex-W8FPY) returned to 20-phone after a lapse of some years and is just getting used to the stepped-up competition of postwar DXing. He started off right with a 3-hour-plus WAC and a sample of his success includes W7LI/J/C5, FARBG, VK48J/VX1, KP6AA, HL1B, MD2AC, BK1MD, W22EW/PK6, OQ5s, BW, CP and DB, QN5BA, E793D and V590AV. ... W20URX adds all catches MF2AA, YS1MS, ZC6UN, KG4AB and OX3BF; and W6UCX notes that VP8AK is making with the w.s. on 14,150 kc. these days and hears that VP2AM shut down temporarily because of a petrol shortage.

Ten activity is at its usual summer low but something pops through now and then to reward the keepers of the patient vigil. Phone work at W4LZM has entered VQ5PBD, VP5AS, KG4AD, YR5AC, EA4WJI and PJ3KO into the log. ... Tulsa W5s MGK, OOC, OPQ and LPB happily found themselves in contact with PK4DA one evening and in need of cards may obtain same by submitting full QSO particulars to this address: C. A. Wiot, W9TDF, 470 Hennessy Rd., Hong Kong.

Where:

It has come to the notice of W1VG that all logs for amateur radio operation of the recent Gatti-Hallcrafters African Expedition now rest in the hands of W9TDF. Those still in need of cards may obtain same by submitting full QSO particulars to this address: C. A. Wiot, W9TDF, 470 Hennessy Rd., Hong Kong.

KB2X (via ARRL)

A quorum of the Swiss DXCC membership met while attending the 1949 USKA convention at Friggiorn. We have, left to right: HB9s CN, J., RX and FE. Two other HB9 Club members, CE and DO, were unable to attend.

News of the new beam was responsible. ... The tremendous signal being poured out by TA8KFD that is liable to pop through at any hour of the day or night has W80IC and others talking to themselves. Must be lots of room for coincidences up there. ... W3JUP (ex-W8FPY) returned to 20-phone after a lapse of some years and is just getting used to the stepped-up competition of postwar DXing. He started off right with a 3-hour-plus WAC and a sample of his success includes W7LI/J/C5, FARBG, VK48J/VX1, KP6AA, HL1B, MD2AC, BK1MD, W22EW/PK6, OQ5s, BW, CP and DB, QN5BA, E793D and V590AV. ... W20URX adds all catches MF2AA, YS1MS, ZC6UN, KG4AB and OX3BF; and W6UCX notes that VP8AK is making with the w.s. on 14,150 kc. these days and hears that VP2AM shut down temporarily because of a petrol shortage.

Ten activity is at its usual summer low but something pops through now and then to reward the keepers of the patient vigil. Phone work at W4LZM has entered VQ5PBD, VP5AS, KG4AD, YR5AC, EA4WJI and PJ3KO into the log. ... Tulsa W5s MGK, OOC, OPQ and LPB happily found themselves in contact with PK4DA one evening and in need of cards may obtain same by submitting full QSO particulars to this address: C. A. Wiot, W9TDF, 470 Hennessy Rd., Hong Kong.

Where:

It has come to the notice of W1VG that all logs for amateur radio operation of the recent Gatti-Hallcrafters African Expedition now rest in the hands of W9TDF. Those still in need of cards may obtain same by submitting full QSO particulars to this address: C. A. Wiot, W9TDF, 470 Hennessy Rd., Hong Kong.

KB2X (via ARRL)

A quorum of the Swiss DXCC membership met while attending the 1949 USKA convention at Friggiorn. We have, left to right: HB9s CN, J., RX and FE. Two other HB9 Club members, CE and DO, were unable to attend.

News of the new beam was responsible. ... The tremendous signal being poured out by TA8KFD that is liable to pop through at any hour of the day or night has W80IC and others talking to themselves. Must be lots of room for coincidences up there. ... W3JUP (ex-W8FPY) returned to 20-phone after a lapse of some years and is just getting used to the stepped-up competition of postwar DXing. He started off right with a 3-hour-plus WAC and a sample of his success includes W7LI/J/C5, FARBG, VK48J/VX1, KP6AA, HL1B, MD2AC, BK1MD, W22EW/PK6, OQ5s, BW, CP and DB, QN5BA, E793D and V590AV. ... W20URX adds all catches MF2AA, YS1MS, ZC6UN, KG4AB and OX3BF; and W6UCX notes that VP8AK is making with the w.s. on 14,150 kc. these days and hears that VP2AM shut down temporarily because of a petrol shortage.

Ten activity is at its usual summer low but something pops through now and then to reward the keepers of the patient vigil. Phone work at W4LZM has entered VQ5PBD, VP5AS, KG4AD, YR5AC, EA4WJI and PJ3KO into the log. ... Tulsa W5s MGK, OOC, OPQ and LPB happily found themselves in contact with PK4DA one evening and in need of cards may obtain same by submitting full QSO particulars to this address: C. A. Wiot, W9TDF, 470 Hennessy Rd., Hong Kong.

Where:

It has come to the notice of W1VG that all logs for amateur radio operation of the recent Gatti-Hallcrafters African Expedition now rest in the hands of W9TDF. Those still in need of cards may obtain same by submitting full QSO particulars to this address: C. A. Wiot, W9TDF, 470 Hennessy Rd., Hong Kong.

KB2X (via ARRL)
Contacts with Dr. Radnai's Hungarian station, HA1SA, have been valued additions to a multitude of logs throughout the world. He will also be well remembered as HA1EA.

Radio effects necessitated a new start from scratch. G44Z got a hang from the DXCC Round-up and reveals that feminine QRM has temporarily shoved DX matters into the back seat so far as he is concerned. Frank's last all-out effort gained him 2nd high G in the 'phone section of the '45 ARRL Test and he has some 160 countries safely logged. JA2BQ states that JA2EG will head home before very long after helping to sparkplug the ham game over there in grand fashion for some time. JA2EG, incidentally, could be heard pounding away on 20 during the Round-up. We know that all continents were actively represented in the affair but as yet there are no reports of anyone snagging a DXCC WAC.

To pip a bunch of queries in the butt, EQ4 stations are both ZC6s and 4X4s active within the new nation. This is probably mainly because there are both ZC6s and 4X4s active within the new nation. So far as the list is concerned, was formerly the single country of Palestine has now become two, Israel and Palestine. Contacts with stations within the boundaries of what is now Israel which occurred prior to March 14th, 1948, qualify as credit for Palestine. For Palestine credit after that date, contacts must have been made with stations outside Israel borders: ZC6PM, who functioned from Nablus, is one example. The FEARL News continues its high-quality output. A peek at the DX box score shows the country parade being lead by JAs 2EG, 3AA, 2AZ and 2AS with totals of 155, 131, 105 and 101 worked respectively. JA2AS, by the way, is leaving for the Uncle Sugar side and this will establish JA2BG (formerly J2POYJ as the longest-serving QSL bureau. Don't fail to mention this!

D. C. Len is also in charge of chores pertaining to the wall adornments of ZP3AW, ZP2BL, HC1AW and YV4AW. You'll know W3GRF better, perhaps, as former W4KXN. For the attention of former operators of ZC6 stations: 4X4BX of the IARC (Israel) QSL Bureau has over 300 QSL cards on file for a total of 75 ZC6 calls. You could do many fellows a good turn by claiming your stacks by mail from wherever you may be and answering same. The QTH is P.O. Box 4099, Tel-Aviv, Israel. The third highest 'phone DX Contest score reported on page 46 of June QST was credited in error to W8HRV. The 214,830 points, 494 contacts and 167 multiplier (resulting from 76 different countries worked) were actually chalked up by Phil Smith, W8HUD. We hasten to give credit where credit is due and offer our apologies for the mix-up.

It won't work for long but I may let you get in that now rare one without too much bloodshed. We mean that new expedient going the rounds in TVI circles whereby one goes on the air with the speech: "Due to circumstances beyond our control this program may be interrupted from time to time."

QSL Manager

(Continued from page 10)

A close-up shot of the oscillator compartment of By Goodman's newly-completed de luxe VFO-exciter, a unit delivering 20 watts on five bands and featuring chip-free keying plus break-in. Having survived the severest of checks in the ARRL Lab, the exciter has lost none of its magic in on-the-air tests at W1DX. We'll bring you full info in our next issue.

Also in September QST:

* A high-power transmitter for 6 and 2 using p.p. 4-65A tetrodes, built and described by Vern Chambers, W1JEQ.

* A complete report on ARRL's representation of the amateur at the Fourth Inter-American Radio Conference just concluded in Washington.

* Highlights and official scores of the c.w. section of the 15th ARRL DX Competition.

44 QST for
SHIELDED HOOK-UP WIRING

In April QST it was suggested that the use of shielded hook-up wire for all d.c. and a.c. leads inside the transmitter chassis was thought to have possibilities in reducing the amplitude of harmonics fed to external power wires. Subsequent tests on several transmitters have shown that while shielded wiring is not a cure-all, it does definitely simplify the problem of keeping harmonics from flowing on to external leads where they can be radiated. So much so that we feel justified in recommending it without qualification in every case where lead radiation is a factor.

In one case, a transmitter unit that has served as a TVI guinea pig over the past two years was completely rewired, insofar as the d.c. and a.c. leads were concerned, with shielded hook-up wire of the ordinary variety. With the non-shielded wiring previously used, elimination of harmonics from leads to the point where they were negligible on a receiver sitting alongside the transmitter had taken a lot of tedious work, involving exploring for hot spots inside the chassis and resulting in the installation of a considerable number of by-pass condensers and chokes. When the shielded wiring was installed, an initial test with no other filtering at all showed a marked reduction in the harmonic currents on external leads, and it was necessary to install only two v.h.f. chokes in the entire set to bring the performance back to where it had been with the rather elaborate filtering used before. Since then a number of other units have been converted to shielded wiring, with the result that in all cases the initial lead currents were small compared with previous experience in similar transmitters, and that the currents were rather easily reduced by comparatively simple filtering.

One feature of shielded wiring is that shielded hook-up wire tends to act as a lossy transmission line at v.h.f. and so introduces considerable attenuation in addition to the plain by-passing effect. Both the by-passing and loss depend on the length of the shielded lead, so it is advantageous to make the leads fairly long. Transmission-line resonance effects should be avoided, however, since under the right conditions it is conceivable that the harmonic strength would be increased, rather than decreased, at the output terminals if a current or voltage loop occurred at those terminals. Unfortunately, we have no data on the velocity factor of hook-up wire, but since the insulation is rubber it is probably in the vicinity of 0.6. Lead lengths that would be a multiple of an electrical quarter wavelength at the harmonic or harmonics of most interest in your locality should be avoided.

Probably of more importance than the attenuation in the wire is the fact that the shield prevents coupling between leads. Such coupling introduces a large factor of confusion in attempts at filtering unshielded leads, since a filter in one lead is not a filter for that lead alone but is an attempt to compensate for things happening in several leads at once. Multiply this by the number of leads and you have a real job in arriving at a satisfactory compromise. With shielded wiring it is fairly certain that if a filter in one lead affects the harmonic current in another one of two things is happening: the current in the affected lead is getting there because there is coupling between the leads outside the transmitter, or the harmonic is traveling over the chassis from the r.f. circuits to the leads. The latter indicates the need for simple shielding around the r.f. circuits, as pointed out previously; such shielding will save wasting a lot of time trying this and that filter combination to no good purpose. If the coupling is between the external leads themselves — or through the power supply to which they are connected — the harmonic currents in all leads will drop as soon as the real offender is discovered.

Using unshielded leads external to the chassis is probably a good idea for preliminary work, because it shows where harmonic filters will pay off best inside the set. However, when the transmitter has been worked over to the point where it seems satisfactory it is highly desirable that all leads, external as well as internal, be of the shielded type. Shielding throughout makes assurance doubly sure. Individual shielded wires are preferable to bunching unprotected wires together and running them through a common shield, because it prevents coupling between wires.

In using shielded wiring the shield braid at the ends where connections have to be made should be pared back for the minimum length — that is, keep the shielding as complete as possible. The ends of the shielding should be connected directly to the chassis, and it is also advisable to bond the shielding to the chassis at every convenient point along the length of the lead. Leads that run side by side or cross over each other should also have their shields bonded. When leads come to an outlet for external connections, the inner wires should be by-passed to the chassis with the shortest possible leads. This by-passing will help to destroy resonances in the wiring and also will help to short-circuit any harmonics that are slipping through. The by-pass condensers should not be too large, either physically or in capacitance. Postage-stamp micas of about 500 µµfd. capacitance are good, especially if they can be.

(Continued on page 80)
Military Amateur Radio System

N o vacation for us" — that's the lament of subcommittee members of the MARS Advisory Committee as they buckle down to the chore of preparing reports for the next full committee meeting, tentatively scheduled for late summer.

Sweltering in humid Washington is the four-man all-military subcommittee, working on a draft of the organization, by-laws and operating procedures of the MARS Advisory Committee. Subcommittee members are Lt. Col. S. C. Sheets, Air Force, W4LEK, Lt. Col. Stephen S. Cerwin, Sig P&O, W4ITY, Maj. Rawleigh H. Ralls, chief, MARS-Air Force, W4RB, and Capt. E. L. Nielsen, chief, MARS-Army, W4LDI. (Civilian members of the full advisory committee specifically asked for an all-military committee because the MARS is a military program.)

Preparing an analysis of the relationship between the proposed extension of MARS and existing amateur organizations are Maj. Ralls and F. E. Handy, communications manager of ARRL.

The Advisory Committee, meeting in May, agreed upon definitions of the terms "disaster" and "emergency" for the purposes of the MARS program. "Disaster" is defined as a localized calamity such as fire, storm or flood. "Emergency" is defined as a nationwide calamity such as a war in which this nation is involved or a nationwide signal communications strike.

The committee also agreed that the terms "disaster" and "emergency" will be applicable only in the event of a signal communications emergency, as it is possible to have a disaster, calamity or catastrophe without having a signal communications emergency, and it is also possible to have a signal communications emergency without having a disaster.

MARS Certificate Presentation

MARS membership certificates were presented to 25 amateur operators in the Greater New York area in an impressive ceremony at the 7th Regiment Armory in New York City in June.

Major executives in the communications field attended the presentations which were made at the regular monthly meeting of the Armed Forces Communications Association. Top executives present included Maj. General Harry C. Ingles, former chief signal officer, now president of RCA, Brig. General Carrol Bickelhaupt, vice-president and secretary of AT&T, Brig. General A. W. Marriner, IT&T, Brig. General S. W. Sherrell, executive vice-president, AFCA, Col. Thomas H. Mitchell, executive vice-president, RCA, and George W. Bailey, president of ARRL and executive secretary of IRE.

The certificates license MARS members to operate as military amateur radio stations under Army calls assigned by the Chief Signal Officer, U.S. Army. In addition to creating interest and furthering training in military radio communications, MARS coordinates existing amateur radio practices with those of military radio communication, forming a pool of trained personnel in the event of any emergency.

Single Sideband for the Average Ham

A Straightforward One-Band Exciter

BY WILLIAM M. RUST,* W2UNJ

Many excellent articles have been published on the theory and construction of single-sideband transmitting equipment utilizing the latest in circuit refinement and flexibility. Amateurs of adventurous nature, willing to plunge deeply into this new field of amateur activity, are well supplied with information. This article will describe an exciter, built mostly of junk-box parts, that is suitable for the average ham who might like to try single sideband with a minimum of cost and effort.

The exciter to be described is small and compact; five inches wide, ten inches deep behind the panel, and seven inches high overall. No special or close tolerance components are used, with the exception of six condensers and six resistors that are carefully chosen from a stock of standard units.

The exciter requires r.f. driving power from the present exciter, audio power from the present speech amplifier, and a power supply. It will deliver single-sideband output in the 3.9-Mc. 'phone band, either to an antenna for local work or to an r.f. amplifier that is adjusted for linear operation. The operating frequency can be varied over a wide range without seriously impairing the adjustment. Provision is made for transmitting either the upper or the lower sideband.

The Circuit

The circuit uses the phasing method of single-sideband generation and is basically the same as that used and described by W6DHG. It is shown in block diagram in Fig. 1.

An r.f. source is fed into two phase-shifting networks. One network has an output voltage that leads the input voltage by 45 degrees, and the other has an output voltage that lags the input voltage by 45 degrees. Therefore, there is a 90-degree phase difference between the output voltages of the two networks. Each of these r.f. voltages is used to drive a pair of balanced modulators. Each pair of balanced modulators balances out the excitation frequency, so that no carrier appears in the output of either pair of balanced modulators.

The audio source is fed into a Dome-type phase-shifting network. This network requires push-pull input voltage, and delivers two output voltages, differing in phase by 90 degrees. These two voltages are used to drive separate Class A amplifiers that serve the dual purpose of amplification and isolation of the network from the audio load (the balanced modulators). Each pair of balanced modulators, when supplied with audio from its amplifier, produces two sidebands in its output, but when the outputs of both pairs of balanced modulators are combined, one sideband is canceled out and the resultant output is single sideband.

Fig. 1—A block diagram of the essential parts of the single-sideband exciter.

A small single-sideband exciter that can be used with practically any 75-meter 'phone rig. Receiving tubes are used throughout.

* 37 Grant Street, Cortland, N. Y.
The complete schematic of the exciter is shown in Fig. 2. Four 6V6 tubes are used as balanced modulators. The plate circuit of the balanced modulators uses a push-pull-parallel arrangement. The grids of one pair of balanced modulators are fed through a phase-shift network consisting of a 300-ohm resistor and an inductance that is adjustable to 300 ohms reactance at the operating frequency. The grids of the second pair of balanced modulators are fed through a phase-shift network consisting of a 300-ohm resistor and a condenser which is adjustable to 300 ohms reactance at the operating frequency. The input impedance of the two phase-shift networks in parallel is 300 ohms. A grid-leak resistor, suitably bypassed, provides bias for each pair of balanced modulators.

The screen of each balanced-modulator tube is bypassed to ground for r.f. Screen modulation is used, and therefore each screen-dropping resistor is bypassed for audio. Two of the resistors are variable to allow balancing of the modulators.

A tapped audio inductance is used in the output of each audio amplifier, to provide push-pull modulating voltages from the single-ended amplifiers. A voltage divider is inserted between each output of the audio phase-shift network and the corresponding amplifier grid. One of these voltage dividers is made variable to provide for balancing of the two audio channels. The network constants are compensated for the load of these voltage dividers.

**The Audio Phase-Shift Network**

In the construction of phasing-type single-sideband equipment, the biggest stumbling block seems to be the audio phase-shift network. Rumor has it that audio phase-shift networks are difficult to construct because they require odd values of resistance and capacitance, made to very close tolerances. However, advantage can be taken of the fact that resistors and condensers in junk boxes and in stock at local dealers do vary considerably from their nominal values.

---

**Fig. 2** — Circuit diagram of the single-sideband exciter.

- $C_1 - C_6$ — See Table I.
- $C_7 - 150$-µfd. air padder condenser.
- $C_8 - 100$-µfd. per-section dual variable.
- $C_9 - C_{13}$, $C_{16}$, $C_{20}$ — 0.001 µfd. 500-volt mica.
- $C_4 - C_{17}$ — 0.01 µfd. 500-volt ceramic or paper.
- $C_{18} - 10$-µfd. 500-volt electrolytic.
- $R_7 - R_9$ — See Table I.
- $R_1 - R_{10}$ — Eight or more one-watt resistors of equal value, paralleled to give 300 ohms.
- $R_0$, $R_{10}$ — 20,000-ohm potentiometers.
- $R_{11}$ — 0.5-megohm potentiometer.
- $R_{12}$, $R_{13}$ — 22,000 ohms, 1 watt.

**R.F. INPUT**

- $R_{14}$, $R_{16}$ — 33,000 ohms, 1 watt.
- $R_{15}$, $R_{17}$ — 10,000 ohms, 1 watt.
- $R_{18} - 300$ ohms, 2 watts.
- $R_{20} - 0.5$ megohm, 1 watt.
- $R_{21} - 0.75$ megohm, 1 watt.
- $R_{22} - 0.25$ megohm, 1 watt.
- $L_1$ — See text.
- $L_2$ — Low-power 80-meter coil (Bud OCL-80 with base removed).
- $L_3$, $L_4$ — Midget push-pull output to voice coil transformer (voice-coil winding not used).
- $S_1$ — S.p.d.t. switch.

---

48 QST for
Table I is used in selecting the network components. The procedure is to collect as many resistors and condensers as possible with nominal values as indicated in the second column of the chart. Measure all of the condensers first, and select the six condensers whose measured values are closest to the "target values" in the third column. Enter the measured values of these condensers in the fourth column of the chart. Then calculate the "target values" for the resistors and select the six resistors whose measured values are closest to these target values.

A capacity bridge, of the type used by servicemen, and a good ohmmeter should give sufficient accuracy in selecting the network components. Absolute accuracy is not important, if the components are all in correct proportion to each other. A difference in percentage error between the resistance measurements and the capacitance measurements will merely shift the operating range of the network.

The network components are mounted on a small sheet of insulating material to facilitate wiring. If the network components have been carefully chosen and assembled, no test of the network should be necessary.

Perhaps some local amateur supply houses can be persuaded to furnish the stock of resistors and condensers, and the measuring equipment, as a service to amateur customers.

The R.F. Phasing Inductance

The only other "tricky" component of the exciter is the r.f. phasing inductance, \( L_1 \). This inductance is wound on a slug-tuned form salvaged from an i.f. transformer. The form is about three-eighths of an inch in diameter and one and five-eighths inches long. The winding is forty turns of No. 30 d.c.c. wire, close-wound. Since duplication of this inductance might be difficult, it is recommended that the constructor use a slug-tuned form and wire from his own junk box, and wind a coil that will resonate at 3.9 Mc. at the center of the slug-tuning range, with a variable condenser set at about 155 \( \mu \)fd. Resonance can be checked by using the coil and condenser as a wavetrap connected in series with the antenna on the station receiver.

Construction

The exciter is assembled on a 5 \( \times \) 10 \( \times \) 3-inch chassis. The plate tank tuning condenser is mounted on top of the chassis, front and center, with two of the 6V6 modulator tubes on each side. The plate tank coil is mounted on top of the condenser. Plate leads from the four 6V6s are brought directly to the tuning condenser through four \( \frac{3}{4} \)-inch holes drilled through the chassis near each tube-socket plate connection. The 6V6 screen grids are by-passed to ground directly at the sockets. \( R_9 \), \( L_1 \), \( C_7 \) and \( R_{10} \) (all
adjustable components) are mounted in a row directly behind the 6V6s. The two 6K6 amplifiers are mounted at the rear of the chassis, one on each side, with R11 and S1 between them. The audio phase-shift network is mounted inside the chassis at the rear. Crystal sockets are used for r.f. input and output connections. A cable is brought out at the rear of the chassis for audio and power connections. Layout, construction and wiring are all conventional. The 5 × 7-inch front panel is optional.

Associated Equipment

The r.f. input impedance of the exciter is 300 ohms, but a link line of lower characteristic impedance will operate satisfactorily for the short distance usually required. A means for adjusting the r.f. driving power is desirable. A surplus Command set transmitter (BC-696 or T-19/ARC-5), operating at low plate voltages, makes an ideal r.f. source, but any VFO or crystal oscillator with a few watts output will do.

In most stations, the handiest source of push-pull audio for the exciter will be the secondary of the modulator driver transformer. A single triode-connected 6F6 output tube in the speech amplifier will provide sufficient audio. The modulator tubes should be removed from their sockets, and the center tap of the driver-transformer secondary should be grounded, after removing the bias connection. An alternative method is to use blocking condensers in the audio leads to the single-sideband exciter to isolate the modulator bias from the audio phase-shift network in the exciter. If some other source of push-pull audio is used, it should have low internal impedance (Class A triodes, or beam tubes with negative voltages feed-back).

