

POSTAL

devoted

STAMP COLLECTOR

50¢

Anniversary

March 1964

50 Cents

READY TO MAIL
Canada

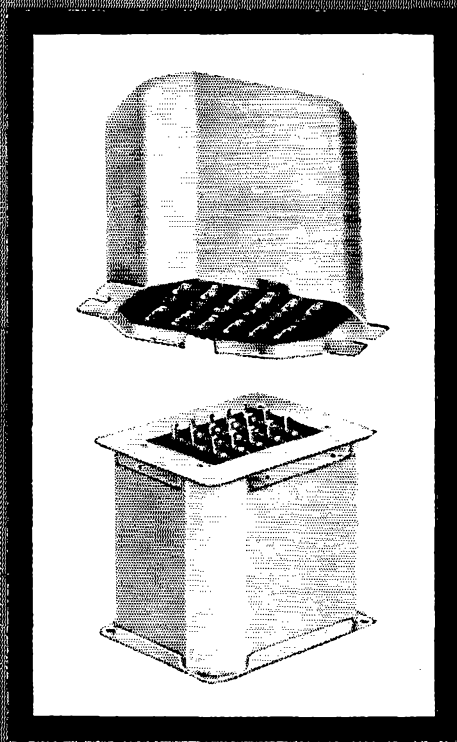
097
588



"S" SERIES

AUDIO & POWER TRANSFORMERS & REACTORS

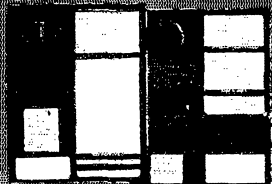
For Complete Ham Systems



Popular Priced
Matched Components
for
Power Supplies
Modulation
Pre-Amps &
Power Amplifiers
for entire ham rigs

These units are designed to meet the requirements of the amateur radio operator. They are built to last and are guaranteed for a minimum of one year. The units are available in a variety of sizes and power ratings to meet the needs of all amateur radio operators. They are also available in a variety of finishes and colors to match your equipment. For more information, write to United Transformer Corp., 150 York Street, New York 10, N.Y.

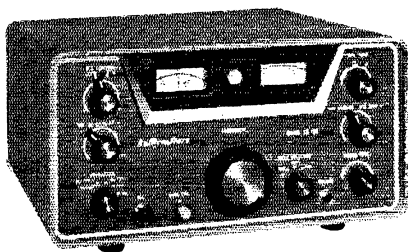
Write or call today for more
UNIT TRANSFORMERS



UNITED TRANSFORMER CORP.

150 YORK STREET, NEW YORK 10, N.Y.

PACIFIC WIRE DIVISION: 3830 EASTWAY DRIVE, QUINCY, ILL. 62430
BY PERMISSION OF FACTORY STORE, NEW YORK 10, N.Y. (CABLE: UTRANS)



think small...*

TALK BIG

No one but Hallicrafters could shoehorn such sheer, unadulterated talk power into so beautifully compact a package as the new SR-160 Tri-band Transceiver. Why Hallicrafters alone? Eight productive, successful years of SSB and transceiver experience, leading to such advanced, exclusive techniques as AALC (Amplified Automatic Level Control) providing up to 12 db. of effective compression . . . RIT (Receiver Incremental Tuning) with ± 3 kc. for superior net and CW operation . . . and a superbly designed crystal lattice filter which makes the most of the desirable SSB transmission characteristics. A built-in changeover relay permits direct operation with the HT-45 or other linear amplifier. Sensitivity is less than 1 μ v for 20 db. (yes, 20) S + N/N ratio. The receiver employs a separate AVC amplifier providing a figure of merit of 100 db. These and a dozen other outstanding features make the new SR-160 your best transceiver buy. Write for complete specifications or see your Hallicrafters distributor today.



Small size: 13" x 6 1/2" x 11"

Small weight: Only 13 1/4 lb.

Small price: \$349.50 less power supplies and mobile mounting kit.