The exciter may be coupled directly to an antenna for use as a low-power transmitter, but most amateurs will wish to use it to drive a buffer or final amplifier. All stages following the exciter must be operated under Class A, AB, or B conditions. In general, the correct operating conditions for stages following the exciter may be found by referring to the audio operating conditions for the tube under consideration. Grid-bias and screen voltages should have very good regulation. For amateur voice operation, tubes may be operated considerably beyond the ratings given in the tube manuals, but such operation is beyond the scope of this article. When the r.f. amplifier is operated Class AB or Class B, the grid tank circuit should be shunted by a resistor in order to provide better regulation of the exciting voltage. The value of this resistor is not critical and may be determined by experiment.

Operating Conditions

The operating conditions for the exciter are determined by the required output. If the required output is low, it is better to run the exciter with low plate voltages. This will reduce the amount of residual carrier present in the output in relation to the sideband output. Also, the exciter will be more stable and maintain adjustment longer with lower plate voltages.

A pair of 807s operating Class AB can be driven by the exciter with only 60 ma. (at 120 volts) input to the balanced modulators, and with the exciter amplifiers also operating at 120 volts. Part of the output of the exciter is, of course, dissipated in the load resistor across the grid tank circuit of the 807s. The balanced modulators require sufficient r.f. drive to develop 12 volts of grid bias under these operating conditions.

Lack of well-regulated adjustable plate-voltage supplies prevented a complete test of the capabilities of the exciter. However, one set of data was taken with the plate supplies available: modulator plate input, 285 volts at 80 ma.; amplifier input, 185 volts at 50 ma.; modulator grid bias, 30 volts; audio input, 19 volts from each input terminal to ground; power output, approximately 7.5 watts.

The power input to the modulator plates should not exceed 30 watts with no audio input. The input to the modulators may be varied by adjusting the voltage used on the amplifiers and modulator screens.

(Continued on page 88)
BEAMS CAN BE STRONG

When the average ham constructs a rotary beam he is confronted by problems of mechanical strength not usually found in his other equipment. A beam is an extended, self-supporting structure. For electrical reasons it is placed in as open an area as possible where it is exposed to the same wind stresses as the rigging of a ship.

If the beam is to withstand these stresses it must have good mechanical design — a property not always apparent to an inexperienced eye. The following paragraphs deal with two points of weakness found in many beams and — as a solution — show well-designed components which any ham can make with hand tools.

![Fig. 1 — Details of a rugged sliding joint for beam elements.](image)

One of the most common and best materials for the elements is 24ST dural tubing. For 28-Mc. beams, two sizes are needed — 5/8 inch and 5/8 inch o.d. While these sizes are used in the illustrations, the methods shown are adaptable to any sizes.

The first point of weakness is the sliding joint. At two points on each element the 5/8-inch tubing telescopes into the 3/4-inch. With average tubing considerable play will be found. This play must be entirely eliminated.

A tapered object (e.g., the ferrule of a small wood chisel) is driven into the end of the 5/8-inch tubing. The end is thus flared as shown in Fig. 1, until it is just too large to enter the 3/4-inch size. It is then carefully dressed with a fine file until a smooth sliding fit is obtained. This is a nice velvety "feel" that can be found on any trombone.

The next step is to prepare the ends of the larger tubing. Small holes, about 5/16 inch, should be drilled on either side of the tubing 2 1/2 inches from the end. Saw cuts, as shown in Fig. 1, can then be made with a hack saw to permit compression. Each cut should be gone over a second time with two blades in the saw. This gives a slot sufficiently wide for adequate compression. The smaller tubing with its flared end is now slid into place within the 3/4-inch piece. A good grade of hose clamp is tightened on. This compresses the outer tubing from all sides so that it grips the entire circumference of the 3/4-inch tubing. The combined effects of the flared and fitted inner end of the 3/4-inch tubing, plus the properly-compressed end of the 3/4-inch tubing, yield a truly rigid joint. In fact, in a test, only three inches of the smaller tubing was inserted and clamped; yet it supported a full 12-foot length without a trace of play.

The second point of weakness is the mounting clamp for attaching elements to insulators. These are of course not used on a "plumber's delight" beam, but when dural tubing is used, crosspieces with insulators are usually necessary. The mounting clamps look so simple that little attention is given to them. Unless well designed and carefully made, however, these little accessory items will loosen. Once this happens, and the elements slap about a bit in a 40-mile wind, literally anything can happen.

Fig. 2 illustrates an efficient clamp. Heavy-gauge dural sheet is a suitable material. It should be cut into 4 x 3/4-inch strips. Half an inch at the end of each strip is turned up at right angles, and is drilled for the mounting screw. This end (S) of the strip should be clamped in the vise with a backing plate of rigid steel as shown in Fig. 3A.

The secret of metal forming is the use of the proper die. The "die" in this case is a piece of pipe whose diameter is about 1/16 inch less than that of the material to be clamped. Since this clamp is to be used on 3/4-inch o.d. beam elements, the forming "die" should be about 1/16 inch in diameter. A short piece of 3/4-inch thin-wall conduit is just right. Place it atop the work and against the backing plate as shown in Fig. 3A. End F of the strip is bent up as shown by the dotted lines. Judicious hammering at the points indicated by arrows will give the right contour to the work. When the strip has been bent round as far as possible, the vise should be opened and the forming pipe clamped in a horizontal position with an end projecting to the side of the vise, as shown in Fig. 3B. Upon this end of the forming pipe the bending is completed with a pair of slip-
joint pliers. When the two ends meet, the edges should be made to coincide to correct any skew, and the excess on end $F$ should be trimmed off.

The clamp is now completely formed. Slide it off the "die," pry open slightly, and insert a short piece of $\frac{3}{8}$-inch o.d. tubing. The extreme corners of ends $S$ and $F$ are caught in the vise. The hole previously drilled in end $S$ is continued through end $F$. The clamp is now finished.

When used to mount an element, the mounting screw will bring end $S$ down to a perfect seat upon end $F$ without deforming the clamp; moreover, the element will be held in a vise-like grip. — T. H. Mackintosh, W4MGG

ANTENNA SWITCH FROM THE BC-375-E

Anyone who is working on construction of the Surplus-Parts Bandswitching Transmitter will be interested in another BC-375 component that can be put to use. This part — a 2-pole 5-circuit switch — has sufficient spacing between wafers and between individual contacts to be ideal for switching open-wire feed lines. At W1JEQ we use the switch to transfer the feed line to any one of five different antenna tuners.

The switch was taken from a BC-306-A tuning unit. It is listed in the BC-375 instruction book as part No. 1501 and the drawing is No. ML-7403075-G1. — C. Vernon Chambers, W1JEQ

SIMPLE NEGATIVE-PEAK OVERMODULATION INDICATOR

Here is a negative-peak overmodulation indicator suited to the needs of the laziest 'phone man. This little gimmick is so easy to install on the average 'phone rig that it is well worth the effort just to know that you are not filling the band with buckshot and monkey-chatter caused by overmodulation.

As shown in Fig. 4, the basic components required are a 1B3-GT/8016 half-wave high-vacuum rectifier and a NE-51 neon bulb. The rectifier has a filament that can be heated from almost any source, provided that about 200 ma. is available. In this unit it is heated by placing it in series with the high-voltage lead to the Class C stage, shunted by a small resistance. The value of $R$, somewhere in the neighborhood of 50 ohms, may be selected by measuring the voltage across the rectifier filament $ab$ with the transmitter operating at normal load. Careful! The filament is at the full plate voltage used in the transmitter! Assuming that you run at least 180 ma. plate current to your final, the value of $R$ should be adjusted until the drop across the rectifier filament is about 1.2 volts d.c.

The filament of the 1B3-GT/8016 has an appreciable thermal lag, so it will not be damaged by momentary overloads, but a good, fast-acting overload relay should be used to take power off the rig in the event of a flash-over or short in the Class C stage. Resistor $R$ also serves to insure a continuous load for the modulator stage even if the rectifier filament does burn out. The wattage rating of the resistor used should be large enough to handle a considerable overload. If you don't have at least 180 ma. available, the gadget won't work, because you won't be able to heat the filament.

A small positive bias is placed on the neon tube (Continued on page 80)
During my sojourn in the Antarctic it was with great pleasure that I was able to work amateur stations in the U.S.A. That, in itself, is not a very extraordinary accomplishment. What made it so pleasing was the courtesy, keenness and assistance given by your fellow countrymen to me "way down south."

Unfortunately I cannot give much detail of results because of the Secret Act (The Tower of London looms ahead). What I do want to record is the way in which these contacts have been made. The "rig" available was capable of 30 watts maximum output, with crystal control. But I had no suitable crystal and utilized an m.o. circuit that left much to be desired. The output seldom exceeded 20 watts. The note was terrible; as one wit remarked, "like keyed QRN," and the frequency drift was anything up to 20 kc. Of course, to be strictly correct, I should not have had no suitable crystal and utilized an m.o. circuit that had burned through the tin can and ignited the paint. Perhaps heating before actual puncture of the can had vaporized volatile contents and formed an explosive gas inside.

I judged from literature inside the car that it was a commercial vehicle operated by some oil-prospecting company or similar outfit. The rear of the car was badly burned and the back seat was burned out completely. The chemical streams had streaked the remainder of the car, and it was obviously in for an expensive body-repair job, although being in a town the fire department had saved the car from total loss.

These comments are passed on, for what they are worth, to those hams who install mobile transmitters with exposed terminals capable of furnishing currents of 300 amperes or so when shorted to the frame of the car.

A. D. Mayo, W6DF

MOBILE HAZARDS

1914 West Capitol St., Jackson, Miss.

Editor, QST:

Some time ago, my attention was drawn to flames pouring out of the rear of a small automobile, accompanied by large amounts of black smoke which obscured the details. In due time the local fire department extinguished the flames by the use of chemical fire extinguishers, which were played on the inside of the car through the rear windows.

The car was apparently a new Ford 1949 model tudor with transmitting-type aerial on the rear. When the rear door to the trunk compartment was opened and the contents inspected, it was apparent that the cause of the fire was ignition and burning of the contents of a 1-gallon can of paint, although the local firemen stated that they could not figure out what started the fire. Inasmuch as the can of paint was removed from a position between a small commercial mobile transmitter and the wall of the compartment, and the can had been resting against a large exposed terminal for the 6-volt supply line, which appeared to be about 3/4-in. diameter copper, and further that there was a hole about 1-in. diameter burned in the side of the paint can at the point where it rested on this terminal, it was obvious to me that the heavy current obtainable from this 6-volt line had burned through the tin can and ignited the paint. Perhaps heating before actual puncture of the can had vaporized volatile contents and formed an explosive gas inside.

I have occasionally read and heard gripes about QST advertising policy. May I say that I too have wondered about the absence of certain advertisers in QST? However, I now wonder whether your policies may not be directed to greater protection of the ham than he realizes.

To date, I have never had any difficulties whatsoever in dealing with your advertisers. This is more than I can say about my experiences with orders to companies that have ads in all the usual ham journals excepting yours. The fact that I have never been "taken" by a QST ad may be pure coincidence, but I should like to think that it is the result of your advertising standards and policies. My last escapade has been with the --- Radio Company of ---, ---, ---. The only results I have to show for an initial prepaid order, two follow-ups, and a registered letter requesting refund had been delivered into their hands on April 13, 1949.

It might be well to inform other ARRL members and QST readers of this situation, particularly if your policies have been working to their benefit without their being aware of it.

Dr. R. G. Minarik, W9GJY

PHILATELY & HAM RADIO

329 Cascade No., Fergus Falls, Minn.

Editor, QST:

For some thirteen years now I have been an active ham. For about an equal number of years I've been a stamp collector of sorts. The philately slumped for several years

(Continued on page 98)
Wanted . . . an Asst. Communications Manager-Phone. Since the inauguration by ARRL in 1933 of the field-organization appointments of Official 'Phone Station, and 'Phone Activities Manager with functional responsibilities of organizing activities for OPS and voice operators at section level, there has been a steady growth in interest in these appointments. Our recent annual report, for example, indicated an 8.9% growth in the number of OPSs over the past year. Voice work has assumed increasing popularity in the amateur ranks. The Board of Directors in annual session has now authorized the special recognition to be accorded by appointment of a new Assistant Communications Manager-Phone Activities on the Headquarters staff.

The new ACM-Phone will have among other duties the function of reviewing all operating and communications programs of the League in order to promote the interests and activities of those stations using voice. He will study and recommend appropriate procedures to assist voice work, and will welcome your ideas on special programs which will be initiated on request. FCC (Sec. 12.106) authorizes such transmissions addressed to amateurs or persons learning. Can you suggest a . . . schedule for the 28--29.7 Mc. band? Please?

Amateur operation of other types on other bands.

CD Policy. This month seems appropriate to restate a long-standing policy of your ARRL Communications Department. It is simply that we attempt to represent and serve every amateur and member along the lines of his natural interest in amateur radio. Inviting as large a general-membership participation as possible, we have a wide range of activities. These take in everything from frequency measuring to CD Parties for all CD appointees, and range from v.h.f. contests on the one hand to DX contests on the other. Awards cover numerous fields. All kinds of station and leadership appointments, with the bulletins conveying unity to group efforts, are available to qualified and interested members through the elected SCMs (see address of your SCM on page 6). Details of all awards and appointments and Emergency Corps information appear in the booklet Operating an Amateur Radio Station, sent free on request of any member.

Station and Leadership Appointments

OPS Official 'Phone Station. Voice operating, example in setting operating standards, activities on voices.

ORS Official Relay Station. Traffic service, operates nets and trunk lines.

OBS Official Bulletin Station. Transmits ARRL and FCC bulletin information to amateurs.

OES Official Experimental Station. Experimental operating, collects reports v.h.f.-u.h.f.-s.h.f. propagation data, may engage in facsimile, TV, etc., experiments.

OO Official Observer. Sends cooperative notices to amateurs to assist in frequency observance, insures high-quality signals, and prevents FCC-trouble.

PAM 'Phone Activities Manager. Organizes activities for OPSs and voice operators in his section.

RM Route Manager. Coordinates traffic activities.

SEC Section Emergency Coordinator. Promotes and administers section emergency-radio organization.

EC Emergency Coordinator. Organizes amateurs of a community or other area for emergency radio service; liaison with officials and agencies served; also with other local communication facilities.

Saying It with Words. STAND-BY is one syllable shorter than Q-R-X. WAIT is still shorter. STATIC is faster to say than Q-R-N, and has the advantage that it escapes confusion with the phonetically-similar QRA.

Code-Practice Volunteers Wanted. Amateur operators who are willing this-September to establish a voluntary schedule of transmitting code-practice information to assist beginners are requested to drop a line to Headquarters setting forth their proposed schedules and effective date in September or October. There is always a keen demand for information on stations sending alternately on code and voice at different code speeds. We would like to present in QST in an early issue, as customary, a full list of such CP stations. Information helpful to the conduct of such programs will be sent on request. FCC (Sec. 12.106) authorizes such transmissions addressed (QST) to amateurs or persons learning. Can you help by taking on a 28--29.7 Mc. schedule, please? This band is preferable to permit CP to go forward with minimum interference to general amateur operation of other types on other bands.
Cooperative Effort. The following was received from an ARRL emergency coördinator:

Brother, ARRL just can't do too much talking about cooperative effort! Many postwar hams don't seem to pay attention to ham radio except for the part that gives them selfish amusement. I tried to get several local 10-meter operators to sign up with our EC some months ago. They asked, "What have we got to do if we sign up?" Answer: "Only drill once a month." They took the blanks but I never received them back. They apparently felt that they should or would be called on in emergency whether they were lined up with AEC or not even if not part of community plans.

After being on the air 7½ hours in our recent flood difficulty, one of these men called me on the telephone. He wanted to know if our city should not be on the air... When I related the work practically completed he said, "I didn't know we were needed... I expected you would call me." Now, would it? After he had had his chance to join up and refused? Untrained hams or those who have not been fitted into the emergency plan are likely to be just so many stations causing QRM.

I'm not so sure but what it would be a good regulation to make every ham have battery-operated equipment and use it at least once per month in order to hold his ham ticket. Might it not also be advisable to add to the license examination some questions covering the history and traditions of amateur radio, emergency procedure including tie-in between nets, and stressing the fact that amateur radio is only allowed because it is in the public interest and necessary? Each amateur must pull his weight for the institution of amateur radio for it to be fully respected and a properly effective communications medium whenever called upon.

May we add a word? Aligning oneself with the Emergency Corps adds to the fun and profit in pursuit of amateur radio rather than otherwise! It is not drudgery to become one of the respected group of people with communications know-how who are ready, through advance preparedness, to conduct effective communications when some emergency comes along. Join the AEC as a full or supporting member to get lined up to do a job when emergency-opportunity suddenly appears. Join the AEC so the amateur service and your cooperative effort work together for good in all communications emergencies.

On Message Handling. There is a peculiar satisfaction that comes to the amateur who handles a message and sees it on its way with accuracy and speed! Messages are the life blood of communications circuits. They bring surprise and pleasure to the recipient. They bring satisfaction to the sender. They require the ultimate in cooperation and fraternalism to see the job through. Messages also are identified with responsibility instead of casual irresponsibility in amateur operating. Not every person interested in amateur radio, we're sorry to admit, has the happy faculty of taking down and passing on a real communication even though the ability to do this identifies an operator as one who knows the ropes! Message handling is a subject of paramount importance when emergency organization and public-service abilities are considered. The organization of section nets, regional connections and ARRL trunk lines is furthered as the systematic means for channeling our traffic east, west, north or south as required for expeditions handling. The training afforded in pushing messages through night after night under ham-band operating conditions creates amateurs with traffic know-how and operating ability second-to-none.

The unselfish work of our traffic men represents public service and makes many a warm friend for the amateur when our messages constitute a third-party delivery as permitted and encouraged in our domestic amateur communications. To any and all amateurs, new to the game, postwar comers or others, we commend the idea of regularly handling some messages. Know the form, know the section frequencies and relay methods, and the people. Give yourself the pleasure of learning by getting in the swim as well as by review of data in the now operating booklet, or the Handbook, or our latest Net Directory. Report in and participate by keeping some schedules or by taking part in net operations and you will become part of a top operating and fraternal group, making contacts that you will value increasingly as the years roll along.

— F. E. H.

This smiling countenance belongs to Alex Reid, VE2BE, ARRL Canadian General Manager. Alex has been the CGM for many years and is the VE's representative on the ARRL Board of Directors. Under the League's By-Laws, he is also the Communications Manager for Canada and has authority over CD affairs in that part of the ARRL field organization. Much of VE2BE's recent activity has been on 14-Mc, "phone, where he has had excellent success in putting a good signal "down under" to the Aussies. The photo was taken during a visit to the shack of W. W. Butchart, VE6LQ, Edmonton, Alberta, who will be remembered for the very important part he played in the Pacific Northwest emergency described in April QST.

August 1949
MEET THE SCM

Everett W. Mayer, KP4KD, started in radio in Illinois in 1912 with his cousin, who is now W5GG. Since then he has held the calls 9BG, 4KD, K4KD, W9CCB, and KP4KD.

For many years Ev has been active in ARRL field-organization work. Before his election as SCM of the West Indies Section, he held the posts of assistant SCM and acting SCM of that section and in 1929-1930 was SCM of the old Puerto Rico-Virgin Islands Section. He formerly was OBS and currently holds OBS, OPS and OA appointments. He is a past-director and past-president of the Puerto Rico Amateur Radio Club.

An ardent ARRL-contest participant, SCM Mayer has been winner for Puerto Rico in many operating competitions. In addition he possesses WAC, DXCC, WA, WBE, BERTA, WPR-175 and WAS Certificates and is a member of the A-1 Operators, Rag Chewers, and Old Timers Clubs.

Present equipment in the KP4KD shack consists of a VF0-42-6L6 exciter driving p.p. 813s at 500 watts input on 14Mc.; VF0-42-6L6-35T, 125 watts input, modulated by p.p. 6L6s Class AB2. Transmitters cover all 'phone and c.w. bands from 3.5 through 28 Mc. Ev's favorite bands are 7- and 14-Mc. c.w. Receivers are an HRO, 5TA1 and a BC-342M. Antennas include a ½-wave horizontal dipole for 14 Mc., a ½-wave vertical and a folded dipole for 27 /28 Mc., and a 66-foot Zepp for 3.5 and 7 Mc. A 40-watt c.w. portable and a 350-watt gas-engine generator are on hand for emergency use.

The little spare time SCM Mayer finds available is spent in studying and reading technical literature and in swimming and horseshoe pitching.

The Civil Aeronautics Administration employs him as radio-maintenance technician in charge at San Juan. He is the father of KP4BJ, ez-K4HEB, and has a three-year-old grandson with the initials K. W. who, he hopes, will some day be a ham running a kw. (after a low-power breaking-in period, of course).

BRIEFS

The Southern Nevada Amateur Radio Club will hold its first “Nevada Weekend” party August 5th-6th in an effort to assist amateurs in all parts of the world to work this hard-to-get state. Club members will monitor all bands, 2-160 meters, starting at 12:01 A.M. August 5th and will try to contact as many stations as possible during the two-day period.

W8HBB was listed in April QST as the winner of the clock prize awarded to the best non-OO participant in the Frequency Measuring Test. Non-OO W2WQG’s rating of 1.5 parts per million was inadvertently listed as that of an OO; his measurements were better by 2 p/m than W8HBB’s and, should therefore be credited as the best in the non-OO class. Our apologies for the error.

In Memoriam: The call of Paul E. Hope, W1KOO, who was lost in action during World War II, has been assigned to the Burlington Amateur Radio Club of Vermont.

DX CENTURY CLUB AWARDS

HONOR ROLL

<table>
<thead>
<tr>
<th>Call</th>
<th>Name</th>
<th>Chronological Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1FH</td>
<td>219</td>
<td>W3GAU 198</td>
</tr>
<tr>
<td>W0YFR</td>
<td>213</td>
<td>W4PD 197</td>
</tr>
<tr>
<td>G2PL</td>
<td>208</td>
<td>W2QW 194</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W6AI 198</td>
</tr>
</tbody>
</table>

RADIO TELEPHONE

<table>
<thead>
<tr>
<th>Call</th>
<th>Name</th>
<th>Chronological Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1FH</td>
<td>178</td>
<td>W4QYU 147</td>
</tr>
<tr>
<td>W8DJ</td>
<td>157</td>
<td>W8HGW 146</td>
</tr>
<tr>
<td>XE1AG</td>
<td>155</td>
<td>W1CJX 145</td>
</tr>
<tr>
<td>G2PL</td>
<td>148</td>
<td></td>
</tr>
</tbody>
</table>

From May 15 to June 15, 1949, DXCC certificates and endorsements based on postwar contacts with 100 or more countries have been issued to the amateurs listed below.

NEW MEMBERS

<table>
<thead>
<tr>
<th>Call</th>
<th>Name</th>
<th>Chronological Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>F8BS</td>
<td>102</td>
<td>W4COC 101</td>
</tr>
<tr>
<td>W5MD</td>
<td>112</td>
<td>W5IC 101</td>
</tr>
<tr>
<td>D4TL</td>
<td>109</td>
<td>W6VRE 100</td>
</tr>
<tr>
<td>W4ERQ</td>
<td>107</td>
<td>W7CIT 100</td>
</tr>
</tbody>
</table>

RADIO TELEPHONE

<table>
<thead>
<tr>
<th>Call</th>
<th>Name</th>
<th>Chronological Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>W4ESP</td>
<td>110</td>
<td>W3AU 101</td>
</tr>
<tr>
<td>W2ON</td>
<td>105</td>
<td>W2X 100</td>
</tr>
</tbody>
</table>

ENDORSEMENTS

<table>
<thead>
<tr>
<th>Call</th>
<th>Name</th>
<th>Chronological Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>G9ZO</td>
<td>192</td>
<td>W6ZK 150</td>
</tr>
<tr>
<td>W2KS</td>
<td>191</td>
<td>W4ZQ 150</td>
</tr>
<tr>
<td>W3CPV</td>
<td>184</td>
<td>W3P 150</td>
</tr>
<tr>
<td>W0XO</td>
<td>183</td>
<td>G3DD 149</td>
</tr>
<tr>
<td>W6JT</td>
<td>182</td>
<td>W6ZG 149</td>
</tr>
<tr>
<td>W5Q4</td>
<td>182</td>
<td>W6H 148</td>
</tr>
<tr>
<td>W1ME</td>
<td>181</td>
<td>W6AEH 143</td>
</tr>
<tr>
<td>W8NBX</td>
<td>180</td>
<td>W2BMJ 142</td>
</tr>
<tr>
<td>P218J</td>
<td>180</td>
<td>W3JK 142</td>
</tr>
<tr>
<td>W0MX</td>
<td>179</td>
<td>K8LHJ 142</td>
</tr>
<tr>
<td>W3QUM</td>
<td>177</td>
<td>W6TI 141</td>
</tr>
<tr>
<td>P33AU</td>
<td>173</td>
<td>W3KUC 142</td>
</tr>
<tr>
<td>W6NEZ</td>
<td>171</td>
<td>W5KSJ 141</td>
</tr>
<tr>
<td>P11DI</td>
<td>170</td>
<td>W3CJH 141</td>
</tr>
<tr>
<td>W6AM</td>
<td>170</td>
<td>W6OM 140</td>
</tr>
<tr>
<td>W6NVN</td>
<td>166</td>
<td>W5GE 140</td>
</tr>
<tr>
<td>W1IBH</td>
<td>165</td>
<td>Q5Q 140</td>
</tr>
<tr>
<td>W2WP</td>
<td>161</td>
<td>W5BD 140</td>
</tr>
<tr>
<td>W4PN</td>
<td>161</td>
<td>W2OMS 140</td>
</tr>
<tr>
<td>W1JYR</td>
<td>151</td>
<td>W6SYG 140</td>
</tr>
<tr>
<td>W2RQ</td>
<td>150</td>
<td>W3KDP 139</td>
</tr>
<tr>
<td>W3EPF</td>
<td>149</td>
<td>W6LAM 139</td>
</tr>
<tr>
<td>ZL2OX</td>
<td>148</td>
<td>W6M 139</td>
</tr>
<tr>
<td>W2QHJ</td>
<td>147</td>
<td>W2BGR 132</td>
</tr>
<tr>
<td>W8OUX</td>
<td>146</td>
<td>Z538J 132</td>
</tr>
<tr>
<td>G4CP</td>
<td>145</td>
<td>G3FRI 131</td>
</tr>
<tr>
<td>W5PB</td>
<td>145</td>
<td>W60K 130</td>
</tr>
<tr>
<td>W2L1L</td>
<td>144</td>
<td>W5CJS 129</td>
</tr>
<tr>
<td>W1YF</td>
<td>143</td>
<td>W2GUM 129</td>
</tr>
<tr>
<td>W2NBK</td>
<td>142</td>
<td>W5MV 129</td>
</tr>
<tr>
<td>W3QW</td>
<td>141</td>
<td>W2RM 129</td>
</tr>
<tr>
<td>W7DL</td>
<td>140</td>
<td>W5G 129</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W3R 128</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8W2OH 112</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ZL2GX 114</td>
</tr>
</tbody>
</table>

QST for
Ooearch among 1946, 1947 and 1949 BPLers and we find that to honor W7CKT, W6REB and W0HMM for their 1948 traffic performances. Since then we have done some re-leaders so far are recognized in the "BPL Honor Roll." W7FST was high man in 1946 and W4PL in 1947. The 1949 of your traffic total. In addition, one point is added for each ciency Certificate. Traffic-wise, he is manager of the Making BPL entitles you to four "BPL points," regardless "Si" himself at the operating position. WNXX is 2 meters. Antennas include a half-wave nets. The rig is a homemade VFO driving an 807 to about 75 watts input on 80, 40 and 20. An SCR-522 does the emitting on 2 meters. Antennas include a half-wave Zepp for 80 and 40 and stacked beams for 20, 10, 6 and 2. Receiver is a BC-348-P and a VHF-152. Altogether, a good practical layout.

August 1949
WITH THE A.E.C.

Assistant EC W6YXE brings an important point to our attention in his San Diego AEC bulletin: "LOOK AT THAT BIG OF YOURS!—Are the switches labeled? Are the controls identified? Can anyone operate your station besides yourself without a full course of instruction? If not, its value as an emergency station is 'way down—several operators may have to operate it during period of emergency. Invest a buck and a little time; you can have it labeled in an evening. Might do well to rearrange a switch or two also; get them in a left-to-right sequence, have all 'on' positions either up, right, or forward. You'll probably find it to have been a good investment one of these days."

The Portland, Oregon, AEC group has installed and tested what is believed to be a unique "first" in amateur emergency communication. Ten-meter mobile units can now travel in the Portland area and maintain contact with the 144-Mc-equipped control headquarters through the use of an automatic relaying system. This automatic "robot" receives signals on 144 Mc. and retransmits them on 28 Mc. and, at the same time, receives signals on 28 Mc. and retransmit them on 144 Mc. Almost two months of concentrated work on the part of W7EYW resulted in a 100% successful test in which 28-Mc mobiles moved throughout the city in response to a control station on 144 Mc. located in a position from which it would have been impossible even to hear a near-by mobile due to heavy noise and low elevation. Operators at the experimental relay point stood by excitedly as the automatic equipment took over completely without needing to be touched for the test of over one hour's duration, during which the net was assembled, test messages were handled, and general emergency operations were conducted.

W9BA of Belleville, Ill., has been cited by the CAP for "unselfish service" in connection with a tornado disaster at Wood River, Ill., on May 21st.

The Santa Clara County Amateur Radio Association has set up its club station in the San Jose (Calif.) Red Cross Headquarters building, operating regularly on 3.5 and 28 Mc. Although the power is only 15 watts at present, the fellows plan to up their output shortly.

The Chattanooga, Tenn., AEC group used the boat races of the Chattanooga Boat Club as an opportunity to test various craft would be visible, and relayed reports on the test of over one hour's duration, during which the net took over completely without needing to be touched for the test of over one hour's duration, during which the net was assembled, test messages were handled, and general emergency operations were conducted.

The MacMillan Expedition Schooner Boudoir left Boothbay Harbor, Me., in late June for its annual cruise in northern waters. Using the call KLPO, it will seek contacts with amateurs on the following schedule: at 4:03 p.m. EST transmits on 12,480 kc., listens for replies on 14 Mc.

Taps on our AEC Honor Roll this month is Calvin D. Johnson, emergency coordinator of Cape Girardeau, Missouri. Johnson, shown left at the operating position of his station, W6PMI, was one of the principal contributors to the amateur communications effort which brought relief to his city after it was struck by a tornado during May. (Details above.)

MISSOURI TORNADO EMERGENCY

On Saturday evening, May 21st, at 6:58 p.m. CST, a tornado struck Cape Girardeau, Missouri. A path 350 yards wide was demolished in the northwest corner of the city. The first ham on the scene was W6PLJ, of Jackson, Mo., who drove 40 miles to lend communications assistance. The Cape Girardeau hams reported to Red Cross Headquarters, and radio communications circuits were operative by early Sunday morning. By 8:30 a.m. Sunday third-party inquiry traffic started pouring in by amateur radio. Emergency Coordinator Johnson, W0PMI, took things in hand, setting up W0QMF and W6PLJ as relay stations. WNMQZ, of Jackson, arrived on the scene to share the operating burden at W0PMI while EC Johnson devoted his entire time to administrative matters. At 4:50 p.m. W0QZS, the assistant EC, got busy on 3660-ke., c.w., when conditions washed out the 3065-ke. 'phone circuit. The balance of the traffic was handled on the 3065-ke. channel. By 11:00 p.m. the hook was clear of delayed traffic, but the operation was continued, to accommodate overload traffic from the wire circuits, until Tuesday when normal communications facilities were restored.

Traffic between the Kansas City Red Cross Headquarters and Cape Girardeau Red Cross was ably handled by SEC W6YXE. Twenty messages of a priority nature were handled for RC by W6YXE, in cooperation with the Cape Girardeau hams.

Although it has been impossible to compile a list of all those amateurs who contributed to the success of this operation, the following are among those known to have been of assistance: W6s RQL, BVL, BYW, CRR, CSM, CKY, CZ2, DSO, DKW, EBE, ECE, EYT, GCT, H8D, KII, ICF, OCH, OKI, MKD, ROL, PCY, QMF, RMF, ROB, TGG, TZX, UIR, UID, VHIK, ZLN, W9s BJE, ENI and OJM.

Ben H. Wendt, W7ICD, SCM, Missouri

BRIEFS

The MacMillan Expedition Schooner Boudoir left Boothbay Harbor, Me., in late June for its annual cruise in northern waters. Using the call KLPO, it will seek contacts with amateurs on the following schedule: at 4:03 p.m. EST transmits on 12,480 kc., listens for replies on 14 Mc.
**ELECTION NOTICE**

(To all ARRL Members residing in the Sections listed below:

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

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

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

Petitions must be in West Hartford, Conn., 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 signer uncertain or ignorant of their membership status, etc.

The following nomination form is suggested:

Communications Manager, ARRL [Place and date] 38 La Salle Road, West Hartford, Conn.

We, the undersigned full members of the [ ] A.R.R.L. Section of the [ ] Division, hereby nominate [ ] [Name of candidate] as candidate for Section Communications Manager for this Section for the next two-year term of office.

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

—— F. E. Handy, Communications Manager

**A.R.R.L. ACTIVITIES CALENDAR**

Aug. 1st: CP Qualifying Run — W60WP

Aug. 18th: CP Qualifying Run — W1AW, W9TQD

Sept. 6th: CP Qualifying Run — W60WP

Sept. 16th: Frequency-Measuring Test

Sept. 19th: CP Qualifying Run — W1AW, W9TQD

Sept. 24th-25th: V.H.F. Contest

Oct. 7th: CP Qualifying Run — W60WP

Oct. 14th: CP Qualifying Run — W1AW, W9TQD

Oct. 18th-16th: Simulated-Emergency Test

Oct. 22nd-23rd: CD QSO Party

Nov. 2nd: CP Qualifying Run — W60WP

Nov. 16th: CP Qualifying Run — W1AW, W9TQD

Nov. 19th-20th, 26th-27th: Sweepstakes Contests

Dec. 4th: CP Qualifying Run — W60WP

Dec. 13th: CP Qualifying Run — W1AW, W9TQD
1949 V.H.F. Sweepstakes Results

The V.H.F. activity was probably more widespread around the United States and Canada during the Second Annual ARRL V.H.F. Sweepstakes than at any previous time in amateur history. Favored by good conditions on 6 and 2 meters, this SS provided its participants with a real workout of equipment and operating skill. The scores and stations worked records of the First V.H.F. SS were surpassed by tremendous margins, partly as a result of the break in propagation conditions and partly because of the enthusiasm of those operators who took part. Reports were received from 317 participants in 43 ARRL sections (the greatest number of sections that has ever reported in a V.H.F. contest). The number of entries from some sections was so large as to make comparisons favorably with the November all-band Sweepstakes.

Winners — Highlights

Like its predecessor, this V.H.F. SS was governed by rules similar to those of the regular Sweepstakes and a scoring system similar except for the absence of a power multiplier. Competition for the awards offered was among participants in each League section. The top scorer in the section from which entries were received is being awarded a certificate in recognition of his standing.

In this V.H.F. contest, the highest scores are usually made by operators located near centers of heavy activity. We wish to point out that the accomplishments of those participants are therefore presented: W2PAU of Westmont, N. J., topped all other v.h.f. SS-ers with a total of 3298 points, scored from 207 contacts with 8 sections on 50 and 144 Mc. His station and antenna layout: 829 final on 144 Mc., 6-element beam 65 feet in the air; p.p. 826s final doubling to 50 Mc., folded dipole mounted at 45 degrees and mounted 40 feet above ground; receiving gear consisted of home-brewed converters working into a Howard 400. Next in line was W3BES — 2864 points, 179 contacts, 8 sections on 6 and 2 meters. W2SAI, of DX Contest fame, made the third highest score, 2404 points, from 189 contacts with 7 sections.


In addition to having the highest score, W2PAU made the highest contact total, 207. Second in number of QSOs was W2SAI with 189 and the 179 contacts of W3BES rated second. Each of these followed the same indirect contacts: W3XG 132, W8ZJ/2 131, W1CTW 130, W2DFY 127, W2ZBO 126, W3KKN 125, W2QED/2 119, W1HIL 117, W2WPW 110, W2DAJ 109, W1OPP 108, W2QNZ 108, W1ATP 102, W2MCQ 987.

Best sections-worked total, 10, was chalked up by W2NGA, W1JKC, W1QJ, W2MEU, W2PCQ and W2QNZ each worked 9 sections.
The following each snagged 8: K1FAA, W1ATP, W2AMJ, W2DAJ, W2PAU, W2SYR, W3BES, W8UKS. Nineteen other contestants worked 7 sections, 35 had contacts with 6 sections and 26 managed QSOs with 5 sections.

The standings of clubs competing for the award offered to the group that submitted the highest aggregate score of members are listed in an accompanying tabulation. The Frankford Radio Club, top group in the First V.H.F. SS, is again the winner of a gavel award. Calls of individual winners of certificates within each club are also listed.

Another V.H.F. Sweepstakes is scheduled for 1950. The dates will be announced in October QST. See “The World Above 50 Mc.” in this issue for a preliminary report of the June V.H.F. Contest. Another of these periodic V.H.F. tests will be held September 24th-25th. Take advantage of the September affair to get warmed up for the Third Annual V.H.F. Sweepstakes.

SCORERS

A.R.R.L. V.H.F. SWEEPSTAKES

(Scores are grouped by Divisions and Sections. . . . The operator of the station first-listed in each Section is winner for that Section. . . . Asterisks denote stations not entered in contest, reporting for checking purposes only . . . The number of contacts and sections worked by each participant are given following the score.)

(Continued on page 24)

SWITCH TO SAFETY!
ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BBS — The York Road Radio Club furnished communication for the Boy Scout Camporee at Camp Wonderland in Roslyn, Pa. .. Mai. 21st-22nd. It was very cold and wet the whole period. York Road also won the pre-Field Day Contest with the Northeast Radio Club by one contact. Northeast operated one-half hour longer than YRRC.

Communication for the Boy Scout Camporee at Camp Wonderland in Roslyn, Pa .. Mai. 21st-22nd. It was very cold and wet the whole period. York Road also won the pre-Field Day Contest with the Northeast Radio Club by one contact. Northeast operated one-half hour longer than YRRC.

Jermyn, Pa. We regret to record the passing of CUU, who was active on the Eastern Pennsylvania Net. The Delco Radio Club, Havertown Net, York Road Radio Club, and the Franklin Radio Club participated in the Red Cross mock evacuation of Philadelphia, ED has 3.5-Mc. c.w.

Radio Club members, at their first May meeting, conducted a monthly club bulletin in May. IBX will be editor of the bulletin this month, covering station activities for the month, covering station activities for the month, covering station activities for the month, covering station activities for the month, covering station activities for the month, covering station activities for the month.

The Utica Amateur Radio Club is building new band-switching transmitter. New calls in Utica are: W3ECP, W3WY, ZYQ, and AOK. SSLI is publishing an FB bulletin for the Utica gang. Traffic: W3QHH 89, PGT 33, WZQ 31, WOE 28, WBP 6, ZSB 15.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Epps W. Darne, W8BBT — The Baltimore Amateur Radio Communications Society will begin publication of a monthly club bulletin. W8BBT will be editor-in-chief and Bill Standish will be assistant editor. Tentative plans for the annual hamfest have set the date as August 14th at Triton Beach. The club has eight mobile units on 28-Mc. operation. Traffic: W3ECP 146, MQJ 120, FWP 55, EQK 16, WU 10, CDQ 6, AKB 3, BWT 2.

SOUTHERN NEW JERSEY — SCM, H. W. (Bill) Tunnell, W20XX — The Hamilton Township Radio Association is now the proud possessor of the call 2A2V, which was given a good workout on Field Day, the South Jersey Radio Assn. boys took over the Collingwood Stadium again this year. How's this for calls? W2AM is for Army C.W. Net and K6KZC for the citizens' band. Traffic honors go to RFP this month.

RPH, RM in charge of the SNJ ORS Net, says they will officially open again in September. ORS is now operating on 14- and 21-Mc. 'phone. NLU uses p.p. 811s for his 14-Mc. c.w. DX.

Maryland-Deleware-District of Columbia — SCM, Epps W. Darne, W8BBT — The Baltimore Amateur Radio Communications Society will begin publication of a monthly club bulletin. W8BBT will be editor-in-chief and Bill Standish will be assistant editor. Tentative plans for the annual hamfest have set the date as August 14th at Triton Beach. The club has eight mobile units on 28-Mc. operation. Traffic: W3ECP 146, MQJ 120, FWP 55, EQK 16, WU 10, CDQ 6, AKB 3, BWT 2.

SOUTHERN NEW JERSEY — SCM, H. W. (Bill) Tunnell, W20XX — The Hamilton Township Radio Association is now the proud possessor of the call 2A2V, which was given a good workout on Field Day, the South Jersey Radio Assn. boys took over the Collingwood Stadium again this year. How's this for calls? W2AM is for Army C.W. Net and K6KZC for the citizens' band. Traffic honors go to RFP this month.

RPH, RM in charge of the SNJ ORS Net, says they will officially open again in September. ORS is now operating on 14- and 21-Mc. 'phone. NLU uses p.p. 811s for his 14-Mc. c.w. DX.

Maryland-Deleware-District of Columbia — SCM, Epps W. Darne, W8BBT — The Baltimore Amateur Radio Communications Society will begin publication of a monthly club bulletin. W8BBT will be editor-in-chief and Bill Standish will be assistant editor. Tentative plans for the annual hamfest have set the date as August 14th at Triton Beach. The club has eight mobile units on 28-Mc. operation. Traffic: W3ECP 146, MQJ 120, FWP 55, EQK 16, WU 10, CDQ 6, AKB 3, BWT 2.

SOUTHERN NEW JERSEY — SCM, H. W. (Bill) Tunnell, W20XX — The Hamilton Township Radio Association is now the proud possessor of the call 2A2V, which was given a good workout on Field Day, the South Jersey Radio Assn. boys took over the Collingwood Stadium again this year. How's this for calls? W2AM is for Army C.W. Net and K6KZC for the citizens' band. Traffic honors go to RFP this month.

RPH, RM in charge of the SNJ ORS Net, says they will officially open again in September. ORS is now operating on 14- and 21-Mc. 'phone. NLU uses p.p. 811s for his 14-Mc. c.w. DX.
Oakes Ground at South Park. Traffic: (May) W3NUG 64, NCJ 11, AER 8, KWL 5, LSS 2. (Apr.) W3NUG 85.

CENTRAL DIVISION

ILLINOIS — SCM, Lloyd E. Hopkins, W9EVJ — ILN, our section c.w. net, has been off the air for just about a month, but will fall after another of the most successful seasons. EdX made WAS and has secured 150 Mc. OD is a new band in Geneva, ION picked up a lot of traffic, and NOJ had a lot of traffic and some 28-Mc. DX. OOS has added a 28-Mc. band to his 10-Mc. operation.

CENTRAL DIVISION

OMaha, Neb. — SCM, G. Beers, K9QNM — NPA has had another successful season. NPA is on the c.w. net, and the club is making plans for the future. OQV is on 50 Mc. and has been doing well. The club is planning a field day for the summer months. OD has new designs for some of his equipment, including the 28-Mc. band. OD is working on a new 28-Mc. antenna for the c.w. net.

CENTRAL DIVISION

MISSOURI — SCM, R. B. Wright, W9LQ — The club is preparing for the upcoming season. W9LQ is on the c.w. net, and the club is planning a field day for the summer months. ND has new designs for some of his equipment, including the 28-Mc. band. OD is working on a new 28-Mc. antenna for the c.w. net.

CENTRAL DIVISION

MONTANA — SCM, W. L. Goetsch, W9RQM — The club is preparing for the upcoming season. W9RQM is on the c.w. net, and the club is planning a field day for the summer months. ND has new designs for some of his equipment, including the 28-Mc. band. OD is working on a new 28-Mc. antenna for the c.w. net.

CENTRAL DIVISION

NEBRASKA — SCM, W. T. Wilkinson, jr., W5VT — The club is preparing for the upcoming season. W5VT is on the c.w. net, and the club is planning a field day for the summer months. ND has new designs for some of his equipment, including the 28-Mc. band. OD is working on a new 28-Mc. antenna for the c.w. net.

CENTRAL DIVISION

INDIANA — SCM, J. C. Wallis, W5DLA — The club is preparing for the upcoming season. W5DLA is on the c.w. net, and the club is planning a field day for the summer months. ND has new designs for some of his equipment, including the 28-Mc. band. OD is working on a new 28-Mc. antenna for the c.w. net.
EC members combined business with pleasure and served the boat club by reporting progress of a race by means of flags flown from 14- to 30-Mc. stations. The operation provided an EC drill and gave the boat club the advantage of getting their news before other clubs by several miles long. Two stations were on cruises and two were located on shore. Several Tennessee fellows attended the Jacksonville station and made contact on a field trip and maintained contact with home for several days.

July QST

Two stations were on 14 Mc. using a pair of 100TMs, between the times the kxK YxS net's schedule. SWF will spend the summer trying to locate and move that 50-ft. tower to their back yard. A new antenna. 

Great Lakes Division

144-Mc. converter. KLM lays down a very strong local field with a 64-Mc. converter. KLM is interested in sending lots of news for the Shackham Radio. How about the old local clubs in the section? Any bulletin from local clubs would be appreciated by the SOM. A reminder to all CD appointees, dubs in the section? Any bulletins from local clubs would be appreciated by the SOM. Your SOM was in the same boat. OHE blames the latter is on the air. ANN still is starting a "local" net. The idea of taking over. Traffic: W2ANW 213, BO 190, OUT 95, O27 26, P2 26, SJC 11, TUK 6.

NORTHERN NEW JERSEY — SCM, Thomas L. Laux, W4BJC, secy.; KIMC, Ron W. Faber, pres.; NKC, Francis S. M. Kuehnel, vice-pres.; KID, PAM, Dr. The N.J. W. C. Net meets daily except Sunday at 1430 Mc. at 7 P.M. The 75-Meter Phone Net meets every Sunday at 7 P.M. The local Famous Radio Club has a new 28-Mc. tripper. The Newark College of Engineering Radio Club are NWA, pres.; Alan Kirsch, vice-pres.; RVL, trustee of JPK, club secretary. N.C. have received their MARS calls. ZEC, recently appointed ORS, is building a 14-Mc. for DX. HII worked K6BBA, with whom he served in the Navy. AXJ received his ticket. CJT was visited by DL4ADT. Please send in reports of your activity so that the resignation of BPV as EC is deeply felt. AUF may be your ORS. NYX is new ORS. LIX is getting on 144. Mc. HEC is rebuilding. BPL is very active on 30 Mc. as is KZ, of Topinka. XXL, of RKC, adds a new antenna and took over. Traffic: JEE, W2QIK, 320. UNJ 213, BO 190, OUT 95, O27 26, P2 26, SJC 11, TUK 6.