NEW SR-160

Tri-band SSB/CW
Transceiver

"See you at the
Single Sideband Dinner,
Statler-Hilton Hotel
New York City
Tuesday, March 24!"




by *hallicrafters*

Fifth & Kostner Aves. Chicago, Ill. 60624

Export: Hallicrafters International Div. Canada: Gould Sales Co., Montreal, P.Q.



WHAT'S NEW?

Here's what's new: The Collins 75S-3B. It's a great new receiver,  with a great new idea at a new low price. The 75S-3B is a versatile receiver with the sharpest selectivity available to you in any of three modes — SSB, CW and RTTY. The great new idea in the 75S-3B is the option of filters. The 75S-3B is furnished with one SSB filter. It has two CW positions on the mode switch. Each position is connected to a mechanical filter socket. Optional filters are available and may be plugged in to give you up to three degrees of selectivity in the CW/SSB function. If you're not interested in CW, you buy the receiver without a filter. That way you don't pay for something you'll never be using. □ There are other new features of Collins 75S-3B. The audio output has been increased to a maximum 3 watts. All oscillators now have Zener regulation which further improves the outstanding stability found in the 75S-3. A filter socket is provided for AM. □ All these new features make Collins 75S-3B a truly great buy. The new low price makes it an even better one. Visit your Collins distributor and ask him to demonstrate the new 75S-3B for you. Then get his price. You'll be pleasantly surprised to find out how little it costs to operate the finest.



PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN., U. S. A.: OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO STATION

STAFF

- JOHN HUNTOON, W1LVQ
Editor
- RICHARD L. BALDWIN, W1IKE
Managing Editor
- EDWARD MEHNERT, K1EUK
Assistant Managing Editor
- GEORGE GRAMMER, W1DF
Technical Editor
- DONALD H. MIX, W1TS
BYRON GOODMAN, W1DX
Assistant Technical Editors
- EDWARD P. TILTON, W1HDQ
V.H.F. Editor
- LEWIS G. McCOY, W1ICP
E. LAIRD CAMPBELL, W1CUT
Technical Assistants
- ROD NEWKIRK, W9BRD
SAM HARRIS, W1FZJ
HELEN HARRIS, W1HOY
JEAN PEACOR, K1IUV
JOHN TROSTER, W6ISQ
Contributing Editors
- SYLVIA M. RIDER
Editorial Assistant
- LORENTZ A. MORROW, W1VIG
Advertising Manager
- EDGAR D. COLLINS
Advertising Assistant
- DAVID H. HOUGHTON
Circulation Manager
- I. A. MOSKEY, W1JMY
Assistant Circulation Manager

OFFICES

225 Main Street
Newington, Connecticut 06111
Tel.: 686-0541
Area Code 203

Subscription rate in United States and Possessions, \$5.00 per year, postpaid; \$5.25 in Canada, \$6.00 in all other countries. Single copies, 50 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

Second-class postage paid at Hartford, Conn. and at additional mailing offices.
Copyright 1964 by the American Radio Relay League, Inc. Title registered at U.S. Patent Office. International copyright secured. All rights reserved. *Quedan reservados todos los derechos.* Printed in U.S.A.

INDEXED BY
Applied Science and Technology
Index
Library of Congress Catalog
Card No.: 21-9421

—CONTENTS—

TECHNICAL —

- VOX in a Box.....E. Laird Campbell, W1CUT 11
- A Sideband Transceiver, VU2 Style
B. A. N. Raju, VU2NR 19
- The Magnamatic Key.....Andrew Pfeiffer, K1KLO 23
- V.H.F. Antenna Facts and Fallacies — Part III
Edward P. Tilton, W1HDQ 29
- C.W. Sign-Off With RTTY Tape
Kenneth N. Sapp, W4AWY/A4AWY 34
- Converting the Knight C-100 CB Transceiver to 50 Mc.
Edward C. Pienkowski, W8BEB 36
- The Flying Spot — I.....George Grammer, W1DF 38
- A Compact Slow-Scan TV Monitor
Cophorne Macdonald, WA2BCW 43
- New Apparatus:
- Jackson Brothers Epicyclic Through Spindle 411/RV. 28
- The Cesco Halo-Matcher..... 42
- Automatic Code Sender and Keyer..... 48
- Recent Equipment:
- Heathkit HR-20 Mobile Receiver..... 58
- Heathkit HX-20 Mobile S.S.B. Transmitter..... 59
- Heathkit Transistorized D.C. Power Supply..... 61

BEGINNER AND NOVICE —

- Two-Band Sixty-Watter for the Novice
Robert E. Anderson, KITVF 15

OPERATING —

- Simulated Emergency Test — 1963
George Hart, WINJM 50

GENERAL —

- Love Them Dits . . . But Ohhhhh Them Dandy Dahs
John G. Troster, W6ISQ 14
- Intruders in the Amateur Bands
Perry F. Williams, W1UED 26
- Resolve to Build Something
Francis M. Yancey, W8DRU 49
- Building Fund Progress..... 57
- Members Are Saying..... 57

FIFTY YEARS OF A.R.R.L. —

- Amateurs Serve Their Country..... 66
- The Coming of C.W..... 71
- King Spark: Crescendo and Diminuendo..... 74

- | | | | |
|---|----|------------------------------|-----|
| Amateur Radio Public Service Corps..... | 79 | How's DX?..... | 89 |
| Coming Conventions..... | 10 | Index to Advertisers..... | 182 |
| Great Lakes Division Convention..... | 10 | "It Seems to Us....." | 9 |
| Feedback..... | 13 | Operating News..... | 94 |
| Hamfest Calendar..... | 61 | Our Cover..... | 10 |
| Happenings of the Month..... | 62 | Silent Keys..... | 77 |
| Hints and Kinks..... | 64 | Station Activities..... | 100 |
| | | World Above 50 Mc., The..... | 86 |
| | | YL News and Views..... | 83 |
| | | 25 Years Ago in QST..... | 77 |

Happy Anniversary A.R.R.L.!



1964 marks the 50th anniversary of the founding of the American Radio Relay League. Eitel-McCullough, Inc. (30 years young in 1964) salutes the A.R.R.L. on the occasion of attaining the half-century mark in noteworthy achievements and leadership in amateur radio.

The vision and direction provided by the American Radio Relay League has strengthened and

fostered the spirit of amateur radio at home and abroad. Continued mature leadership in the best interest of the Radio Amateur Service by the A.R.R.L. will insure that this unique avocation will prosper and grow during the coming years. All radio amateurs of good will salute the American Radio Relay League and join us at Eimac in wishing "Happy Anniversary A.R.R.L.!"

W1KKP
W1NZX
K1PRD
K2MTQ
W2UXY
W3YQM
W4TO
K4AIM
W5CGR
W5EYZ
W5FPV
W5SKL
K5QZC
W6ADK
K6AFH
WA6ANY
K6BAJ
WA6BAN
W6BAX
K6BCM
W6BDN
W6BHI
W6BMU
W6BZ
W6CEO

W6CHE
WA6CNL
W6DJI
WA6DPN
W6DVB
W6EXX
W6FBR
W6FJN
W6FKS
K6GJF
W6HB
W6IOH
W6IVZ
W6JBC
W6JFV
WA6JTZ
W6KEV
W6WWD
W6KM
W6LGZ
W6LOZ
K6MIT
W6MJG
W6MUC

W6MWT
W6NBD
W6NGP
WA6NWR
WA6NXB
K6OAZ
W6ODT
K6OUS
W6PHS
WA6PMX
W6PUB
W6QD
W6RWI
W6RXW
W6SAI
W6SDD
K6SMM
W6TKJ
K6TNK
W6UF
K6UHC
W6UOV
K6VRQ
W6VV

W6VYH
K6VQO
K6YEM
K6YKD
W6YSX
W6ZIU
W6ZLB
W6ZVV
K7BYQ
K7BZA
K7CQP
K7ELO
K7LFZ
K7OUM
W7SLC
W8QDI
W9IEU
W9RHV
W0AZY
W0AZT
K0GWH
K0IUN
W0NWW
VE3AHR

EITEL-McCULLOUGH, INC.