MIDWEST DIVISION

IOWA — SCM, William G. Davis, W8PP — On May 15th the Milwaukee Railroad gave a banquet of appreciation to those hams who helped in the blizzard emergencies. IFP has a new ham shack about ready to go at Twin Lakes. EPL, HUY, and HMM have been appointed assistants to Director Collett, DEA. DEA met with the Sioux City Club June 16th. Fellows, looks like you are keeping me as your SOM for another two years. I consider this a vote of confidence, and will do my part to help you, your club and the organized effort to the best of my ability. But remember, I MUST have your cooperation. Thanks for your past cooperation. Traffic: WHHMM 300, SEQ 14, NXY 14, TX 23. KANSAS — SCM, Earl N. Johnston, W6ICV — IYR and MVG assisted the Red Cross in Salina after the tornado. W6IC assisted the local emergency Squad at the Red Cross Building each month and has an attendance of over 100 at each meeting. Traffic: SOE, at Wichita, handled important traffic on Amarillo tornado. Its radio contact into Amarillo prevented unnecessary round trips of bloodmobiles. The cost would have been worth far more than the original cost of the station. WARC meets in the Red Cross Building each month and has an attendance of over 100 at each meeting. Traffic: SOE, at Wichita, handled important traffic on Amarillo tornado. Its radio contact into Amarillo prevented unnecessary round trips of bloodmobiles. The cost would have been worth far more than the original cost of the station. WARC meets in the Red Cross Building each month and has an attendance of over 100 at each meeting. Traffic: SOE, at Wichita, handled important traffic on Amarillo tornado. Its radio contact into Amarillo prevented unnecessary round trips of bloodmobiles. The cost would have been worth far more than the original cost of the station. WARC...
NEW ENGLAND DIVISION

CONNECTICUT — SCM, Walter L. Glover, W1VB — \(\ldots\) to announce the death of KB of Haverhill. \(\ldots\) amateurs and both on 144 Mc. with S2s. Traffic: W1NGV, Jerry Shere on transformers. QXX has a new five-element antenna in the vicinity of Old Orchard can contact GKJ on 144 Mc. as Norm has a 228 rig at the filling station. QJX is a BC-454 and 455. QUA, SEC for Maine, reports QCC and QWJ are battling for honors in states around the world. ELL has W:A.C., all with 15 watts to start off with a bang in the fall. The 'phone and c.w. nets, special events, and possibly equipment. VB will be on the air very irregularly during the summer, but will be glad to hear from the gang by mail. Traffic: W1111 247, AW 159, TV 157, MK 150, VR 148, ORP 146, BVB 145, RUP 143, ORP 143, RUP 142, IEK 4.

MAINE — SCM, Manley W. Haskell, W1VY — A number of amateurs in the vicinity of Old Orchard can contact GKJ on 144 Mc. as Norm has a 228 rig at the filling station. QJX is a BC-454 and 455. QUA, SEC for Maine, reports QCC and QWJ are battling for honors in states around the world. ELL has W:A.C., all with 15 watts to start off with a bang in the fall. The 'phone and c.w. nets, special events, and possibly equipment. VB will be on the air very irregularly during the summer, but will be glad to hear from the gang by mail. Traffic: W1111 247, AW 159, TV 157, MK 150, VR 148, ORP 146, BVB 145, RUP 143, ORP 143, RUP 142, IEK 4.

CARA 1s dickering with the Red Cross for accommodations, and possibly equipment. VB will be on the air very irregularly during the summer, but will be glad to hear from the gang by mail. Traffic: W1111 247, AW 159, TV 157, MK 150, VR 148, ORP 146, BVB 145, RUP 143, ORP 143, RUP 142, IEK 4.

YPA 9, QUA 5, GKJ 2.

Baker, jr., W1ALP -- OLN is the new EC for Haverhill. The following have had their appointments endorsed for their assignments: HUB, LML, NBS, and ORB as 801s; ORA and RRK as OEs; BB as EC; and LMB as PAM and OPS. We are sorry to have to announce the death of KB of Haverhill. LFC is moving to Brazil. Good luck, OM. SEA is a new ham in Worcester. GZ is on 29-Mc. 'phone with Meck T-60. NWW is rebuilding a three-element beams for 28 Mc. PKW has a new Jr. operator, PU on the DU 54 Rig. Drill had the following reporting in: (May) W1CRW 128, PVF/1 112, HYF 101, F11 89, RWS 83, LKF 78, BIH 59, BDI 21, HYF 19, ORP 19, BVB 16, RMU 15, RUP 14, IEK 4.

NEW HAMPSHIRE — SCM, Gilman Crowell, W7VH — Pocatello: KEA is sold on his BC-654A for portable and vacation use. BDL is on 144 Mc. B10 is back on 144 Mc. after getting a T.V. receiver going. BJN also is on 144 Mc. Traffic: W1LM 132, FY 62, DMS 61, JCK 41, EMG 23, RS 22, WW 19, RBK 18, ORB 14, QJB 6, LMLU 4. Many of the gang seem to be off the air for the summer, but we should set aside a time for a rag chew. Traffic: W1WU 37, MYA 35, EMT 21, GHT 20, BDL 9, RQ 8.

WESTERN MASSACHUSETTS — SCM, Prentiss M. Bailey, W1AZW — SEC: UD, RM: BVR. The younger members are particularly interested in running another inter-ham fiesta this fall at Poconos, probably in the middle of September. Slow-speeders welcome — in fact, we should set aside a time for a rag chew. Traffic: W1WU 37, MYA 35, EMT 21, GHT 20, BDL 9, RQ 8.

NORTHERN DIVISION

IDAHO — Alan K. Ross, W7IWU — Pocatello: KEA is sold on his BC-654A for portable and vacation use. BDL is also vacationing at this time. Downey: LQJ and I had a QSO on Morse wire while I was passing through Downey. Theo: The "Gypsy Mail" is not too happy with our QSL mailing, but that is nice response to my query regarding a 7-Mc. net. We have received QSOs from 17 states and from Canada. We have chosen 7155 kc. for our Idaho frequency. Let's have a good time while enjoying the summer. ORP has received his old call, EUA, again.
and will be on the air with a Harvey-Wells job at Martin City. A new call in Kalispell is NJZ. KOG has purchased the ham gear of the late Dr. Lambi. Billings and Kogell held public test events for the regular Field Day. EWR has taken up stamp collecting and welcomes contributions taken from DX cars. CT continues "church line." A. schedules through the summer pre-Feld Day try-outs to test equipment and locations for SO is active on 144 Mc. and is doing a good job on OEN. September. BHP moved to Washington and is back on 3.85-Mc. storm resistant antennas. Baker: The club is reorganized. Traffic: W7OT 59, EGN 27, EWR 6. DXer. Astoria: COZ reports EBD is an expert on installing 144 Mc. 'phone. EGN is Acting SEC until a new appointment to fishing hole. AHZ auctioned off his excess gear. JER is new call for Dick Booth. KEN is new mobile on 28 Mc. to Vancouver. New YL operator is new pole. HGO joined the AEC. KAA reports an FB Y L mailing. ISQ is moving back across the Sound again for the summer while doing 40 m.p.h. GEU has applied for ORS of 144 Mc. The Walla Walla gang ready for Field Day. CKT is busy getting nets and schedules reorganized for summer traffic. 144 Mc. is used across the board. New Collux was such a nuisance center until Martha's put it on the map. ZU had his ORS for another year. DIA expects to be busy. G.L. is really getting into it. If he can put up his L.F. is on low power - 200 watts - but promises a kw. soon. JZT is having an old-time brasspounder. has an automatic key on 160 meters - 37 Mc. - and 28-Mc. beams up which were built by R.M. PB spends a lot of interest there on 420 Mc. FWD is doing on 28-Mc. job as OBS. WY4 says he is not going to check in on WSNET until MCW is back on WSN. and 28-Mc. "if you play your cards right." W6ZT is on 144 Mc. with 3.85-Mc. C.W. ORS who will take over the job of NOS a couple of times a month. W6ZT is on 144 Mc. with JSZ and 3.85-Mc. for the c.w. net. YGN is heading the 'phone net and ZRZ is Net Control of the c.w. net. Anyone wishing to become active in either net should call the to the following frequencies on Monday, Wednesday, and Friday nights. 'phone net meets at 8 P.M. and the c.w. net meets at 8:30 P.M. SO will take over the job of KBO Thursday. Roy will handle traffic for both nets. SYW is going to work 160 meters with 3.85-Mc. beam on as long as possible. KEO and LSQ are on 3.85-Mc. 'phone. ISQ is moving his QTH to Whittier and should be heard from the new location very soon. GJG is checking into the SCMA for a new location. NX and BPO were recently viewed over KEEN, giving information on the amateurs' connection with the Red Cross emergency communication committee. The club is reorganized. SO will be Salinas outlet for the Valley Net, ZRZ is doing a fine job getting the locals on c.w. to try to build up this section. NX and BPO were recently viewed over KEEN.

Continued on page 68)

PACIFIC DIVISION

HAWAII - SCM, Dr. Robert Katsuki, KH6TIJ - AEC member. Mrs. B. P. Johnson, K7BCS reports that 144 Mc. opened up on May 15th to the San Francisco Bay area. W6ZT has applied for ORS of 144 Mc. openings in the San Francisco Bay area. OB6 is on 144 Mc. with 3.85-Mc. beam on 144 Mc. AY has gone back to 144 Mc. with 28-Mc. beams which were built by RBM. PB spends one week away each month on the road, and worries if it will cause him to lose his call. W6ZT has a 3.85-Mc. "if you play your cards right." W6ZT is on 144 Mc. with 3.85-Mc. C.W. ORS who will take over the job of NOS a couple of times a month. W6ZT is on 144 Mc. with JSZ and 3.85-Mc. for the c.w. net. YGN is heading the 'phone net and ZRZ is Net Control of the c.w. net. Anyone wishing to become active in either net should call the to the following frequencies on Monday, Wednesday, and Friday nights. 'phone net meets at 8 P.M. and the c.w. net meets at 8:30 P.M. SO will take over the job of KBO Thursday. Roy will handle traffic for both nets. SYW is going to work 160 meters with 3.85-Mc. beam on as long as possible. KEO and LSQ are on 3.85-Mc. 'phone. ISQ is moving his QTH to Whittier and should be heard from the new location very soon. GJG is checking into the SCMA for a new location. NX and BPO were recently viewed over KEEN, giving information on the amateurs' connection with the Red Cross emergency communication committee. The club is reorganized. SO will be Salinas outlet for the Valley Net, ZRZ is doing a fine job getting the locals on c.w. to try to build up this section. NX and BPO were recently viewed over KEEN.

Continued on page 68)
This Page

On the occasion of our Fifteenth Anniversary of monopolizing this page, we appended a footnote to Cal Hadlock's story, asking if our readers considered the stuff we had presented here worth reading. The response was overwhelming!

At the risk of appearing unduly sentimental, we are rather fond of this thing called radio, for it has not only provided us with both an absorbing hobby and a means of livelihood, but it has enabled us to make a host of friends, many of whom we have never seen. It was a real pleasure to hear from so many of you and we particularly enjoyed the letters from fellows we knew "way back when" but had lost track of in intervening years.

A few of the letters received were so flattering that we might have had to buy a larger hat had not others contained constructive criticism which brought the head-size back to normal. We promise to heed the suggestions so generously given, and hope that the subjects to be discussed here in the future will reflect our effort. Next month, we will get back into our stride with renewed vigor under the stimulus of the "shot in the arm" you fellows gave us. There are new things to come — better things; the "good old days" of amateur radio have gone, but the best, and greatest days lie before us.

— W. A. Ready
PHILIPPINES — SOM, M/Sgt. Stanley J. Gier, KAlAI
— In November 1948 the Philippine Government adopted amateur radio regulations which were essentially a copy of FCC Amateur Service Regulations. This provided that no non-citizen of the Philippines could hold an amateur license. However, all existing licenses were to remain valid until the date of expiration. Philippine amateur licenses were issued for a six-months period and all non-citizen licenses expired April 30, 1949. At present the only station licensed in the Philippines is KAlAI, which is licensed by the Armed Services to the Clark Field Amateur Radio Club. It is hoped that the situation will improve and that Far East Command in Tokyo will issue additional American amateur stations in the Philippines.

SAN JOAQUIN VALLEY — SOM, Ted R. Souza, WS6KL (Ret. SOM, James F. Wakefield, G6SQ)
— The San Joaquin Valley Emergency Net is going great guns with weekly drills. A new call in Stockton is P2W, CPT is mobile now. VPV has moved to Merced. HCZ is converting garage into shack. YGZ is working on emergency rig. DXJ has moved to Lindsay. U3W is active on 3.85 Mc. YBZ, BF3, RWI, and AFL helped K0H and K0T in the regatta with mobile rigs. JPS has a PB new shack and a rig on every band. KUT and SRI are still going strong for these club members. Y3R is thinking "hoot phone". VPV now works for the City of Fresno as a radio technician. PHIL is building a new half-gallon rig.

ROANOAKE DIVISION

NORTH CAROLINA — SOM, W. J. Wortman, W4CYB
— MOC has received his old call, N0RF, and is moving back to California. MIZ/4 is operating with 60 watts from N. C. State M.D. dormitory and is getting a lot of DX. OIF is operating ATC on 3.55-Mc. phone for Engineer’s Exposition. ILM raised his 28-Mc. beam. MSN is slightly active on 7 Mc. and is working on free power for 28-Mc. phone. LOZ has new beam on 80-ft. windmill tower. ODF, OSF, and 30TH graduated from State College. JOH is handling some traffic and is active at ATC. NAP is experimenting with beams, working some DX, and needs Utah for WAS. HEH, GG, and MR were leaders in Greensboro Field Day work. All the boys in and around Greensboro are building low-power rigs, and rebuilding for T.V.I. A new club has been organized in Hickory known as the Catawba Valley Amateur Radio Club. Members are composed of amateurs from Catawba, Lincoln, Burke, Caldwell, and Alexander Counties. EBR is the guiding light. Officers are EBN, pres.; OQV, vice-pres.; ENQ, secy.; EBD, treas. The radio net meets on the 1st and 3rd Fridays of each month at an announced central location at 7:45 p.m. EST. FZ6, PH8, PIA, and PIB are new names. DSO and MDE are busy up in Morganton on the "Terrible Quartet." LTW is busy with 7-Mc. c.w. LSI is kicking up the breeze on 28 Mc. OXG has new rig with 2x4’s on 28 Mc. DSO and MDE are busy on Morganton on the "right side of the tracks." PIF in North Wilkesboro is mortening a new ticket. ILC is new NOS of the Tar Heel Phone Net and OKG is secretary. The Net meets Monday through Friday at 7:30 p.m. on 3865 kc. Traffic: W4JQO 9.

SOUTH CAROLINA — SOM, Ted Ferguson, W4BOE/ANG
— A new ham in Columbia is PII. Welcome, James. BEN and KRYW are active on 50 Mc. BEN has 9 states and KRYW 18 states to their credit. ANR turned in another good traffic score and again makes 3PL. The SEC reports that all members of the 3.55-Mc. phone net have become Assistant Emergency Coordinators. Nice work, ANR, and the fellows. The Charleston gang had three transmitters on Field Day. The boys at Easley took a shot at Field Day, so reports HAG and SBS reports good success on MC, are going to the following stations taking part: CP2, KMK, BEN, KRYW, and BBS. We are glad to welcome NLI” to the section from W1 Land. He operates 7-Mc. from Hemingway. K2NLA now is a W2. Look for him on 28 Mc., boys. Thanks to the boys down in Orangeburg for a nice picnic and gatineau. We always enjoy the gatherings here. W4ANK 2.

VIRGINIA — SOM, Victor C. Clark, W4KFG
— New officers of Falls Church Club are IOV, pres.; DWF, v.p.; WVQ, secy.; OIN, treas.; and around. Virginia Phone Net gang held a highly successful picnic in Richmond June 6th. CLD, IWA, KAO, KIL, and NAD managed the affair. The 3865 kc. phone group went "all out" for Field Day, operating 4PA4Y at Pender and 4KFC/3 in the Penna. mountains, respectively. NQV celebrated the first anniversary of his Class A and joining AEC. IA reported to PYRC on the ARRL Board Meeting. Active on 7 Mc. are MIZ, QWM, SN, and ZB. ZB’s first QSO was in 1945 LAF is off to

(Continued on page 70)
In many respects the technical developments of the year 1931 marked the transition of Amateur Radio from swaddling clothes to long pants. 1931 marked the beginning of the "golden era" of Ham Radio when the number of licensed Amateurs practically doubled overnight.

That was the year when the screen-grid tube and the superheterodyne circuit first enjoyed serious consideration by Mr. Average Amateur. More and more pure DC signals from crystal-controlled, multi-stage transmitters were being heard on the Hambands. Class "B" modulation was introduced for the first time making more efficient telephone transmission. And QST was stressing the importance of frequency stability, clean signals and good operating practice to reduce QRM which even then was beginning to be a serious problem.

We, at Mallory, like to believe that we contributed in some small measure to the Amateur's technical development during this transition. For it was in 1931 that the Mallory-Elkon high voltage "bone dry" electrolytic capacitors first made their appearance on the shelves of the radio supply houses.

The Mallory-Elkon capacitor of 1931 was the first truly dry electrolytic ever made. It established many of the standards of quality still in use today, for it was the first electrolytic capacitor which could be used continuously at 450 volts. It was the first electrolytic which could be housed in a cardboard carton and could be mounted in any position without the slightest fear of leaking electrolyte spoiling valuable transmitting and receiving equipment.

The Mallory-Elkon dry electrolytic capacitor of 1931 was instrumental in providing the "old timer" of that year with a practical, safe, and economical means of getting the pure DC power he needed for efficient phone operation and clean CW signals.

For 18 solid years the tradition of quality established way back in 1931 has been maintained and added to year after year by subsequent important Mallory improvements in electrolytic capacitor design. A list of only a few of the many improvements originating in the Mallory laboratories reads like a "Who's Who" of electrolytic capacitors.

Exclusive Fabricated Plate (FP) construction, 85°C., temperature operation, heavier cathode tabs, and consistently lower impedance at radio frequencies are only a few of the "extras" you can rely on when you specify Mallory capacitors for your rig.

After all, there is no substitute for experience. And Mallory engineers have been designing and building dry electrolytic capacitors longer than anyone else in the business.

But whether you need an electrolytic capacitor, or some other of the long list of Mallory parts, you can always count on Mallory to give you the best there is. Be sure to specify Mallory when you need ham band switches, push button switches, controls—hosestats—potentiometers—pads, tubular capacitors, ceramic capacitors, dry disc rectifiers, vibrators, and Vibrapack* power supplies.

Florida again. JLW worked 100 stations in the VE Contest, in all VE sections. IGO is active on 3.5, 14, and 28 Mc. A new jr. operator at GRY has Daddy warming the bottle in his PA. LRI is new EC for Arlington County. VE joined the exclusive UWA (Crest Workers of America) by nailing 5V6AA. IQV begins himself with experimenting and ground wave DX on 28 Mc. OVK works out on 28 Mc. Phone with 25 watts and indoor beer-can ground-plane. JHI is erecting antennas at new QTH and is alert for openings on two. Is OLL the first W4 using s.s.s.c.? He is on 3005 kc. at 6 p.m. daily. DWF opens the garage door by radio. JVA is loud. OVK has 17 states on 30 Mc. and in. W9QVM on 144 Mc. is building 100-watt 50-Mc. rig and putting the beam higher. EMJ and JFE are about to resume activity from new QTHs. QWM visited W9LQ during vacation. JHI is contemplating portable operation from the beach this summer. SU opened up on 1.75-Mc. c.w. KYM took in 39 kc. at 6 P.M. daily. DWF opens the garage door by nail. SV6AA is a top-notch emergency set-up this coming fall and winter and will appreciate very much your answers to his questions. Mail to: W8OXX 28, DPC 43, AUJ 38, GBF 29, BKR 18.

ROCKY MOUNTAIN DIVISION
COLORADO — SCM, M. W. Mitchell, W8HQZ — SEC: O K1HH, RM: IC, K9RZ and said "hello" and "goodbye" to K9RZ on his way to the mountains. The Greeley Radio Club now is organized and new QTHs are being sought. The joint meeting with the Cheyenne Club on the 11th was well attended. The Colorado Slow Speed Net is on summer schedule Tuesdays at 6:30 p.m. and Thursdays at 3:30 p.m. on 7225 kc. IC made BPL last month. Congratulations! IQZ has 7-Mc. schedule on 7 Mc. with low power. BWD and JKN schedule TDJ and EP on 50 and 144 Mc. PZT and GBE are remodeling the rig for full operation on e.w. nets. NTV visited amateurs in California while on vacation. AJS reports 21 s.w.s. to obtain a rig that can be maintained on the air. YL is QS although the possibility of moving. W9NQ claims to have the longest distance to the serial of any ham — only 2000 feet. FMU reports AEC progress good over the entire State. EC-W60Q now is operating portable on Guam on 14 and 28 Mc. Traffic: W8OXX 28, DPC 43, AUJ 38, GBF 29, BKR 18.

WRITE FOR FREE BOOKLET
Let us prove to you that the training you need to qualify for a better radio job is free! To help us answer intelligently your inquiry — please state briefly your background of experience, education and present position.

VETERANS! CREI TRAINING AVAILABLE Under G. I. Bill
For Most Veterans, July 25, 1951, is the deadline — Act NOW!

CAPITOL RADIO ENGINEERING INSTITUTE
Dept. 168A, 16th & Park Road, N. W.
Washington 10, D. C.

Mail me your FREE 24-page booklet.

Check field of greatest interest:
[ ] TELEVISION  [ ] PRACTICAL RADIO-ELECTRONICS
[ ] BROADCASTING  [ ] AERONAUTICAL RADIO ENGINEERING
[ ] RECEIVER SERVICING  [ ] INDUSTRIAL ELECTRONICS

Name ......................................................
Street ......................................................
City ......................................................
Zone ......................................................
State ......................................................

I am entitled to training under the G. I. Bill.

(Continued on page 72)
Now... 5 more germanium diodes in Sylvania's famous line!

1N54. High back resistance diode. Two megohms or more at -10 volts.

1N55. 150 volt diode.

1N56. High conduction diode. Passes 15 ma or more at +1 volt.

1N57. 80 volt diode.

1N58. 100 volt diode.

Products of continuing research by the world's largest manufacturer of germanium diodes, these 5 new types open up interesting new fields of application to the radio amateur. See your Sylvania Distributor or send convenient coupon for full particulars.

Mail coupon for descriptive literature

Sylvania Electric Products Inc.
Advertising Dept. R-2508
Emporium, Pa.

Gentlemen: Please send me descriptive literature on Germanium Diodes 1N54, 1N55, 1N56, 1N57 and 1N58.

Name...........................................

Address........................................

City...........................................Zone..State......
Birmingham established 144-Mc. contact via FSW and BOU. Traffic: W4XUX 118, KIX 20, CYL 18.

EASTERN FLORIDA — SCM, John W. Hollister, WA4FWZ — Congratulations to CJ and the Reverend Floyd H. Andrus for a most inspiring program on the Knights of the Kilocycle memorializing Silent Key members GVZ and LFG. Congratulations also to ARB for his fine work at the ARRL Board Meeting and his report to R. of K. He 7290-kc. Net now is on at 1930 instead of 1900 each night. All local traffic nets. Net closed for the summer. R. and RP, our RM, says there are plenty of plans for next season. Now is the time to "sign up" for the c.w. nets. Contact PWZ, RP, and CJ and the Net Chairman will write the DOQ, about AEC plans and EC apointments? MNT reports that MV3 will be QSO’s on the 7290-kc. Net. 144 Mc.: AYX worked Orlando, etc.; Clearwater to Orlandon, etc.; L4QW worked L4QW, etc. A 144-65 Mc. QVY, Lake City, went to RU plus L4QW, etc. in Jacksonville and had two QSO’s with Orlando, etc. A 144-95 Mc. QVY, Lake City, went to RU plus L4QW, etc. in Jacksonville and had two QSO’s with Orlando, etc.