San Carlos, California

Subsidiaries: National Electronics, Geneva, Ill.; Eitel-McCullough, S.A., Geneva, Switzerland.



cash in with
HAMMARLUND'S

\$25⁰⁰
BILL

You read correctly.

This certificate is worth exactly \$25 toward the purchase of an outstanding HQ-100A general coverage or HQ-110A Ham Band Receiver complete with 24 hour clock-timer and the high quality S-100 speaker.

Just cut out the Hammarlund-Issue \$25 bill and present it to your nearest Hammarlund distributor for the **BIGGEST** Amateur Radio Bargain of this . . . or *any* year.

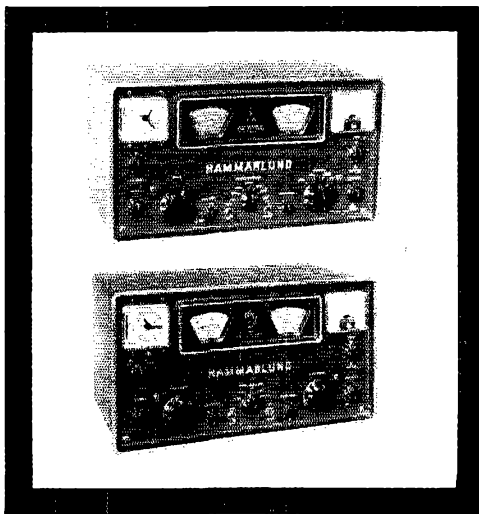
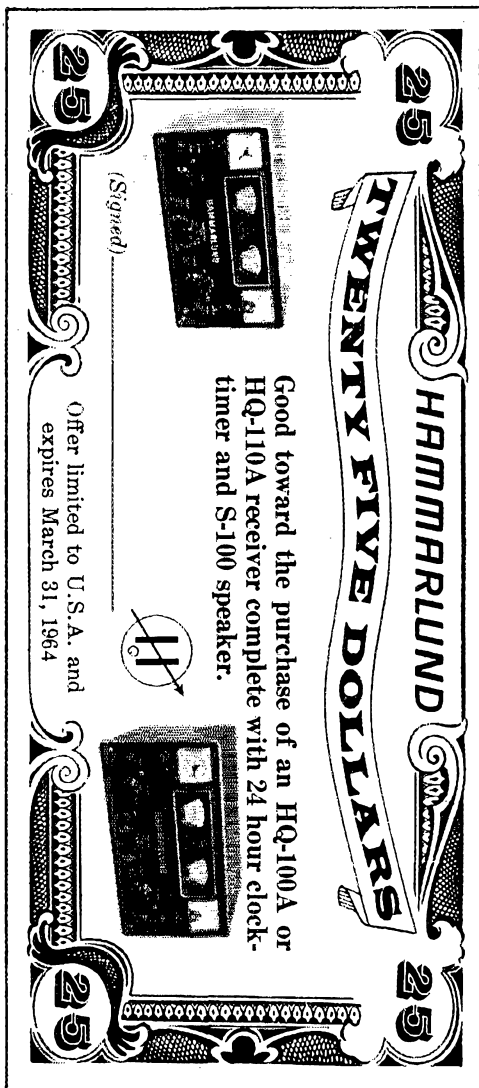
Don't delay. This offer is limited to the continental limits of the U.S.A. and is good only until *March 31, 1964*



HAMMARLUND
MANUFACTURING COMPANY
 A GIANNINI SCIENTIFIC COMPANY

53 West 23rd Street, New York 10, N.Y.

Cable Address: SUPERPRO



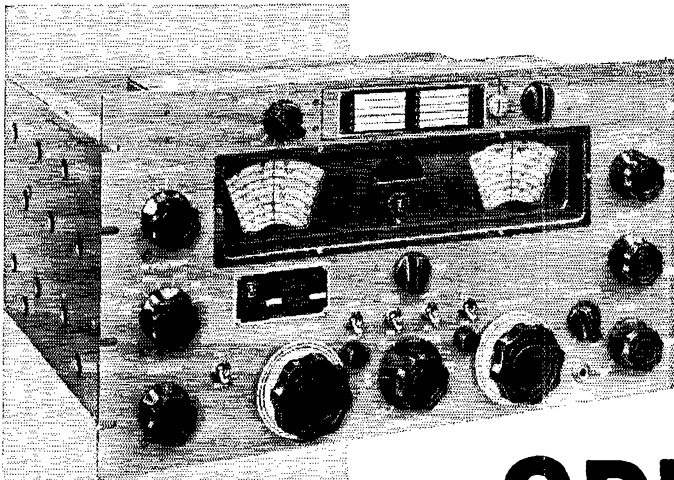
Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in QST. **ARRL Field Organization station appointments** are available in areas shown to qualified League members holding Canadian or FCC amateur license. General or Conditional Class or above. These include ORS, OES, OPS, OO and OBS. SCMs desire applications for SEC, EC, RAJ and PAM where vacancies exist. OES, v.h.f. bands appointment, is available to Technicians and Novice, as well as to full-privilege amateur licensees.