It’s higher learning for EHU at Fia. New confirmations for L2M include MB9AD, MB9BN, MB9SS, MT2PU, PJ5OK, K6AID, ZJ6H, K9QV, T9X, UX, and N2AH, etc. JCK has more than 100 confirmed. The Navair Club includes WX9O, XG9Q, YC9O, YC9Q, XG9O, XG9Q, XG9O, YC9O, and OE4QQ, etc. All grounded-folded dipole array

FEATURES OF HY-LITE'S YAGI TYPE

YAGI 2 METER BEAMS AVAILABLE NOW

482 4 Element 2 Meter with Folded Dipole. $875
882 Consists of 2-482 units and "Q" Bars, Boom and all necessary hardware. $200.50 Net
1682 Consists of 4-482 units, "Q" Bars, Boom and all necessary hardware. $410.00 Net

HY-LITE is ON 2 mtrs
NEW
TWICE as big as the previous
ANTENNA BOOK

288 pages—containing:

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wave Propagation</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Antenna Fundamentals</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>Transmission Lines</td>
<td>65</td>
</tr>
<tr>
<td>4</td>
<td>Multielement Directive Arrays</td>
<td>138</td>
</tr>
<tr>
<td>5</td>
<td>Long-Wire Antennas</td>
<td>167</td>
</tr>
<tr>
<td>6</td>
<td>Multiband Antennas</td>
<td>183</td>
</tr>
<tr>
<td>7</td>
<td>Antennas for 3.5 and 7 Mc</td>
<td>187</td>
</tr>
<tr>
<td>8</td>
<td>Antennas for 14, 21 and 28 Mc</td>
<td>191</td>
</tr>
<tr>
<td>9</td>
<td>V.H.F. and U.H.F. Antenna Systems</td>
<td>200</td>
</tr>
<tr>
<td>10</td>
<td>Antennas for 160 Meters</td>
<td>217</td>
</tr>
<tr>
<td>11</td>
<td>Supports and Construction</td>
<td>223</td>
</tr>
<tr>
<td>12</td>
<td>Rotary-Beam Construction</td>
<td>236</td>
</tr>
<tr>
<td>13</td>
<td>Finding Directions</td>
<td>256</td>
</tr>
<tr>
<td>14</td>
<td>Receiving Antennas</td>
<td>262</td>
</tr>
<tr>
<td></td>
<td>Bibliography</td>
<td>266</td>
</tr>
<tr>
<td></td>
<td>Index</td>
<td>267</td>
</tr>
</tbody>
</table>

Have You the
NEW ANTENNA BOOK?

$1.00 U.S.A., Its Possessions and Canada
$1.25 Elsewhere

AMERICAN RADIO RELAY LEAGUE, INC., West Hartford, Conn., U.S.A.
Shunts and stand the hard usage of amateur radio, servicing, production. Engineered as a portable, compact test set to with precision's larger test sets, including: Rotary Selection - 1%, 9'2-'27 Horace Harding Blvd., Elmhurst 1 J, N. Y.

In custom molded carrying case. Series CO Export Division, 458 Broadway, New York, N. Y.

Resistance Ranges: self-contained batteries.

Recessed 12, DGA 11, JQB 10, QMI/6, 6APG, SEC, DUP, RM, BGF. LRU is running 100 watts in

(Continued on page 78)
CUSTOMMODE is the answer to the ever expanding requirements of audio-video equipment. Today you may install a tuner, an amplifier and a record changer with your loudspeaker. Tomorrow you can add a TV receiver, a pick-up for micro-groove records and a record cabinet. The illustrations show a few of the hundreds of possible arrangements for Home Entertainment Centers.

Designed by leading furniture stylists and acoustic engineers around a JENSEN 15-inch loudspeaker in a Bass Reflex Cabinet—the very ultimate in high-fidelity sound reproduction—CUSTOMMODE is as functional as it is beautiful. Its "building block" versatility enables you to create your own layouts as you wish, when you wish.


Shown above is Shelf which provides for inclusion of TV receiver or record albums in a CUSTOMODE ensemble.
West Gulf Division

Northern Texas — SCM, Joe G. Buch, W6CDU — An activity of Dallas Club members is being concentrated on VHF contacts. Better QSOs are expected and gett by the Big West Gulf Convention Aug. 27th and 28th. There will be a set-acquainted party for early arrivals in the evening of the 26th. Remember the dates and be sure to tell your friends. Much credit is due KZA for his good work following the Amarillo tornado disaster. BYU complains of too much traffic and not enough time to work. K6ZHB is getting ready for his final round at A. & M. Glad to hear FQG back on 3.5, 3.85, and 7 Mc. I6M debugged his 32V of the 160-meter band by using a line-coupled antenna conditioner and cleared lots of T.V.I. with a quarter-wave stub across transmitter output terminals. OFN works 3.85-Mc. phone most of the time. K6A doesn’t have much time to spend on the air but turns in a nice traffic total. PZH runs the Commerce ham total up to 50, QAN is the latest in McKinney and is active with NTX Traffic Net. MAW’s DX record on 50 Mc. is 125 miles. OIS is new Class A. GZU again makes BPL. The Red Cross, City Government, and Texas Electric Co. have given the Big Spring Club space and equipment in appreciation for communication assistance rendered during the ice storm. AW is EC for Big Spring and remains the following list of active amateurs: AW, AWT, HCB, 9G6, ISD, KID, KTU, NCC, PFI, P3X, PXR, LAP, and Z6F. See you Aug. 26th in Dallas. Traffic: W6ZGZU 128, B6A 98, ASA 59, KFB 32, ARK 47, CDU 43, ISD 35.

Southern Texas — SCM, Ammon O. Young, W6BDB — KSW is working 50 Mc. and also is keeping schedule with 28SKX. MN has schedule with 4PL and hits the Bounce Net in the mornings. The Costume Emergency Net is doing a very nice job in this area. BLS is on 3.85-Mc. mobile and, by operating in both the above-mentioned net and the new Net, allows to manage two together. ON is building a 150-watt 144-Mc. rig. ISX is Zone 2 Net Control of S.T.E.N. KFY is building a shack. PGR is considering a move to North Carolina. JWM is trying to get his dual 10-20 beam going in spite of school taking a lot of time. P14 is rebuilding in emerald metal rack. GZU has a co-axial tower that is 14- and 28-Mc. beams on top. 1YR is building a kw. rig and hopes to be on 14 Mc. soon with a four-element beam. UCB has a new kw. power supply that puts out from Oto 4000 volts by just turning the knob. Traffic: W6PBAM 34, BGF 21, LDF 15, DBZ 8, P6Z 5.

Radio Shack August Sale!

H-23U Radio Phone Handset Only $2.95

NEW Brand New AAF Hand Mike $1.49

Cardwell 180 MMF Split-Stator Tuning Condenser Only $2.98

Send Today For New 108-Page Catalog And Surplus Flyer

The Radio Shack Corp.

Cable Address: Radioshack
167 Washington St., Boston, Mass., U.S.A.
THE NEW SUBRACO MT 15X

The new converter which covers all bands from 3 to 30 mc. Same size as all Gonset mobile converters.

| Model 3-30 | $39.95 |
| Model 10-11 | $39.95 |
| Gonset Noise Clipper | $8.25 |

Also available completely factory incl. all tubes except kine.

31-tube kit with components for use with up to 20-inch tubes. Don't confuse with cheaper kits. Pre-wired and aligned RCA front end, all major components are RCA and are mounted. Adjustable kine mounting brackets. Complete RCA manual, with service notes, plus ultra-simplified instructions.

Complete, less kine tube | $63.50

16" kine tube (sold separately) | $98.50

BRAND NEW-MT15X for 20 meters | $87.50

ALSO NEW-MT15X for 75 meters | $87.50

Speech input. Any of the MT15X can be ordered with high-gain speech input for either xtal or dynamic mikes at an additional cost of...

$9.95

SUBRACO DS400

Dynamotor supply. 6 V. DC input, 400 V. at 175 ma. output. Complete with built-in control relays, filter, etc. | $59.95

AC Supply for operation of any of above Subraco xmttrs indoors. Complete with rectifier and built-in control relay | $39.50

STANCO'S NEW ST-203-A

Mobile xmttr kit. Uses 2E26 in final, PP 6V6 modulator. Weighs 9'/• lbs. with tubes and xtal. Built-in push-to-talk relay. Complete kit of parts, less tubes and accessories | $44.70

Completely assembled, wired and tested, less tubes and accessories | $58.90

MOBILE ANTENNAS

Auto receiving type, collapsible, 96" | $3.60

Premax Model A5196, solid stainless steel, 96" whip. | $3.60

Type NA bumper mount for antenna | $3.60

Type R mount with 5A spring adapter | $14.40

LYSCO'S NEW MOBILE XMTTR

Dimensions 4 x 3 x 5½". Uses 6AG7 osc 6AG7 amp; 6AG7 modulator for A3 emission. Available in either 10-11 or 60 meter models. Built-in antenna changeover relay. Power requirements 6 V. 2 A., 350 V. 110 ma. Either unit completely wired and tested, less tubes and accessories | $23.95

Lyasco model NXL noise clipper | $7.50

Lyasco grid dip meter, 3-150 mc range, calibrated dial, no plug-in coils, complete with power supply and tubes | $33.50

NOTE: All prices are Net. F.O.B. N.Y.C. and are subject to change without notice.

TECHMASTER SUPER-16 KIT

31-tube kit with components for use with up to 20-inch tubes. Don't confuse with cheaper kits. Pre-wired and aligned RCA front end, all major components are RCA and are mounted. Adjustable kine mounting brackets. Complete RCA manual, with service notes, plus ultra-simplified instructions.

Complete, less kine tube | $184.00

16" kine tube (sold separately) | $63.50

24 VOLT POWER SUPPLY

Filtered DC supply has hundreds of uses. All parts conservatively rated. Transformer, 36 V. 10 amp; 50 V condenser; filter choke; 5 amp full-wave rectifier. Ample capacity for practically all surplus 24 V. devices. Output may be increased to 10 amps by adding a rectifier in parallel.

Complete kit, net | $18.74

Additional 5 amp rectifier for increasing output | 5.95

AMERTRAN TRANSTAT

GE FM TUNER

Only a few left of this unusual buy. Covers 88-108 mc, Guillotine tuning. Designed for export and tropicalized, has power inputs for 110 to 250 volts 60 cy. Shpg. Wt. 15 lbs.

SPECIAL PRICE | $49.50

NOTE: All prices are Net. F.O.B. N.Y.C. and are subject to change without notice.

TV PICTURE TUBES at new low prices

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>12LP4</td>
<td>$48.50</td>
</tr>
<tr>
<td>12JP4</td>
<td>$41.25</td>
</tr>
<tr>
<td>15AP4</td>
<td>$66.75</td>
</tr>
<tr>
<td>16AP4</td>
<td>$63.50</td>
</tr>
<tr>
<td>20BP4</td>
<td>$222.75</td>
</tr>
<tr>
<td>STP4</td>
<td>$59.40</td>
</tr>
<tr>
<td>7JP4</td>
<td>$20.60</td>
</tr>
<tr>
<td>10BP4</td>
<td>$31.13</td>
</tr>
<tr>
<td>10FP4</td>
<td>$33.25</td>
</tr>
<tr>
<td>12KP4</td>
<td>$50.60</td>
</tr>
</tbody>
</table>

24 VOLT POWER SUPPLY

FAQ: How does a 24 volt power supply work?

A: A 24 volt power supply converts AC power into DC power at 24 volts. It is commonly used in electronic devices, such as in theaters or in the home, where it can provide a stable power source for various devices that require a low voltage.

77
MOBILE POWER SUPPLY

The original E-L Model 2506 "HAMPACK", delivers full 30 watts output (300 volts at 100 ma.) complete hum filtering and RF noise suppression, 6 DC amp, input, 4½ " x 5½ " x 5". weight 6½ lbs. Regular amateur net $15.00, special buy.

$9.95

STEINBERG'S

633 WALNUT STREET • CINCINNATI 2, OHIO
Save Up to 22% at ALLIED on these famous Hallicrafters models

WAS $99.50 NOW $79.95

Popular S-40A & S-52 All-Wave Receivers

Here's more value in popular Hallicrafters communications receivers packed with advanced features. Covers 540 kc to 43 mc in 4 bands. Highlights include: full electrical bandspread; inertia flywheel tuning; calibrated main dial; automatic noise limiter; adjustable pitch BFO; standby switch; code-phone switch; headphone jack; shock-mounted PM speaker; separate sensitivity and volume controls; 3-position tone control. All tubes included. In handsome all-steel cabinet. 18½x9x11½. Shpg. wt., 32 lbs. 97-546. S-40A, for 105-125 v., 50-60 cy. AC, 97-581. S-52, for 117 volts AC or DC. EITHER MODEL, reduced to $79.95 Available on Easy Payment Terms

$79.95

SX-43 — Short-Wave, AM and FM

You save $30 on this great receiver preferred by Amateurs, DX fans and AM-FM listeners! Delivers professional performance over the entire range of 540 kc to 55 mc — plus the 88-108 mc FM range. Features: accurately calibrated main tuning and electrical bandspread dials; accurate carrier-level meter; 4-position control for broad or sharp tuning; variable-pitch BFO; tone control; automatic noise limiter; dual IF system; RF gain control; crystal phasing control; selectivity control; standby-receive switch; 300 and 5,000 ohms output impedances. Complete with tubes. In rich satin-gray steel cabinet; 18½x9½x13½. For 105-125 v., 50-60 cy. AC. Shpg. wt., 45 lbs. 97-743. SX-43, less speaker, reduced to $159.50 Available on Easy Payment Terms

$79.95

Famous All-Wave S-53 — World-Wide Coverage

Save $19.55 on this quality, professional-type communications receiver! Covers 540 kc to 54.5 mc in 5 bands. Advanced features include: full electrical bandspread; large slide-rule dial accurately calibrated for all ranges; automatic noise limiter; adjustable pitch BFO; tone control; code-phone switch; headphone jack; separate sensitivity and volume controls; built-in PM speaker. Includes all tubes. In satin-black steel cabinet with chrome trim; 12½x6½x7½". For 105-125 v., 50-60 cycles AC. Shpg. wt., 20 lbs. 97-573. Hallicrafters S-53, reduced to $69.95 Available on Easy Payment Terms

$69.95

Send for the Leading Amateur Buying Guide

For everything in station equipment — use your ALLIED Catalog. Get every advantage: fast shipment, low price, square trade-ins, easy-payment plan. Send today for your Free Copy of the ALLIED Catalog!
To be sure your calculations are

RIGHT, use

1. Fischer's

RADIO & TELEVISION
MATHEMATICS

Over 400 sample problems, completely worked out. All the calculations commonly required in the design, operation or servicing of radio, television and modern industrial electronics are included, arranged under electronic headings where they are easily found. All electronic formulas, mathematical tables, and a math review are included.

Excellent preparation for FCC examinations, this book also provides a convenient handbook on the calculation of all factors in a-c and d-c circuits; vacuum and other electronic tubes; power supplies, amplifiers, receivers, transmitters, and antennas for radio and television, and special electronic circuits. In each case it is shown how to set the problem up as well as how to solve it, with every step in the solution included.

§6.

Have you got these useful books?

2. Introduction to Practical Radio

By Tucker. "I have this book and it is money well spent," says one of the thousand of radio men using it. It explains all fundamentals, including the necessary math, and gives hundreds of practice problems. §3.

3. Principles of Radio for Operators

By Atkinson. Teaches radio essentials through hundreds of pictures and graphic demonstrations, with clear, simple explanations. §4.

4. Introduction to Electronics

By Hudson. Will help you understand the principles and key equipment of television and other modern electronic developments. $3.50.

SEE THEM FREE

The Macmillan Co., 60 Fifth Ave., New York 11

Please send me the books checked by number below, I will remit in full or return the books within ten days without further obligation. 1. 2. 3. 4.

Signed. ..............................................................

Address ....................................................................

a trip to England and reports many FB personal contacts. While in London he was the guest of honor at an old timers banquet. FY is the latest addition to the Albertas Radio Club. BC has been transferred to Blairmore. UH has acquired two fifty-foot poles for antenna. BX announces the arrival of a new antenna tower. TR is active on 14-Mc. CW. VR has taken over the duties of secretary of the NARC. CB is active again after power plant overhaul. MA and family had a swing time recuperation in Vancouver. RS has moved QTH to Edmonton. TK now has 36 members in AEC in Calgary. WS is all set to operate mobile on 3.8 Mc. IQ still maintains schedule with QSO. FX says 28 Mc. is the only band, proves it by getting daily contacts even when the band appears to be dead to the other locals. BW made a trip to Eastern U. NZ saw T.V. for the first time. ARLR reports only 82 members in Alberta. Let's make an effort to increase this. Remember, gang, ARLR is our organization. Applications may be sent through your SCM. Traffic: VE6NA 181. MJ 10.

BRITISH COLUMBIA — AHC, SGC, Ralph O. Norman, VE7ID — Amateur radio generally and emergency operations particularly continue to get publicity from US and 2G. US gave stirring lectures, reported in the press, to the local operation and is now in new QTH. CB is moving to Port Arthur. ZK is a welcome voice on 3.8-Mc. 'phone, 5FS is now located in Winnipeg and signing JL. IR, a new ham, is using an 807 final and a Converter. 1V5 and is very active on 7 Mc. DS is active in The Was. W3ZY upset the AFARS 'Phone Net on 3.8-Mc. when she paid a visit to LF. No role was called as everyone was too interested. Margaret Call again. JZ is active on 7 Mc. AW, at Dauphin, had the boys over, with XP, PA, HX, and WW all attending. It is reported that in between they managed one contact on 14 Mc. Don't talk me what in between. 1X5 is on 7 Mc. and uses a BC-348 for receiver. PA got his ticket OKed for 'phone but tried it, but when he turned to CW. He said that he would rather wander around at 10 w.p.m. than battle the 'phone QRM. Thanks for the dope Lyall. Ex-5MW now has 4AX, TN, WN, HB, HR, NJ, DK, MF, CH, SJ, DT, BB, LU, LO, LY, FO, HS, MG, BW, RP, RD, HL, MA, CC, GT, and AE.

PRAIRIE DIVISION

MANITOBA — SGC, A. W. Morley, VE7AM — FY is using 807 on 30 Mc. to a point and made a few nice contacts. The big rig is on 7-Mc. CW. BJ is heard on 3.5 Mc. with a total of 7 watts. IW is fully recovered from his recent operation and is now in new QTH. CB is moving to Port Arthur. ZK is a welcome voice on 3.8-Mc. 'phone. 5FS is now located in Winnipeg and signing JL. IR, a new ham, is using an 807 final and a Converter and is very active on 7 Mc. DS is active in The Was. W3ZY upset the AFARS 'Phone Net on 3.8-Mc. when she paid a visit to LF. No role was called as everyone was too interested. Margaret Call again. JZ is active on 7 Mc. AW, at Dauphin, had the boys over, with XP, PA, HX, and WW all attending. It is reported that in between they managed one contact on 14 Mc. Don't talk me what in between. 1X5 is on 7 Mc. and uses a BC-348 for receiver. PA got his ticket OKed for 'phone but tried it, but when he turned to CW. He said that he would rather wander around at 10 w.p.m. than battle the 'phone QRM. Thanks for the dope Lyall. Ex-5MW now has 4AX, TN, WN, HB, HR, NJ, DK, MF, CH, SJ, DT, BB, LU, LO, LY, FO, HS, MG, BW, RP, RD, HL, MA, CC, GT, and AE.

The Macmillan Co., 60 Fifth Ave., New York 11

Please send me the books checked by number below, I will remit in full or return the books within ten days without further obligation. 1. 2. 3. 4.

Signed. ..............................................................

Address ....................................................................
Hallicrafters
10" TV CHASSIS
$179.50

Complete with 10" Picture tube

T-64, Deluxe TV Chassis, completely wired — ready for custom installation. New Dual-Focus switch gives choice of conventional 56 sq. inch or 64 sq. inch telescopic view, 12-channel push-button tuning, improved circuits, FM sound, 15 tubes plus 3 rectifiers. Complete with 18 tubes, power supply, speaker and 10" CR tube. AC only.

No. A2088.................................Cash Price $179.50
Only $38.90 Down — 12 Months at $12.69

T-64, 12" TV Chassis. Same as above, but with 12" picture tube. No. A2089..............................Cash Price $199.50
Only $39.90 Down — 12 Months at $14.10

15" TV CHASSIS


Only $51.90 Down — 12 Months at $18.34

N E W

Hallicrafters
All-Wave PORTABLE RECEIVER
S-72
$79.95

Less Batteries
AC, DC or Battery
BC and SW

New Portable Communication Receiver for Broadcast or Amateur Use.

540 Kc to 31 Mc in 4 bands. Separate bandspread tuning. Loop and whip antennas. 6 tubes plus rect. Many deluxe features. Complete with tubes, less batteries.

No. A-2079.................................Cash Price $79.95
Only $15.99 Down — 12 Months at $5.85

Prices Slashed on These HALLCRAFTERS RECEIVERS

SX-43
Formerly $189.50
Reduced To
$159.50
Less Speaker

Only $31.90 Down — 12 months at $11.27

S-53
Formerly $89.50
Reduced To
$69.95

S-53 Receiver, Frequency range 540 Kc to 31 Mc, 48-54 Mc, 5 Bands. Two IF, 7 tubes plus rectifier. 115VAC. No. A2054...............................Cash Price $69.95
Only $13.99 Down — 12 months at $4.95

S-40A
Formerly $99.50
Reduced To
$79.95

with built-in Speaker

S-40A Receiver. Frequency range 550 Kc to 44 Mc, 4 Bands. One RF, two IF, 8 tubes plus rectifier. Internal speaker. No. A-2060...............................Cash Price $79.95
Only $15.99 Down — 12 months at $5.43

ALL HALLCRAFTERS EQUIPMENT IN STOCK

20% Down — One Year To Pay!

<table>
<thead>
<tr>
<th>Description</th>
<th>Cash Price</th>
<th>Pay Down</th>
<th>Per Mo.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-38 Receiver</td>
<td>$39.95</td>
<td>$11.83</td>
<td>$4.12</td>
</tr>
<tr>
<td>S-37 Rcvr. (less spkr.)</td>
<td>$59.75</td>
<td>$18.35</td>
<td>$6.12</td>
</tr>
<tr>
<td>S-47 Rcvr. (less spkr.)</td>
<td>$29.75</td>
<td>$9.90</td>
<td>$3.30</td>
</tr>
<tr>
<td>S-51 Rcvr., complete</td>
<td>$149.50</td>
<td>$9.90</td>
<td>$3.30</td>
</tr>
<tr>
<td>SX-62 Rcvr. (less spkr.)</td>
<td>$269.50</td>
<td>$9.90</td>
<td>$3.30</td>
</tr>
<tr>
<td>HT-17 Transmitter*</td>
<td>$39.50</td>
<td>$11.80</td>
<td>$3.95</td>
</tr>
<tr>
<td>HT-18 Oscillator</td>
<td>$110.00</td>
<td>$22.00</td>
<td>$7.78</td>
</tr>
<tr>
<td>HT-19 Transmitter</td>
<td>$359.50</td>
<td>$71.90</td>
<td>$25.41</td>
</tr>
</tbody>
</table>

*Complete with all coils for 10, 15, 20, 40, 80 mtrs.
Beginners

**HERE’S THE SHORTCUT TO THAT PERFECT FIST**

Automatic Dots and Dashes With the Modern Key.

The MON-KEY is a favorite with beginners and veteran cw operators alike.

In a very short time, beginners send faster, smoother code with the MON-KEY. The MON-KEY is complete. There’s nothing else to buy, it’s key, code practice oscillator, monitor — all in one.

Other features include:
- Automatic dots and dashes
- Dashes equal to three dots in duration
- Speed approx. 8 to 45 words per minute
- No weights to adjust
- Monitor with volume control
- Operation 115 v AC or DC

**ILLUSTRATED FOLDER ON REQUEST**

Amateur Net, Only $29.95

If your dealer can’t supply you, send check for $29.95 direct to us. Immediate shipment on Money Back Guarantee.

The following is an abstract of the minutes of the Executive Committee of the League during the past year between Board meetings, as ratified by the Board at its recent meeting, here published for your information by order of the Board:

Meeting No. 201, June 14, 1948. Appropriated $203.73 to cover director expense at the 1948 annual meeting in excess of the appropriation made by the Board. Ratified previous informal actions in approving the holding of ARRL conventions.

Meeting No. 202, Sept. 6, 1948 (in Milwaukee, Wisc.): Designated A. L. Budlong as acting secretary of the League to act until the next meeting of the Board of Directors.

Meeting No. 203, Oct. 4, 1948. Examined nominations in regular autumn elections, determined eligibility of candidates; in cases where there was only one eligible candidate, declared him elected without balloting; ordered ballots sent on others.

Meeting No. 204, Nov. 22, 1948. Opened and counted ballots in regular autumn elections, certified winning candidates. Ratified affiliation of 55 clubs, and affiliated 5 additional clubs. Appropriated $327.35 from surplus to cover past expenses of SCMs and QSL managers to conventions and organization meetings in excess of the Board appropriation already made for that purpose. Appropriated $500 from surplus to continue reimbursement to SCMs for future organization meetings only, and at a rate of 8¢ per mile. Adopted policy on availability of affiliated club lists parallel to Board directive on availability of membership lists.

**TVI Reduction**

(Continued from page 7)

numerous sources of interference and, of course, any improvements will likely be mutually beneficial.

Yes, it was hard work eliminating TVI — awfully hard. It was only two weeks until DX Contest time. But here is the pay-off. After completely eliminating this severe case of TVI, my worst case of BCI is also cured. Two cases of small a.c.-d.c. sets in the immediate neighborhood no longer know the transmitter is on the air.

Ho hum . . .

**Happenings**

(Continued from page 6)

similar news of interest to the radio amateurs of all countries. The broadcasts, the first of which was aired on June 25th, are scheduled twice weekly: each Saturday at 4:45 P.M., EDST, beamed to Europe and the near East; and each Sunday at 9 A.M., EDST, beamed to the Far East and Latin America. Transmissions are made simultaneously on several of the h.f. broadcast bands from 9 Mc. up. Relay stations at strategic points add to the coverage of both hemispheres.

**REGS CHANGE**

As of August 1st FCC has made a slight modification in our rules which, although having no practical effect on amateur operation, we wish to record here. In Sec. 12.111, amateur frequency allocations, the phrase “1800 to 2050 kc.” is changed to “1800 to 2000 and 2006 to 2050 kc.” and a later reference to “2000 to 2050 kc.” is changed to “2006 to 2050 kc.” The band 2006 to 2050 kc. remains unavailable for amateur use, as before.

**EXECUTIVE COMMITTEE MEETINGS**

The following is an abstract of the minutes of the Executive Committee of the League during the past year between Board meetings, as ratified by the Board at its recent meeting, here published for your information by order of the Board:

Meeting No. 201, June 14, 1948. Appropriated $203.73 to cover director expense at the 1948 annual meeting in excess of the appropriation made by the Board. Ratified previous informal actions in approving the holding of ARRL conventions.

Meeting No. 202, Sept. 6, 1948 (in Milwaukee, Wisc.): Designated A. L. Budlong as acting secretary of the League to act until the next meeting of the Board of Directors.

Meeting No. 203, Oct. 4, 1948. Examined nominations in regular autumn elections, determined eligibility of candidates; in cases where there was only one eligible candidate, declared him elected without balloting; ordered ballots sent on others.

Meeting No. 204, Nov. 22, 1948. Opened and counted ballots in regular autumn elections, certified winning candidates. Ratified affiliation of 55 clubs, and affiliated 5 additional clubs. Appropriated $327.35 from surplus to cover past expenses of SCMs and QSL managers to conventions and organization meetings in excess of the Board appropriation already made for that purpose. Appropriated $500 from surplus to continue reimbursement to SCMs for future organization meetings only, and at a rate of 8¢ per mile. Adopted policy on availability of affiliated club lists parallel to Board directive on availability of membership lists.

**ORIGINAL**

**TWIN-LINE CONNECTORS**

TWIN LEAD SOCKET PLUG
FOR STANDARD 300 OHM FM and TV LINE

There are scores of uses for this handy little gadget. A polystyrene block ¾" x ¾" x ½" with pins spaced to fit standard ½ inch crystal sockets—or alternate pinholes in octal sockets.

**LIST PRICE 46¢ EACH**

**ELECTRIC EYE EQUIPMENT CO.**
8 West Fairchild St., Danville, Ill.

**EXPORT:** Rocke International Corp.,
13 E 40th Street
New York 16, New York
BOB HENRY

Has it in Stock . . .

and Offers You a

BETTER DEAL!

Henry Radio stores in Butler, Missouri and 11240 West Olympic Blvd., Los Angeles, California have complete stock of all Collins and of all other amateur receivers, transmitters, and parts. I promise you that you can find nowhere else lower prices, more complete stocks, quicker delivery, easier terms or more generous trade-ins. I give you 10-day free trial and 90-day free service. I promise that you will be satisfied on every detail. Write, wire, phone or visit either store today.

A FEW ITEMS I STOCK ARE:

- National NC-33 $57.50
- National NC-57 $89.50
- National NC-173 $189.50
- National NC-183 $268.00
- National HRO-7 $292.50
- National HRO-7C $372.45
- National HFS $142.00
- Hallicrafters S38 $39.95
- Hallicrafters S72 portable $79.95
- Hallicrafters S40A $79.95
- Hallicrafters SX71 $179.50
- Hallicrafters SX43 $159.50
- Hallicrafters SX42 $275.00
- Hallicrafters SX62 $269.50
- Hallicrafters HT18 $110.00
- Hallicrafters HT19 $359.50
- RME HR-10-20 $77.00
- RME VHF-152A $86.60
- RME DB22A $71.00
- Hammarlund HQ-129X $177.30
- Signal Shifter EX kit $49.75
- Telvar T60-2 $150.00
- Harvey-Wells TBS-50 $99.50
- Harvey-Wells TBS-50A $121.25
- Hunter 20A Cyclomaster $169.50
- Subraco MT-15X $79.95
- Hallicrafter & National TV sets

Gonetet, Silver, Meissner, Miles, Sonar, Stancor, Bud, Mon-Key, Vibraplex, B & W, Johnson, RCA, Gordon, Amphenol, Hy-Lite, Elincor, Workshop, Premax; I have everything for the amateur.

Some prices higher on west coast

BOB HENRY
W9ARA

HENRY RADIO STORES

11240 West Olympic Blvd.
Los Angeles 25, Calif.

"WORLD'S LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"
RADAR, COMMUNICATIONS and SONAR TECHNICIANS WANTED

For Overseas Assignments

Technical Qualifications:
1. At least 3 years’ practical experience in installation and maintenance.
2. Navy veterans ETM 1/c or higher.
3. Army veterans TECH/SGT or higher.

Personal Qualifications:
1. Age, over 22—must pass physical examination.
2. Ability to assume responsibility.
3. Must stand thorough character investigation.
4. Willing to go overseas for 1 year.

Base pay, bonus, living allowance, vacation add up to $7,000.00 per year. Permanent connection with company possible.

Apply by Writing to
C-3, P.O. Box 3552
Philadelphia 22, Pa.

Men qualified in RADAR, COMMUNICATIONS or SONAR give complete history. Interview will be arranged for successful applicants.

NEW ENGLAND DIVISION

Connecticut

WBDU...... 30,905-06-250
WINJ........ 30,600-07-251
WJTD........ 29,627-53-238
WIDX...... 18,870-51-170
WILHE...... 18,780-48-180
WILQV...... 10,293-49-148
W4IEM/I..... 8092-34-109
WIPEK...... 7735-35-103
WIBMM...... 5890-37- 71
WJMY........ 1773-31- 84
WIFTX...... 5070-25- 83
WIAW...... 4238-25- 64
WIFWH...... 3984-26- 54
WIRFC...... 3468-24- 46
WIBUD...... 3234-26- 64
WICTI...... 2100-15- 28
WIBDI...... 2085-15- 27
WIAPA...... 733-12- 18
WIRY...... 598-14- 21
WIDXT...... 298- 8- 11
WIKEE...... 37- 1- 1

Maine

WIGXJ...... 39,910-60-237
WIMDF...... 13,110-38-133
WILKD...... 6718-23-106
WINXX...... 3454-32- 61
WICOV....... 2846-37- 49
WLYA...... 4200-19- 19
WIPDN/A..... 818-14- 22

E. Massachusetts

W1QM....... 38,003-61-264
W1AQE...... 30,387-57-273
W1USM....... 25,422-67-223
W1QMJ...... 23,390-50-217
W1RS........ 41,200-50-176
W1PIJ....... 6270-31- 50
W1MEG....... 4175-25- 46
W1RKG....... 1690-20- 24
W1PYM....... 1082-19- 29
W1MD........ 871-11- 13
W1BB....... 357- 7- 8

W. Massachusetts

W1YJH...... 42,575-61-309
W1EOB...... 36,540-60-292
W1RBU....... 11,022-33-130
W1JYJ....... 4720-35-109
W1RJN....... 5064-24- 83
W1BEF....... 3054-29- 64
W1JIT....... 1350-15- 26
W1OEU...... 270-10- 14
W1BDY....... 295- 5- 6

New Hampshire

W1CRC....... 27,108-54-281

Rhode Island

W1GCH....... 33,072-53-279

Vermont

W1KRV....... 34,100-62-250

NORTHWESTERN DIVISION

Alaska

W1LBW/KL7.... 7267-41- 89

Idaho

W7EMT....... 9331-43- 96

Montana

W7B8U....... 30,012-61-211
W7KQJ....... 15,057-51-129
W7KVR........ 11,844-47-128
W7F6B....... 8418-44- 97
W7KHY....... 2760-20- 29

(Continued on page 55)

Member Party

W7KGN....... 2632-28- 47
W7COH....... 1160-18- 36
W7GBL....... 275-11- 13

Oregon

W7BOH....... 15,777-48-106
W7LNG....... 510-15- 17

Washington

W7UTY....... 31,941-01-262
W7WKC....... 25,760-59-191
W7CTY....... 19,630-45-110
W7GP........ 13,113-47-100
W7FWD....... 10,870-48- 89
W7ZU....... 9785-41- 83
W7AMZ....... 3150-25- 88
W7DP....... 1965-15- 23
W7ETO....... 918-17- 27
W7WY....... 96- 6- 8

PACIFIC DIVISION

Hawaii

KH6JJ....... 8600-40- 91

Santa Clara Valley

W6BQ....... 34,658-02-242
W6KMM....... 20,000-50-183

East Bay

W6PH....... 29,400-55-156
W6JW....... 3312-24- 74
W6FQ....... 2774-15- 33
W6EX....... 630-10- 14

San Francisco

W6BQ....... 23,300-69-164
W6NL....... 9886-48-103

Sacramento Valley

W6MTY....... 4590-34- 55

San Joaquin Valley

W6RU....... 26,561-58-229

ROANOKE DIVISION

North Carolina

W401X ........ 27,664-56-248
W4FPL........ 16,450-50-147
W4GJH........ 15,008-09-156
W4DQ........ 3550-28- 54
W4QO/A/....... 2714-24- 44

Virginia

W4PFC....... 73,350-70-482
W4LA....... 35,340-62-268
W4BZE....... 34,200-02-248
W4LAP....... 25,500-57-522
W4KYM....... 20,125-50-193
W4FF....... 15,640-40-130
W4NCR....... 9856-54-102
W4PC........ 9130-38-165
W4RL........ 9740-08- 50
W4WM........ 3724-28- 49
W4ITA....... 1624-14- 18

West Virginia

W3JUM....... 16,385-58-151

ROCKY MOUNTAIN DIVISION

Utah-Wyoming

W7UGJ....... 11,892-46-116
W7UTM....... 8588-38- 73
W7VYR....... 1080-21- 25

Colorado

W7MC....... 33,090-56-912
W7CDP....... 30,149-59-218

(Continued on page 89)
<table>
<thead>
<tr>
<th>Type</th>
<th>SW</th>
<th>I</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-87</td>
<td>4-16</td>
<td>150</td>
<td>$3.09</td>
</tr>
<tr>
<td>C-88</td>
<td>4-16</td>
<td>200</td>
<td>$3.82</td>
</tr>
<tr>
<td>C-89</td>
<td>4-16</td>
<td>250</td>
<td>$5.29</td>
</tr>
<tr>
<td>C-90</td>
<td>3-14</td>
<td>300</td>
<td>$5.59</td>
</tr>
<tr>
<td>C-91</td>
<td>3-14</td>
<td>350</td>
<td>$6.25</td>
</tr>
</tbody>
</table>

**SUPERIOR POWERSTATS**
Smooth, direct current voltage control. 0 to 135V output from 115V AC line.

- Type 20 illustrated (3 amps) $12.30
- 116 CE $99.00
- Type 116U for panel mg $99.00
- 116U $59.00

**ALUMINUM CHASSIS—Heavy Duty**
- 7 x 7 x 2 94c
- 7 x 9 x 2 89c
- 5 x 10 x 3 $1.00
- 7 x 11 x 2 $1.15
- 7 x 13 x 2 $1.25
- 10 x 17 x 3 $1.88

**NATIONAL CHASSIS**
Live in a fringe area? Want bright pictures? The new National TV Booster solves your problem. Covers all 12 channels. It's ideal for apartments or other places where outdoor antennas cannot be used. Self-contained power supply, 115V AC, 60 cycles, 10W. Special $39.95

**WIRE WOUND POTENTIOMETER**
100,000 ohm, precision, made G.R. type. 25 ohm precision meter. Brand New $1.95

**SELSYN MOTORS**
115 V A.C. 60 cycle ±C-27248. Can be used to turn small antenna or other indicators. Size 3½" x 5½". Price per pair $6.95

**RAYTHEON VOLTAGE STABILIZERS**
Positive Stabilization ±1%
Input 95-130 volts, 60 cycles single phase; output 115 volts stabilized ±1%. *Output 6.0 or 7.5 volts stabilized ±1%.

**GRID DIP METER**
LYSCO "DIPMASTER" 3 Ma to 150 Ma frequency for signal generator, 3 to 300 Ma range phone monitor, F.S. phase meter, or absolute power supply. Comes complete. Really a useful tool and good buy at $33.50

**STEEL CHASSIS 16 GAUGE**
- 4 x 17 x 3 Black Crackle $1.05
- 4 x 14 x 3 Black Crackle $1.44
- 4 x 17 x 3 Black Crackle $1.94
- 13 x 17 x 3 Black Crackle $2.35
- 13 x 17 x 4 Black Crackle $2.70

**FILAMENT TRANSFORMERS**
<table>
<thead>
<tr>
<th>Type</th>
<th>SW</th>
<th>I</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 940</td>
<td>2.5V</td>
<td>10 Amps</td>
<td>$0.79</td>
</tr>
<tr>
<td>Type 940</td>
<td>5.5V</td>
<td>3 Amps</td>
<td>$2.06</td>
</tr>
<tr>
<td>Type 543</td>
<td>5</td>
<td>20 Amps</td>
<td>$3.38</td>
</tr>
<tr>
<td>Type 946</td>
<td>6.3V</td>
<td>3 Amps</td>
<td>$1.91</td>
</tr>
<tr>
<td>Type 948</td>
<td>6.3V</td>
<td>10 Amps</td>
<td>$2.79</td>
</tr>
<tr>
<td>Type 960</td>
<td>7.5V</td>
<td>4 Amps</td>
<td>$2.35</td>
</tr>
<tr>
<td>Type 146</td>
<td>10 V</td>
<td>10 Amps</td>
<td>$4.12</td>
</tr>
<tr>
<td>Type 961</td>
<td>6.3V</td>
<td>3 Amps</td>
<td>$2.38</td>
</tr>
<tr>
<td>Type 961</td>
<td>2.6V</td>
<td>3 Amps</td>
<td>$3.38</td>
</tr>
</tbody>
</table>

**BIAS TRANSFORMER TYPE K 56797**
Completely shielded, Insulator terminal. Primary: 115 Volts 60 cycle 200 V ± 10%. Secondaries:
- 300 V ± 10% $3.50
- 200 V ± 10% $3.75
- 300 V ± 10% $3.50

**CONVERTERS**
Mobile or Fixed, RF Gain control. Simplified installation. Size 2" x 2" x 1/2". Model 210 $25.20
Model 213 to 30 Mc-10 meters $25.50
Model 214 to 148 Mc-2 meters $25.50
3 tubes for converter $3.49

**TRANSISTORS**
Mobile or Emergency, 8 watt output crystal control, push to talk. Power rating: 6.3V, 2 amp; 300V, at 110 Ma. Without dynamotor. Model 129 $6.95
Model 175-29.7 Mc (10 meters)...$23.95
Model 175-370 to 4000 Kc (75 meters)...$23.95
6AL5 tube $1.11
SOUTHEASTERN DIVISION

Alabama
W4CYC........ 43,112-66-282
W4MXU........ 27,335-58-206
W4FJ........ 18,984-54-136

Eastern Florida
W4LF......... 28,497-56-100
W4AYV........ 24,944-61-107
W4JYT........ 1409-22-32
W4BYR........ 476-14-17

Western Florida
W4TL........ 20,288-54-195
W4OKD........ 12,470-49-120
W4QBD........ 7440-49-68
W4AXP........ 4890-30-46

Georgia
W4MCM........ 20,700-45-224
W4GDD........ 3839-29-29

West Indies
K4PNQ......... 19,133-58-103
K4PBD........ 8778-38-65

Canal Zone
K2VBY.......... 1599-19-28

SOUTHWESTERN DIVISION

Los Angeles
W6SSF........ 21,924-54-161
W6CMN........ 21,188-54-186
W6VQAQ....... 17,220-49-82
W6FYW........ 927-9-11
W6AM........ 32-4-4

Arizona
W7JPP........ 20,340-52-185
W7QAP........ 12,192-48-126

San Diego
W6GM......... 31,688-65-209
W6MVO........ 24,095-61-209
W6MJI......... 17,712-54-124
W6BGF........ 406-9-10

WEST GULF DIVISION

Northern Texas
W5JD........ 17,952-59-163
W5CDU........ 16,115-59-151

Southern Texas
W5PCF........ 9960-40-82
W5MCT........ 6232-38-82

New Mexico
W5OA1......... 32,320-53-220

CANADA

Maritime
VE1PA.......... 28,404-54-124
VE1CU........ 16,288-49-132
VE1EK........ 13,300-38-140
VE1IM........ 1,174-37-119
VE1EB........ 7535-53-70

Ontario
VE3AWB........ 23,436-54-192
VE3BUR........ 21,388-48-180
VE3ACB........ 18,522-54-134
VE3AKD........ 16,282-47-150
VE3DU........ 14,214-57-117
VE3AUY........ 9234-88-84
VE3DHS........ 6954-38-83
VE3BAJ........ 1920-12-18

Quebec
VE3BMG........ 12,240-40-141

Alberta
VE3BMJ........ 2228-18-32

British Columbia
VE3BSW........ 24,567-59-172
VE3BFAI........ 3534-31-57

Ontario
VE4HS........ 3912-24-44
VE4HS........ 3536-33-51

Saskatchewan
VE4CSW........ 3932-24-44
VE4HS........ 3536-33-51

Tentative

TVI Tips

(Continued from page 45)

placed so that the actual connections to ground and to the lead being by-passed are right at the bakelite case and not at the ends of the leads furnished with the condensers. A similar "leadless" technique also can be practiced with the physically-larger high-voltage units.

The small shielded wire available has a rather surprising breakdown-voltage rating—several thousand volts—but to be on the safe side a wire with fairly husky insulation should be used for circuits of 1000 volts or over. Although shielded wire is more expensive than ordinary hook-up wire, the actual cost is small because we have so far had no trouble with inadvertent short-circuits caused by soldering to the shield braid. Such troubles are unlikely if reasonable care is used—"care," in this case, meaning to have the shield braid bright and clean before soldering, to use a good rosin-core solder, and to apply the heat just long enough to make the solder run freely. The quicker a joint can be made the less danger of softening or burning the insulation. — G. G.
WORLD FAMOUS WRL TRANSMITTERS deliver MORE WATTS per DOLLAR!

"Deal with the World's Most Personalized Radio Supply House"

I FINANCE MY OWN PAPER — MAKING IT EASIER AND CHEAPER FOR YOU TO BUY FROM ME — LIBERAL TRADE-IN ALLOWANCE ON YOUR PRESENT EQUIPMENT. LET'S GET ACQUAINTED!

LEO I. MEYERSON
WOGFQ

THE NEW WRL
"400" GLOBE KING
350 Watt Phone — 400 Watt CW
An outstanding value—for the first time a transmitter at less than $1.00 per watt! Unconditionally guaranteed! A versatile, advanced design transmitter that will give you efficient performance on all bands from 10 to 160 on phone and CW, 350 watt phone 100% modulated, and 400 watt CW make this XMT the outstanding buy on the market. Provisions for ECO. Complete with one set of coils.

$39945 WIRED $37945 KIT FORM

WRL 175 WATT GLOBE CHAMPION
R.F. Section a complete 175 watt XMT—provisions for ECO—Automatic Bias on Final and Buffer—voltage regulated Oscillator and Buffer—class B Speech Modulator—175 watt input from 10 thru the 160 meter band—complete with tubes and meters including 1 set of coils — specially crated for safe shipment.

$28900 WIRED $26900 KIT FORM

WRL 40 WATT GLOBE TROTTER
Capable of 25 watt input on phone and 40 watt input on CW on all bands from 1500 KC through 28 megacycles. Band switching for any 3 bands. A proven rig. Thousands in operation throughout the world.

$7950 WIRED $6995 KIT FORM

GIANT RADIO REFERENCE MAP
Just right for your control room wall. Approximately 28"x42". Contains time zones, amateur zones, leading short-wave stations, monitoring stations. Mail Coupon Today and 25¢

The most complete Ham Catalog ever assembled. Send for your copy today!

Free

WRITE—WIRE PHONE 7795

WORLD RADIO LABORATORIES
744 West Broadway
Council Bluffs, Iowa

Please send me:

☐ New Catalog
☐ "400" Globe King
☐ Radio Map
☐ 175 Watt Globe Champion
☐ List of Used Equipment
☐ 40 Watt Globe Trotter

Name______________________________
Address______________________________
City_________________________State_________________________

87
TRYLON TOWERS FOR AMATEURS

Buy only the genuine, lightweight TRYLON Steel Ladder Towers. Ezeely adapted to Amateur use, they employ the basic design of the famous TRYLON Vertical Radiators. Look for these features:

- Designed and engineered for 100 mph winds
- All steel parts hot dip galvanized after fabrication to rigid Army and Navy specifications
- Easy-to-climb ladder on all towers
- Prefabricated guys with factory assembled compression sleeves
- "PALMUTS" supplied with each and every bolt
- Easy to install on small ground area

60" STEEL LADDER TOWER
Shipped completely knocked down, with 2 sets of 3 prefabricated guys, 3 earth anchors, top casting, and top plate. 12" face size, Approx. Shipping Wt. 420 lbs.

Wire, write or call
WIND TURBINE COMPANY
West Chester, Pennsylvania

Don't Lose those Good QSO's While Turning Your Beam by Hand

MUNGER Electro-Beam ROTATOR

Hold those rare DX contacts right through QRM by peaking up your own and received signals in a few seconds. Ruggedly built, Powerful reversible motor. 115V—60 cycles. Swings your beam at 1 r.p.m.

- Price Includes Reversible Electro-Beam Rotator and Accurate Direction Indicator
- Professional Potentiometer and Meter Circuit. Calibrations in Both Degrees and Directions

Free Inspection Offer!

Order today. If not satisfied, return rotator within 10 days for refund. (Control-power cable supplied at 10c per ft. in 50' or 100' lengths.)

MANUFACTURED AND SOLD EXCLUSIVELY BY
REX L. MUNGER COMPANY
4701 Sheridan Road, Chicago 40, III.

PRICE AT ONLY
Complete

Illustrated Bulletin on Request
- - - Time Payment Plan

$69.20

TRYLON LADDER TOWERS

S.S. for the Average Ham
(Continued from page 60)

Adjustment

Adjustment of the exciter is best made under actual operating conditions. Connect the exciter to the transmitter, load the transmitter into a dummy load, apply r.f. excitation to the exciter, feed a source of sine-wave audio into the speech amplifier, and tune the transmitter in the conventional way for maximum output.

Remove the audio input to zero, and adjust potentiometers R6 and R10 for minimum carrier output. Minimum carrier output may be determined by any sensitive r.f. indicator coupled to the final-amplifier plate circuit. A 0-1 milliammeter, in series with a crystal detector and a two-turn coupling loop, will make a satisfactory indicator. The meter should be by-passed with a 0.005-µfd. condenser. If a null indication cannot be obtained within the range of the potentiometers, the 6V6 tubes are not evenly matched. Exchanging the positions of the 6V6s may aid in obtaining the balance, or other tubes may have to be used.

After the carrier balance is obtained, tune in the r.f. source on the station receiver, and with the antenna terminals shorted, and the crystal selectivity in sharp position, adjust the crystal phasing to the point where only one sharply-peaked response is obtained as the receiver is tuned through the signal. Now apply sine-wave audio of about 1500-cycle frequency to the speech amplifier, and find the two sidebands on the receiver. Three distinct peak indications will be observed on the S-meter as the receiver is tuned. Set the receiver on the weaker of the two sidebands and adjust L1, C1 and R11 for minimum sideband strength. If suppression of the other sideband is desired, throw S1 to its other position. A dip obtained with one set of adjustments is not necessarily the minimum. Other combinations should be tried. The final adjustment should give S-meter readings for the two sidebands which differ by at least 30 db. The bias voltages on the two pairs of balanced modulators will be equal.

After the adjustments have been completed, the r.f. drive to the exciter should be adjusted to the point where a decrease in drive will cause a decrease in output, but an increase in drive will not cause an increase in output. The complete adjustment procedure should then be rechecked. The rig is then ready for a microphone, an antenna, and an on-the-air test.

If an oscilloscope is available, a simpler and more reliable adjustment procedure may be used. Either linear or sine-wave horizontal sweep may be used on the oscilloscope. The vertical input should be coupled to the output of the transmitter in the same manner as is used for observing amplitude modulation. The sine-wave audio-frequency input to the speech amplifier should be any convenient multiple of the oscilloscope sweep frequency. A 60-cycle sweep frequency and

(Continued on page 90)
TWO MORE GREAT NAMES
Come To Electronic Wholesalers, Inc.

COMPLETE LINE
JAMES MILLEN MFG. CO., INC.

BRAND NEW! Grid Dip Meters with 100 applications!

Use it to align receiver tuned circuits, determine frequency of transmitter tuned circuits with power off, transmitter neutralization, find parasitic oscillations. Frequency Range: 1.7 to 300 megacycles in seven overlapping ranges.

No. 90651 • Grid Dip Meter complete with 7 inductors, rack and tube. $55.00

VOLUME CONTROLS
- SWITCHES
- JACKS
- CONDENSERS

COMPLETE LINE!
MALLORY
ELECTRONIC COMPONENT PARTS

- Products of all National Manufacturers in stock—25% deposit on C.O.D. orders, F.O.B. Washington, D. C.

Washington’s Big Radio Parts Distributor Has All the Greatest Names in Radio
AIR CONDITIONED

Electronic wholesalers, inc.
2010 14th STREET, N. W. • WASHINGTON 9, D. C.

LANSING • XCELLITE • KRAUETER • SPRAGUE • BELDEN
STURDY! JOHNSON BANANA SPRING PLUGS AND JACKS

Studs extend full length of springs for added support. High grade nickel plated brass screw machine parts with accurate threads and milled nuts. All plugs can be furnished with nickel, cadmium or silver plating if required. JOHNSON also manufactures spring sleeve types, removable round head tip jacks, molded round head tip jacks, insulated combination jacks, metal head tip jacks, twin tip jacks and shorting type twin tip jacks.

See them at your JOHNSON Dealer...notice their high quality...excellent design!

E. F. JOHNSON CO.
WAASECA, MINNESOTA

MORE SIGNALS PER DOLLAR
From Money Invested in an Antenna

ATTRACTION--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
(We will supply stress diagrams for your building inspector)

EASY MONTHLY PAYMENTS
Up to 12 Months to Pay!

All Vesto Towers are available on a special monthly payment plan which requires only 1/8 down. Write for free details.

IMMEDIATE DELIVERY
on all 8 popular sizes. Note the low prices for these quality lifetime towers: 22'-$73.50, 28'-$92.25, 33'-$109.75, 39'-$129.75, 44'-$149.75, 50'-$175.00, 61'-$229.75, 100'-

$846.50. Towers are shipped to your home knocked down, FOB Kansas City, Mo., 4th class freight. Prices subject to change...so order now! Send check or money order...or write for free information.

The VESTO Company
101 Main St., Parkville, Mo.

Noise-Generator Technique
(Continued from page 91)

from almost any source that is available. The value of resistors $R_2$ and $R_4$, and of potentiometer $R_3$, should be adjusted so that about 60 volts positive appears at the point indicated in the diagram. The potentiometer may then be used to set the flashing level to any desired percentage of modulation using an oscilloscope or other modulation indicator. Since the current drain on the bias source is low, even batteries may be used.

In operation, once the desired flashing level has been set by $R_3$, the neon tube will flash every time you exceed that level. To be on the safe side, it should be set to flash before the 100-per-cent level is reached. — R. Page Burr, W2KQP

Hints & Kinks
(Continued from page 68)

from almost any source that is available. The value of resistors $R_2$ and $R_4$, and of potentiometer $R_3$, should be adjusted so that about 60 volts positive appears at the point indicated in the diagram. The potentiometer may then be used to set the flashing level to any desired percentage of modulation using an oscilloscope or other modulation indicator. Since the current drain on the bias source is low, even batteries may be used.

In operation, once the desired flashing level has been set by $R_3$, the neon tube will flash every time you exceed that level. To be on the safe side, it should be set to flash before the 100-per-cent level is reached. — R. Page Burr, W2KQP

No commercial equipment is on the market that is reliable, accurate, and can take care of all the needs that can be developed in a noise generator. One highly-prized commercial receiver for the v.h.f. range was shown to have a noise figure of 11 db. No bandswitching commercial receiver yet checked has come even close to the performance that any amateur can obtain with a little care, know-how, and a noise generator.

Well, maybe you still feel that you want the mechanical qualities which the manufactured receiver or converter provides. Then how about a preamplifier ahead of it? We have yet to see the commercial v.h.f. job whose performance cannot be mightily improved by the addition of a cascode amplifier, or even a simple neutralized 6J6 ahead of it.

The way to improved v.h.f. coverage lies along the road of improved receiver performance. In the years since the war we've learned to work on

(Continued on page 92)

3 "Using the Cascode on 50 Mc.,” QST, March, 1949, page 29.
SEN SATIONAL “SURPRISE” TRADE-IN ALLOWANCES ON YOUR USED, FACTORY-BUILT COMMUNICATION EQUIPMENT, MAKE IT POSSIBLE FOR YOU TO OWN HALICRAFTERS TV FOR FAR LESS MONEY! Here's all you have to do: Simply tell us what you have to trade. Indicate your preference for any one of the Hallicrafters TV sets or Chassis featured. We'll respond with an extra-liberal allowance that's sure to please you. Start right now to enjoy your new Hallicrafters TV set... the equipment that steals the show for its brightness, clarity and advanced engineering features. Wire, write, phone or use the handy coupon. Do it today!

HALICRAFTERS TV Model 509
Push button tuning on all 12 channels. Dual Focus for larger round pictures with 56 sq. in. rectangular picture or 64 sq. in. full circle picture for dramatic close-ups—all at a flick of a front panel switch. Mahogany veneer cabinet. Transparent safety shield. 19 tubes plus 3 rectifiers. Complete with ALL TUBES. Shpg. Wt. 105 lbs.

$269.50

TELEVISION CUSTOM CHASSIS

Model T-69
15” TV CUSTOM CHASSIS
Now! Big picture television at a price. 130 sq. in. direct view picture. All 12 channel push button tuning. 8” FM speaker. Mounted on reinforced wood frame ready to be slipped into cabinet or opening in wall, etc. Dimensions 19¼” high x 23” wide x 21⅛” deep. Factory wired and tested. Complete with 15AP4 Picture Tube.....

$259.50

Model T-64
Chassis unit only, of Model T-509.
Plan your own TV installation and save money! 95 sq. in. picture with 12” tube; 64 sq. in. picture with 10” tube. Push button tuning on all 12 TV Channels. New DUAL FOCUS Switch for larger, round picture. Factory-wired and tested. Complete with 19 tubes plus 3 rectifiers.

NOW! NEW LOW PRICES ON
T-64 Chassis Complete   $179.50  Shpg. Wt. 63 lbs.
With 10” Picture Tube....  $199.50  Shpg. Wt. 66 lbs.

Walter Ashe Radio Co.
Bill DoBard, WGOBF, Mgr., TV and Amateur Div.
1125 Pine St., St. Louis 1, Missouri
Q-49-8

Walter Ashe
1125 PINE ST. • ST. LOUIS 1, MO.
Mobile “75”
ANTENNA
BASE-LOADED

The Premax Mobile “75” Base-Loaded Antenna vastly improves the radiation characteristics of this Antenna over those of ordinary "whip" types. Its 6-decibel gain is immediately apparent as it is equivalent to quadrupling transmitter power and greatly increases effectiveness and range, both on transmission and reception.

It consists of an unusually long, space-wound, base-loaded inductor, topped by a vertical whip. With this Antenna many of the usual difficulties in the 75-meter band have been overcome, permitting wider operations.

Write for special Bulletin and prices

PREMAX PRODUCTS
DIVISION CHISHOLM-RYDER CO., INC.
4904 Highland Ave. Niagara Falls, N.Y.

NOW! RF POWER MONITOR
Micro-Match

50 and 144 Mc. with signal levels which would have been unthinkable before Intelligent and widespread employment of noise-generator technique should speed us farther along that road, at the end of which lies the theoretically “perfect” receiver.

Correspondence
(Continued from page 55)

but has been reawakened during a few ten-meter DX contacts. I’ve run into many hams in many countries who are collectors of these stupid chunks of paper.

It seems to me that both hobbies have terrific potentialities in furthering international good will and brotherhood. Why can’t they be combined, with an occasional on-the-air get together? If we could get the ball rolling, a really good organization could be fostered. Possibly there is such a group. If so, I’d like the dope on it. If not, let’s start one.

— P. H. Rockwood, 1FLVTV

CQ HOUNDS
Kineardine, Ontario, Canada

Editor, QST:

To ARRL I would suggest that you add to your many fine certificates and awards a “CQ ROUND CERTIFICATE.” This to be awarded to ops who clutter up the bands with seemingly endless strings of CQs and other undesirable operating practices. I have heard 60 and more CQs without a station signature and think that a certificate as ugly in appearance as some of these ugly procedures are themselves might help to clear up some of our QRM problems.

— K. Lautenbacher, VESATR

TWO-METER C.W.
10110 Pierce Drive, Silver Spring, Md.

Editor, QST:

... I deplore the complete ignorance of the advantages of A1 exhibited by most 2-meter stations to the northwest. Apparently all except 2 or 3 have no b.f.o. or don’t know the code. I wish we had an exclusive band of 100 kc. or so for A1 only on 144 Mc., as it would save much time spent in tuning a 4000-kc. band with a receiver 100 cycles wide. The boys to the north and west are much more alive to c.w. — they respond well to A1 calls and shift to A1 without request when the conditions or QRM get bad.

— William L. Smith, WS9KP

40-METER QRM
1727 Van Hise Ave., Madison 5, Wis.

Editor, QST:

Just because certain portions of the 40-meter band ring with the sound of foreign ‘phone stations is no reason these frequencies cannot be used successfully by American amateurs. By operating the transmitter within two kilocycles of a strong foreign carrier, your signal can be heard rather easily by anyone whose b.f.o. is turned off. The foreign station acts like a b.f.o., producing an audible tone at the receiver. I heard W9DRA’s 40 wats RST 590 while he was beating with a Russian ‘phone on 7280 kc. This technique is not as successful when the ‘phone station is transmitting music as when voice is being broadcast, but with a good crystal filter results can still be obtained.

— Thomas J. Maresca, WS8FQX

SWITCH TO SAFETY!
CRYSTALS WITH A MILLION USES

Crystals from Armco MC harmonic ratings but Sun encloses directions for deriving the correct fundamental frequency in kilocycles.

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 to 100 kHz</td>
<td>$3.89 each</td>
</tr>
<tr>
<td>100 kHz to 1 MHz</td>
<td>$9.99 each</td>
</tr>
</tbody>
</table>

**CATHODE RAY TUBE - $3.99**

**METERS**

- **WESTON** 2" r. 500 micro-amp, with scale for 0-15/600v: $2.97
- **TRIPLETT** - 3" sq., 0-10 DC METER: $4.97
- **SUN** 2" r. 0-800 V DC: $2.97
- **WESTINGHOUSE** 2" sq. 0-150 V AC: $4.97
- **SIMPSON-FOUNDATION METER** for J-177 Mutual Conductance Tube Tester: $3.49
- **WESTON** - 2 range ohmmeter, new with base, 0-10/1000 ohms: $12.95
- **PORTABLE AMPLIFYING MEGAPHONE**, complete with carrying case, tripod, extra mike: $29.95
- **TUNING UNITS** - from BC 375, TU 98, TU 108: $1.95
- **TRANSmitter** - **SUN**-1073A, 150-210 mc, original unit with BC 1073A Wavemeter, complete with tubes and 15v-60cy supply: $19.95
- **PB 2-6 MC RECEIVER**, 6 tubes, 4 PB preset to any frequency, 4 complete version instructions, H1 band supplied: $9.95
- **MAGNETRONs** - $18.95

**MOntor Scope UNIT** - TS - 121/CYP. $29.95

**ANNouncements**

- **SUN** 2" r. O-1000 V DC: $2.97
- **28v VAC**...

**HeadsPhones**

- **H-B 4** - High-impedance with PL 55 plug: $2.49
- **PB 20** High-impedance with phone plug: $2.99

**AlumINUM Rods** - 30" by 1/4" diam. for constructing antennas: $1.29

**GENERAL USE** - $9.95

**CATHODE TUBE - 15GA**.

**Electrostatics**...

$12.95

**JF 29/8 2B Transmitting Tube** - $3.99

**SOCKET FOR ABOVE**: $1.99

**Antenna Relay UNIT** - BC442A with R. F. Ammeter Vacuum control: $2.89

**BC-746 TUNING UNIT** - Contains antenna and tank coils tuning cond. Ideal foundation for miniature transmitters. with 2 xtras, 1 in 80 mc band and 1 in 30 mc band: $1.29

**Aluminum Rods**...

$1.29

**Phonographs**...

$7.95

**Microphones**...

$1.29

**RADIO'S**

**J.B.T. REED FREQUENCY METER - TS - 121/CYP. $29.95**

**SUN** 2" r. O-1000 V DC: $2.97

**28v VAC**...

**HeadsPhones**

- **H-B 4** - High-impedance with PL 55 plug: $2.49
- **PB 20** High-impedance with phone plug: $2.99

**AlumINUM Rods** - 30" by 1/4" diam. for constructing antennas: $1.29

**GENERAL USE** - $9.95

**CATHODE TUBE - 15GA**.

**Electrostatics**...

$12.95

**JF 29/8 2B Transmitting Tube** - $3.99

**SOCKET FOR ABOVE**: $1.99

**Antenna Relay UNIT** - BC442A with R. F. Ammeter Vacuum control: $2.89

**BC-746 TUNING UNIT** - Contains antenna and tank coils tuning cond. Ideal foundation for miniature transmitters. with 2 xtras, 1 in 80 mc band and 1 in 30 mc band: $1.29

**Aluminum Rods**...

$1.29

**Phonographs**...

$7.95

**Microphones**...

$1.29

**RADIO'S**
**MOBILE HAMS**

Complete mobile package — nothing else to buy. Outstanding mobile signals use Motorola equipment — backed by years of communication equipment experience — World's largest producer of 2-way mobile equipment.

A mobile transmitter with a double feature. FM or AM at flip of the switch, the MOTOROLA P-MT-30-DMS (27–30 MC). $130.00

MOTOROLA P-69-13-ARS receiver with special noise limiter for use with any converter having 1500–3000 Kc. $60.00

The above comes complete with all necessary accessories and mounting hardware. Order direct or through the Motorola National Service Organization member in your area.

**Add Sight to Your Sound**

with this basic oscilloscope featuring calibrated modulation percentage scale, linear 60 cy sweep with return trace blanking, trace intensifier window, complete controls, reversible panel, rack mounting provisions and many other outstanding features. See the MM-2 at your dealer or write Dept. 8-9.

**Attention**

**Mobile Hams**

** Atlantic Division **

(Continued from page 60)

**V.H.F. Sweepstakes Results**

(Continued on page 61)
Mobile Transmitter

Here's your best mobile transmitter! Compact size (only 4½" x 5½") gives comfort or under dashboard installation. Built-in tuning, metering, and 2 watt output...every drive takes on a new dimension. Crystal controlled oscillator. 2220 RF amplifier. With high power efficiency. Covers 100 meters in 1 meter bands. Automatic battery economy control. Temperature compensated panel. Automatic meter illumination. Dark green, slide-in cabinet.

Complete $87.50

(Subenco 500 Dynamic Pack for MT-15X $99.95)

Mobile Transmitter

DX BAIT A PHONE PATCH!

Just let me know when you are on the air and within hearing distance for you! Herod were those elusive ones we two. A well balanced phone patch will do you no trouble! Automatic switch in operation - no chance of an error.

DE LUXE MODEL - Complete kit of parts and cabinet. Simpson 5½" VU meter and full instructions.

UTILITY MODEL - Complete kit of parts and instructions. (Uses no meter) Item MX-6 $18.95

HARRISON HAM-A-LOG

Did you get the BIG OUTDOOR ISSUE of our HAM-A-LOG? More rigs - 9 v 9 rythinq for the antenna - a real "good phone patch" - hundreds of FB bargains, etc. etc.

NEWLY ANNOUNCED GEAR

PREMAX 56" Steel Police type whip - New Low Price $2.35

GRAFTRON E-72 Portable Comm. Receiver $29.95

DRAKE Instant hamsider $11.95

DELIVERY charges added. Send orders today!

NATIONAL MB-50 3½-Watt Multi-Band

DRAKE Complete kit of parts $175.50

Sylvan 8¾" Germanium Diode A buy 4 for $2.50

HARRISON HAS IT!

I have COMPLETE STOCK of all makes and models of amateur equipment for immediate delivery at the LOWEST PRICES! A large and complete stock of new and used equipment is in stock. Mail order prices. All material shipped in the original factory-sealed carton (never opened) Another reason why it pays to deal with Harrison. Mail orders welcome.

Collins 75A-1 $375.00

Collins 32V-2 $375.00

Collins 30K-1 $375.00

Collins 30K-2 $375.00

Collins 310C-1 $375.00

Collins 310C-2 $375.00

Collins 310B-1 $375.00

Collins 310B-3 $375.00

National NC-57 $375.00

National NC-173 $375.00

National NC-180 $375.00

National HRC-7 $375.00

National HFS $375.00

RMD-45 $375.00

RMD HI 20-20 $375.00

RMD VHF 2-11 $144.95

If you don't see it listed - if it's ham gear - send your order now! Harrison Has It! Lowest prices! Delivery now!

HARRISON HAM-A-LOG

TELEVISION HEADQUARTERS

TECH-MASTER Super 16" Deluxe TV Kit - Original RCA 830 Voltage doubler circuit for superior performance. Uses the latest components. RCA TV, high definition, and color television. Selectable NTSC or PAL. Complete TV circuit includes TV, base, and power supplies. Comes complete with instructions. Low price, $39.95

TECH-MASTER 19" C30FX TV Kit 19" Color TV complete $159.95

Insulating Boot and Rapping Insulation Kits $15.00 and 20.00

If you don't see it listed - send your order now! Harrison Has It! Lowest prices! Delivery now!

MOBILE TROPHIES

Two large silver loving cups, suitably engraved, to be presented to the first W (or K) amateurs who, with an automobile installation:

Works all continents (WAC) $75.00

Works all states from one call area (WAS) $75.00

Send for simple rules and entry blank

PRINTED CIRCUIT KIT

Make your own sub-miniature equipment in some cases (shown on the glass envelope of the tube) by the printing process. Ceramic printed circuit cores, etc. by drawing capacitors, resistors, and other electronic parts. Complete kit of silver, copper, resistance, insulating, etc. Printed circuit boards of Standard form on printed circuits. Only $1.25 Complete

Acquire practical knowledge about this latest development in the electronic field with this kit. Keep up-to-date! Order now or write for free literature.

The Bil Harrison MOBILE TROPHIES FOR WAS

Two large silver loving cups, suitably engraved, to be presented to the first W (or K) amateurs who, with an automobile installation:

Works all continents (WAC) $75.00

Works all states from one call area (WAS) $75.00

Send for simple rules and entry blank

_EQUAL-LOW ANTENNA SUPER-BARGAIN Ward dual-band $28.50


امراله 300-series tubes - Scaled 100" package $75.00

All National and Hallicrafters TV receivers and Chassis In stock. Complete stock of TV parts - RCA, Sylvania, Sylvania, etc.
Radio, CORNISH engineers have kept abreast of electronic developments so as to serve YOU better.

CORNISH WIRE COMPANY, INC.
15 Park Row New York 7, N. Y.

ALUMINUM CALL PLATES

Your call cast in aluminum with black background and polished 1½" letters. Plate size 3"x 3/4". 3 styles: P for panel mounting, L for car license and D for desk use. $1.75 each postpaid.

P & H SALES CO.
619 Jasper St. Kalamazoo 31, Michigan

15-IN. TV CHASSIS by HALLICRAFTERS
For Custom Installation
$259.50 COMPLETE

130 square inches of picture on a big 15-inch tube! Needs only your choice of cabinet, wall or bookcase. Comes complete with 15-inch tube, 8-inch pm speaker, 19 tubes, 3 rectifiers. Famous Hallicrafters all channel push button tuning. A fine Hallicrafters engineered receiver for your personal custom use.

Write for FREE Almo Broadcaster newspaper.

Phone
LO 3-9255

509 ARCH ST, PHILADELPHIA, PA.
SIXTH AND ORANGE, WILMINGTON, DEL.
6205 MARKET ST, W. PHILADELPHIA, PA.

W3KWH . 228- 28-3-B
W3QKH . 228- 23-6-B
W3CQG . 96- 24-2-B
W3NCD . 78- 20-2-B
W3CFP . 64- 19-2-B
W3NOD . 36- 9-2-B
W3QCN . 26- 7-9-B
W3LOC . 24- 6-2-B

CENTRAL DIVISION

Illinois

W6PK . 270- 45-3-A-B
W6DBW . 234- 39-3-A-B
W6WV . 198- 33-3-A-B
W6HTY . 104- 20-2-B
W6WPC . 114- 14-3-B
W6MMY . 36- 18-1-B
W6CZR . 34- 17-1-B
W6ZNJ . 32- 16-1-B
W6BEO . 30- 16-1-B
W6BMI . 20- 8-2-A
W6CT . 16- 9-1-B
W6BHI . 16- 8-1-A-B

Indiana

W4AMS . 322- 33-7-A-B
W4AML . 12- 3-2-B
W4UJA . 12- 3-2-A-B
W4VX . 38- 19-2-B
W4LY . 27- 20-7-A
W4CQ . 10- 5-1-B
W4IHZ . 2- 1-1-A

DAKOTA DIVISION

Minnesota

W6KQ . 8- 4-1-B

DELTA DIVISION

Tennessee

W4WV . 8- 4-1-A-B

GREAT LAKES DIVISION

Kentucky

W4BDJ . 184- 23-4-A-B
W4MKJ . 120- 15-1-B
W4JDN . 32- 8-2-B
W4BPE . 12- 6-1-B
W4MRI . 6- 3-1-B

Michigan

W8DIV . 64- 8-B
W8DVP . 64- 8-B
W8DVR . 64- 8-B
W8DVG . 64- 8-B
W8DVL . 64- 8-B

Ohio

W8KVS . 1056- 65-5-B
W8WSE . 672- 48-7-A
W8CYE . 637- 46-7-B
W8SGG . 508- 40-5-A-B
W8PQK . 155- 20-4-A-B
W8WRN . 136- 17-1-B
W8NYZ . 44- 11-2-B
W8BLH . 12- 6-1-A

Hudson Division

E. New York

W9PQ . 619- 90-9-B
W9FEP . 150- 22-3-B
W9ACY . 133- 22-3-B
W9WYJ . 80- 90-9-B
W9PV . 81- 17-2-B
W9TAC . 20- 11-1-B
W9PQD . 18- 5-2-C

New England Division

E. Massachusetts

W1ATT . 1632- 109-8-A-B
W1WPH . 808- 112-4-A-B-C
W1K . 464- 117-6-B
W1Q . 335- 34-5-A
W1QY . 320- 21-7-A
W1W . 273- 21-3-A-B
W1PTX . 125- 21-3-A
W1AW . 109- 18-3-A
W1KHM . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

W1EIO . 32- 9-2-B

NEW ENGLAND DIVISION

W1EIO . 32- 9-2-B

W1KHC . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

W1EIO . 32- 9-2-B

W100P . 1290-108-4-A-B-C
W1BDG . 600- 75-6-B
W1WJL . 900- 60-5-B
W1L . 900- 75-6-B
W1Q . 335- 34-5-A
W1QY . 320- 21-7-A
W1W . 273- 21-3-A-B
W1PTX . 125- 21-3-A
W1AW . 109- 18-3-A
W1KHM . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

W1Q . 335- 34-5-A
W1QY . 320- 21-7-A
W1W . 273- 21-3-A-B
W1PTX . 125- 21-3-A
W1AW . 109- 18-3-A
W1KHM . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

W1Q . 335- 34-5-A
W1QY . 320- 21-7-A
W1W . 273- 21-3-A-B
W1PTX . 125- 21-3-A
W1AW . 109- 18-3-A
W1KHM . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

W1Q . 335- 34-5-A
W1QY . 320- 21-7-A
W1W . 273- 21-3-A-B
W1PTX . 125- 21-3-A
W1AW . 109- 18-3-A
W1KHM . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

W1Q . 335- 34-5-A
W1QY . 320- 21-7-A
W1W . 273- 21-3-A-B
W1PTX . 125- 21-3-A
W1AW . 109- 18-3-A
W1KHM . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

W1Q . 335- 34-5-A
W1QY . 320- 21-7-A
W1W . 273- 21-3-A-B
W1PTX . 125- 21-3-A
W1AW . 109- 18-3-A
W1KHM . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

W1Q . 335- 34-5-A
W1QY . 320- 21-7-A
W1W . 273- 21-3-A-B
W1PTX . 125- 21-3-A
W1AW . 109- 18-3-A
W1KHM . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

W1Q . 335- 34-5-A
W1QY . 320- 21-7-A
W1W . 273- 21-3-A-B
W1PTX . 125- 21-3-A
W1AW . 109- 18-3-A
W1KHM . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

W1Q . 335- 34-5-A
W1QY . 320- 21-7-A
W1W . 273- 21-3-A-B
W1PTX . 125- 21-3-A
W1AW . 109- 18-3-A
W1KHM . 66- 11-3-B
W1KDF . 50- 8-2-B
W1FPH . 14- 7-1-B

(W Continued on page 08)
Interesting NEW Process
CREATES PIEZOELECTRIC CERAMIC ELEMENTS
for ASTATIC Microphones

• Thin ceramic sheets, produced by a recently developed process, are the starting point for conversion of this material into piezoelectric elements for Astatic Microphones. Ground extremely fine, ceramic material is spread on a moving metal belt, from which it is removed in sheet form after drying. Fired at a temperature of 2500 degrees Fahrenheit, the sheets are then coated with a ceramic fired-on-silver layer. Two small, silver-faced ceramic slabs, thus prepared, are soldered on each side of a metal armature to become the element of an Astatic mike. Piezoelectricity is induced by precharging the element with DC voltage. The advantages of Astatic Microphones employing ceramic elements are many and are exclusive with this type of unit. Voice reproduction is decidedly more natural. Excessive moisture or high temperatures do not affect the element. Response is stable regardless of climate. The element is capable of withstanding greater amounts of mechanical shock than other type units. Final endorsement for amateur use is in the fact that Astatic Ceramic Microphones are adaptable to most existing circuits without circuit alterations.

WRITE FOR ADDITIONAL DETAILS

THE RADIO AMATEUR'S HANDBOOK

Over a period of more than twenty years The Radio Amateur's Handbook has grown from a small manual on amateur operating to the world's most valuable and widely-used radio book. Just as amateur techniques and developments have often been forerunners of professional engineering, and the amateur body itself become a training ground in providing executives, engineers and technicians for the radio industry, so has this standard manual of amateur communication become the all-purpose volume of radio.

The 1949 edition retains the material on theory, principles and design which made the Handbook so valuable, but it has been revised and integrated with constructional data. This is not only of value to the practicing radiomam but to the student as well, for it gives him practical applications and examples of the theory he is learning. As a text, the Handbook is probably more used in radio schools and colleges than any other single volume.

In constructional material, no publication equals the Handbook in practical utility, its treatment of radio communications problems in terms of how-to-do-it rather than by abstract discussions and abstruse formulas. There are few radio manufacturers, schools, engineering firms, experimental laboratories and military communications units which do not possess at least one copy of this valued and modern reference work.

Text, data book, constructional manual, operating reference book — it is all these and more. Its annual rewriting assures a modern up-to-date text, so necessary in a science so fast-moving and progressive as radio. Yet in this virtually continuous modification there has always been the objective of presenting the soundest and proved aspects of current engineering practice rather than the merely new and novel.

$2.00 U.S.A., Its Possessions and Canada
Buckram Bound $3.00 U.S.A., Its Possessions and Canada • Elsewhere $2.50 • Buckram Bound $4.00

THE AMERICAN RADIO RELAY LEAGUE • West Hartford, Conn.
POPULAR FUNCTIONAL TERMINALS

FWG Victron strip for high frequency use. Takes both banana plugs and wires through holes at bottom. FWH Molded mica bakelite with serrated bosses to grip thinnest panel—same terminals as FWG. FWJ
Same insulators as FWH but has jacks. FWF Molded mica bakelite plug fits FWG, FWH, FWJ. All are available at your National dealer's!

RADIO and TELEVISION
Thorough Training in All Technical Phases
APPROVED FOR VETERANS
WEEKLY RATES—DAYS—EVENINGS
RCA GRADUATES ARE IN DEMAND
For Free Catalog write Dept. ST-49
RCA INSTITUTES, INC.
A Service of Radio Corporation of America
250 W. 44th St., New York 1, N. Y.
THE NEW TURNER
MODEL 25X-25D

Crystal or Dynamic

New...all new from its precision engineered crystal and dynamic circuits to its specially designed case. The Turner 25X-25D combines quality performance, convenience, and style with world famous Turner dependability. Features include Alnico V magnets, high quality moisture sealed crystals, smooth, wide range response to voice and music pickups, 90° tilting head, 20-ft. removable quick-change cable set, mechanical-shock proof interior mounting, and high quality construction throughout. Finished in two-tone umber gray with chrome plated grill.

25X CRYSTAL—Level: 52
db below 1 volt/dyne/sq.cm.
Response: 50—9000 c.p.s.

25D DYNAMIC—Level: 54
db below 1 volt/dyne/sq.cm.
at high impedance.
Response: 50—10,000 c.p.s.

ASK YOUR DEALER
IN CANADA—Canadian Marconi Co., Ltd., Montreal, P. Q.
EXPORT—Ad. Auricula Inc., 89 Broad Street, New York 4, N. Y.

THE TURNER COMPANY
917 17th Street, N. E.
Cedar Rapids, Iowa

Microphones by TURNER


CARTER SUPER CONVERTER—
Change DC to AC

Weighs only 13 lbs. Ideally suited for radio equipment, PA systems, tape recorders, etc. For 85 to 100% Power Factor, noninductive loads only. Ball-bearing equipped. Models from 40 to 250 watts AC output. 12, 24, 32, and 115 volt DC input. 6 volt input models from 40 to 150 watt AC output. Write for new Bulletin No. 447 and name authorized Carter distributor. CARTER MOTOR CO., 2649 North Maplewood Avenue, Chicago 47, Illinois.

COMPLETE RADIO TRAINING!

Prepare now to accept a responsible position in Commercial Radio. New developments will demand technicians with thorough basic training, plus a knowledge of new techniques discovered during the war. Training open to high school graduates, or those with high school equivalency. Course 6 to 18 months' duration in RADIO AND ELECTRONICS. Approved Veteran training in Radio. Write for particulars.

VALPARAISO TECHNICAL INSTITUTE
DEPT. TN
Valparaiso, Ind.

RADIO • ELECTRONICS • TELEVISION

ENGINEER FACULTY — Excellent Laboratory and Technical Facilities. Limited Classes—Unlimited Opportunities. DAY—EVENING CLASSES. CRL is Sponsored and under Technical Supervision of CRYSTAL RESEARCH LABORATORIES, INC. Licensed by Connecticut State Board of Education. Approved for Veterans. Write today for Catalog and copy of Telecaster.

SCHOOL OF ELECTRONICS, INC.
29 ALLYN STREET • HARTFORD, CONNECTICUT

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way — with an Instructograph Code Teacher. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 2 to 40 WPM. Always ready, no QRM, beats having someone ready to you.

ENDORSED BY THOUSANDS!
The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the Instructograph system. Write today for full particulars and convenient rental plans.

INSTRUCTOGRAPH COMPANY
4769 SHERIDAN ROAD, CHICAGO 40, ILLINOIS

CALL LETTER PLATES

- Type A-10 — For Your Car
- Type A-19 — For Panel
Mounting
$2.95 POSTPAID

a large, sturdy cast aluminum plate with satin-finished letters and border against a black baked enamel background. Red, green, blue, and gray are 50¢ extra. Size — 2½" x 8½" with ½" letters.

LAPEL BUTTONS

An attractive metal button with highly polished raised letters against a black background. Other colors 50¢ extra.

INSTRUCTOGRAPH COMPANY
4769 SHERIDAN ROAD, CHICAGO 40, ILLINOIS
HAM-ADS

1. Advertising shall pertain to radio and shall be of such nature as to interest radio amateurs or experimenters in their pursuit of the art.

2. All advertising must be in typewritten form and shall be readable, as well as legible. All capital letters shall be used in such a way as to make the advertisement more prominent to the reader.

3. All the Ad rate is $0.50 per word, except as noted in paragraph (A) below.

4. Reprint in full must accompany copy. No cash or check discount or agency commission will be allowed.

5. Closing date for Ham-Ad is the 25th of the second month preceding publication date.

6. All inquiries must be answered. L. V. Day, W5LQM, 714 S. San Jose St., 2nd Floor, San Jose, Calif.

7. MOTORCRAFT recording wire, Boy by the pound, $0.01 per foot, ideal telephone, W2DLE, Box 90, Blackwell, Okla.

8. MUST sell 600-watt phone transmitter complete, used about 10 hours, in steel cabinet, $185.00. Also a new 10-meter phone, 15W watt, $225.00. 500-watt power output. For sale in our shop. W5RCF, 410 West End Ave., New York, N. Y.

9. FM MAFIL & Q Super Pro BC-279 receiver for sale, including power supply, $120.00. Gene Wannahaker, WA4QBE, 314 Ambrose St., Latrobe, Mass.

10. ADK Axios TX-15X ten meter mobile transmitter and DS 400 dynamotor supply. Used two years. For sale at $1,500 each. D. R. Ballard, 410 West End Ave., New York, N. Y.

11. GLOBE Trotter transceiver, complete with power supplies. See Feb. 164 description, P. 123. Like new. Moving to apartment GTH, 4029 Columbus Drive, Columbus, Ohio. St. Louis, Mo.

12. Complete station, with BC-453 fitted with 1½ watt panel and installed: LCNKE perforator 11½" width, same as used by Instructo-Graph model. For sale at $1,500 each. W7LCA, 1417 North 1st St., Austin, Texas.

13. $175.00, or best offer. All inquiries answered. L. V. Day, W5LQM, 197 No. 14th, San Jose 12, Calif.

Please note the 76 rate on hamads is $.50 a word except in the case of announcements of surplus equipment owned, used and for sale by an individual amateur, which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual amateur will be charged at the 76 rate unless accompanied by a letter signed and addressed to be printed plainly.

Advertising made to look like invitational advertisements in the classified columns will be charged at the 76 rate, so to much for their obvious non-commercial purpose or for the grade or character of the products or services advertised.
Fiftieth Founded

**Radio Telegraphy**

Courses ranging in length from 7 to 12 months. Dormitory room and board on campus for $40.00 a month. The college owns KPC, 5 kW broadcast station with studios located on campus. New students accepted monthly. If interested in radio training beginning this fall, examinations for first-class telegraph and second-class telegraph licenses, write for details.

PORT ARTHUR COLLEGE
PORT ARTHUR, TEXAS
Approved for G.I. training

---

**Mass. Radio School**

Mass. Radio School

21 Huntington Ave., Boston 15, Mass.

Offers Training Courses for Radio Technician (Pre-Television) and Licensed Radio Operator (All Types) including maintenance and operation of General Electronic Equipment. Over 20,000 Alumni and 30 years radio training EXPERIENCE. Courses approved for G.I. Training for Veterans.

Send for Catalog

Licensed by Commonwealth of Massachusetts.

---

**JOBS IN TELEVISION**

YOUNG MEN 16 TO 60

There is a job opening for every qualified trained television technician.

**WE CAN TRAIN YOU**

Visit our modern laboratories and class rooms

Approved under G.I. Bill of Rights

**AMERICAN RADIO INSTITUTE**

New York Buffalo, N. Y. Syracuse, N. Y.

1901 Broadway (68th) 640 Main St. 131 Shonnard St.

**TEACHING RADIO SINCE 1933**

101
THE NO. 37001 SAFETY TERMINAL

An old favorite in the line of exclusive Millen "Designed for Application" products. Combination high voltage terminal and thru-bushing. Tapered contact pin fits firmly into conical socket providing large area, low resistance connection. Pin is swivel mounted in cap to prevent twisting of lead wire. Easy to use. ¼" o.d. insulation high voltage cable fits into opening in cap. Bared conductor passes thru pin for easy soldering to pre-tinned tip of contact plug.

Standard 37001 available in either black or red bakelite. No. 37501 is low loss mica filled yellow bakelite for R.F. applications.

JAMES MILLEN MFG. CO., INC.
MAIN OFFICE AND FACTORY
MALDEN
MASSACHUSETTS
These tubes bear the trademark "Eimac"... important... because it reflects the basic integrity of Eitel-McCullough, Inc.—a trademark synonymous with quality.

Operational characteristics are conservatively rated; consequently... Eimac Tubes operate within their ratings at a fraction of their peak abilities.

Outstanding operational stability is an inherent characteristic of all Eimac tubes.

"Clean" mechanical design, plus a coordinate balance in the chemical and physical properties of internal-structure materials gives these tubes the ability to withstand abnormal momentary overloads, as well as thermal and physical shock.

Millions of hours of proven performance in the key socket positions of electronic equipment is evidence of Eimac superiority.

Standardization of test procedures and uniformity of production produce coinciding tube characteristics assuring unvarying equipment performance.

There are Eimac representatives, qualified to assist with your vacuum tube problems and service... as close as your telephone. Please take advantage of their counsel... talk over your tube problems with them... there is no obligation.

EITEL-McCULLOUGH, INC.
San Bruno, California

Follow the Leaders to Eimac TUBES
Make Your Hobby Into a GOOD PAYING JOB

Do you know over 50% of Broadcast Station Engineers started as hams? You can become a Broadcast Engineer easily — if you hold an FCC 1st class Commercial operator's license. Many other new jobs now open to FCC Commercial license holders. I can train you to pass your FCC Commercial License Exams in a few short weeks. My time-proven plan can help put you, too, on the road to success. I'll send you the entire story free of charge. Mail coupon for full information today.

Eow. H. Guilford, Vice-President

ADD TECHNICAL TRAINING TO YOUR HAM EXPERIENCE AND

Get Your FCC COMMERCIAL RADIO OPERATOR LICENSE in a Few Short Weeks

It's EASY if you use CIRE Simplified Training and Coaching AT HOME in SPARE TIME

Get your license easily and quickly and be ready for the jobs open to ticket holders which lead to $3000 to $7500 (average pay reported by FCC nationwide survey). CIRE training is the only planned course of coaching and training that leads directly to an FCC commercial license.

Your FCC Commercial Ticket Is Always Recognized in All Radio Fields as Proof of Your Technical Ability

CIRE Graduates Find FCC Commercial License Pays Off

"I now hold ticket P-10-3787, and holding the license has helped me to obtain the type of job I've always dreamed of having. Yes, thanks to CIRE, I am now working for CAA as Radio Maintenance Technician, at a far better salary than I've ever had before. I am deeply grateful."

Student No. 3319N12

"I took the FCC examination on March 4th and received my second class radiotelephone license March 9th. I go to work for the Trans-Texas Airways in the maintenance department. Thanks for all the assistance."

Student No. 2394A1

CLEVELAND INSTITUTE OF RADIO ELECTRONICS
Desk QT-8 • 4900 Euclid Bldg. • Cleveland 3, Ohio
Approved for Veteran Training Under the "G.I. BILL OF RIGHTS"

Get This Amazing New Booklet

1. TELLS OF THOUSANDS OF BRAND-NEW, BETTER-PAYING RADIO JOBS NOW OPEN TO FCC LICENSE HOLDERS.
2. TELLS HOW YOU WILL BENEFIT BY HOLDING AN FCC COMMERCIAL LICENSE.
3. TELLS HOW YOU CAN GET YOUR FCC COMMERCIAL RADIO OPERATOR LICENSE IN A FEW SHORT WEEKS—EASILY AND QUICKLY, BY USING CIRE SIMPLIFIED TRAINING AND COACHING AT HOME IN YOUR SPARE TIME.
4. TELLS OF HUNDREDS OF YOUR SUCCESSFUL STUDENTS WHO, NOW HAVE LICENSES AND NEW, BETTER-PAYING JOBS.
5. TELLS HOW WE PREPARE YOU TO PASS THE NEW FCC COMMERCIAL LICENSE EXAMINATIONS, WHICH NOW INCLUDE FM AND TELEVISION.
6. TELLS HOW WE GUARANTEE TO TRAIN AND COACH YOU UNTIL YOU GET YOUR LICENSE.
7. TELLS HOW WE HELP YOU TO GET A BETTER-PAYING, LICENSED JOB, WITH OUR FREE AND EXCLUSIVE SERVICE, WHICH PREPARES YOUR EMPLOYMENT APPLICATION FOR MAILING TO HUNDREDS OF EMPLOYERS, INCLUDING FM, AM AND TELEVISION BROADCAST STATIONS, RADIO MANUFACTURERS, POLICE RADIO STATIONS, AND RADIO-EQUIPPED TAXI, BUS AND PUBLIC UTILITY COMPANIES.

Send Us Your Name and Address Today-

CLEVELAND INSTITUTE OF RADIO ELECTRONICS
Desk QT-8 • 4900 Euclid Bldg. • Cleveland 3, Ohio
Address to Desk No., to avoid delay.

I want to know how I can get my FCC Commercial Ticket in a few short weeks by training at home in spare time. Send me your FREE booklet, "Money Making FCC License Information," as well as a sample FCC-type exam and free booklet, "How to Pass FCC Commercial License Examinations" (does not cover exams for Amateur License).

Name
Address
City
State
Zone

NO OBLIGATION — NO SALESMEN

Veterans check for enrollment information under G.I. Bill

NO OBLIGATION — NO SALESMEN

Veterans check for enrollment information under G.I. Bill

Printed in U.S.A.

RUMFORD PRESS

CONCORD, N. H.
4224 Alamo
Fort Worth, Texas
June 3, 1949

The National Company
Malden, Mass.

Gentlemen:

On May 17, 1949, I was one of the unfortunates that was caught in the Fort Worth flood. My house being submerged for approximately 24 hours.

You may be interested to know that I own a National NC200 receiver. This receiver has never given me any trouble since I first purchased it. After being submerged in the flood, it appears that the only damage that was incurred was the power transformer. Even the speaker was not damaged, as were most radios. A little washing down with a hose and clear water, and a drop of oil and a little grease on the coil turret, was all that appears necessary.

I thought you would be interested in knowing how this receiver reacted. The power transformer indicates a resistance from the primary to ground, which causes the fuse to blow after a few minutes of operation. This is apparently the only damage caused.

Yours very truly,

F. J. Pharo, W7NUP
Three miniatures that will solve your voltage regulation problems

WHERE space is at a premium, and good voltage regulation an essential ... solve these problems simply with one or more RCA miniature glow-discharge tubes.

The RCA-OA2 maintains a dc operating voltage of approximately 150 volts over a current range of 5 to 30 milliamperes. The RCA-OB2 regulates at approximately 108 volts over the same current range. In both instances the dc voltage is substantially independent of load current and moderate line-voltage variations. Regulated voltage may be increased by operating tubes in series; regulated current increased by operating the same type in parallel.

Extreme voltage stability is provided by the RCA-5651 voltage-reference tube, for use in dc power supplies incorporating electronic voltage regulation. It maintains a dc operating voltage of 87 volts over a current range of 1.5 to 3.5 milliamperes. The voltage stability is such that fluctuation at any current value within its range is less than 0.1 volt. This extreme stability is the result of a design which utilizes the total cathode area at all current values. Other features are the use of a thin metallic coating on the inside of the glass envelope to minimize slow voltage drift, and long aging to stabilize the tube characteristics.

To get all the tube performance and life you pay for ... buy genuine RCA tubes in the familiar red-black-and-white cartons from your local RCA tube supplier. For technical bulletins on the tube types in which you are interested, write RCA, Commercial Engineering, Section 48 HM, Harrison, N. J.