ATLANTIC DIVISION			
Eastern Pennsylvania Maryland-D. C. Delaware Southern New Jersey New York Western Pennsylvania	W3ZRQ W3JZY K3GKF K2BZG K2HUK W3UHN	Allen R. Bröner Andrew H. Abraham M. F. Nelson Herbert C. Brooks Charles T. Hansen Anthony J. Mroczka	212 Race St. RFY 1 505 Hilltown Rd. 800 Lincoln Ave. 211 Rosemount Drive 475-5th St.
			Tamaqua 19252 Smithsburg, Md. 21783 Marshalltown Palmira 08085 Buffalo 26 Donora
CENTRAL DIVISION			
Illinois Indiana Wisconsin	W9PRN W9YYX K9GSC	Edmond A. Metzger Ernest L. Nichols Kenneth A. Ebneter	1520 South 4th St. RFD 7 822 Watona Trail
			Springfield Bloomington Portage
DAKOTA DIVISION			
North Dakota South Dakota Minnesota	W0HVA W0RRN W0OPX	Harold A. Wengel J. W. Sikorski Mrs. Helen Mejdrieh	805-3rd St., S. W. 1900 S. Menlo Ave. Route 3
			Minot Sioux Falls Aitkin
DELTA DIVISION			
Arkansas Louisiana Mississippi Tennessee	W5DTR W5FMO W5FMM W4OGG	Curtis R. Williams Thomas J. Morgavi S. H. Hairston David C. Goggio	Route 3, Box 230 3409 Beaulieu St. 2321-27th Ave. 1419 Favell Dr.
			Little Rock 72205 Metairie 70001 Meridian Memphis 38118
GREAT LAKES DIVISION			
Kentucky Michigan Ohio	K4QIO W8XN W8AL	Mrs. Patricia C. Schafer Ralph P. Thetreau Wilson E. Weckel	732 Greenridge Lane 27209 W. 8th Mile Road 2118 Tuscarawas St., W.
			Louisville 7 Detroit 48240 Canton 44708
HUDSON DIVISION			
Eastern New York N. Y. C. & Long Island Northern New Jersey	W2JFU K2LDB W2CVW	George W. Tracy Blaine S. Johnson Edward F. Erickson	1138 North Country Club Drive 266 Cypress St. 13 Robert Circle
			Schenectady Massapequa Park, L. I. South Amboy 08879
MIDWEST DIVISION			
Iowa Kansas Missouri Nebraska	W0NTB W0ALA W0TFF W0GPK	Dennis Burke C. LeLand Cheney Alfred E. Schwaneke Frank Allen	1418 Douglas Ave. 814 Lovitt Dr. Edgar Star Rte. Box 272
			Ames 50010 Wheat Rolla 65401 Gering
NEW ENGLAND DIVISION			
Connecticut Maine Eastern Massachusetts Western Massachusetts New Hampshire Rhode Island Vermont	W1FHP W1AHM W1ALP W1BYR W1YHI K1AAV K1M1N	Robert J. O'Neil Arthur J. Brymer Frank L. Baker, Jr. Percy C. Noble Albert F. Haworth John E. Johnson E. Reginald Murray	Hard Hill Road 20 Herwick St. 85 Solar Ave. 8 St. Dennis St. 20 Plummer Rd. (Bedford) 30 Fruit St. 3 Hillcrest Drive
			Bethlehem Portland 3 Braintree 02185 Westfield 01085 Manchester 03102 Pawtucket 02860 Montpelier 05601
NORTHWESTERN DIVISION			
Alaska Idaho Montana Oregon Washington	K17BZO K7HJR W7KUR W7AJN W7PGY	Kenneth E. Koestler Raymond V. Evans Walter R. Marten Everett H. France Robert B. Thurston	2005 Sunrise Dr. Route 3 3021-4th Ave., So. 3335 S.E. 116th Ave. 7700-31st Ave., N.E.
			Anchorage Twin Falls Great Falls Portland Seattle 98115
PACIFIC DIVISION			
Hawaii Nevada Santa Clara Valley East Bay San Francisco Sacramento Valley San Joaquin Valley	KH6BZF W7FBY W6ZRJ K6LRN W6UDL K6CWP W6BTY W6JPU	Lee R. Wicat Leonard M. Norman Jean A. Gmelin Richard Wilson C. Arthur Messineo George E. Hudson Ralph Saroyan	P. O. Box 2200 652 Boulder St. 10835 Willowbrook Way 3519 Skylvark Dr. 2175-45th Ave. 2209 Alger Way 6204 E. Townsend Ave.
			Honolulu 96805 Houli City 89005 Cupertino Concord San Francisco Sacramento Fresno
ROANOKE DIVISION			
North Carolina South Carolina Virginia West Virginia	K4QFV/W4YZH K4HDX W4QDY W8JMI	Barnett S. Doud Lee F. Worthington Robert L. Follmar Donald B. Morris	420 West Franklin St. 418 Crestview Drive 1057 Dune St. 1136 Morningstar Lane
			Salisbury Spartanburg Norfolk 23503 Fairmont 26554
ROCKY MOUNTAIN DIVISION			
Colorado Utah New Mexico Wyoming	K0TTB W7QWH W5ZHN W7AMU	Donald Ray Crumpton Thomas H. Miller Carl W. Franz L. D. Branson	P. O. Box 223 3148 South 3360 East 1100 Wade Circle, N.E. 342 South Elk
			Alamosa Salt Lake City 9 Albuquerque Casper
SOUTHEASTERN DIVISION			
Alabama Eastern Florida Western Florida Georgia West Indies (P. R.-V. I.) Canal Zone	K4KJD W4GJJ W4RKH W4LQ K44DJ K75TD	William S. Crafts Guerusey Curran Frank M. Butler, Jr. James A. Giglio William Werner Thomas B. DeMels	Route 3, Box 233 P. O. Box 48 494 Elliott Rd. 1378 Metropolitan Ave., S.E. 563 Ramon Liovet P. O. Box 1111
			Athens 35611 Palm Beach Fort Walton Beach 32548 Atlanta 30316 Urb. Truman Rio Piedras, P. R. Balboa
SOUTHWESTERN DIVISION			
Los Angeles Arizona San Diego Santa Barbara	W6FNE W7QZH W6LRU K6AAK	John A. McKowen Kenneth P. Cole Don Stansifer William C. Shelton	3430 So. Hills St., 221 East Camelback, Suite P-15 4427 Pescadero 2036 Grandview Drive
			Los Angeles 90007 Phoenix 12 San Diego 7 Camarillo
WEST GULF DIVISION			
Northern Texas Oklahoma Southern Texas	W5BNG K5KTW W5QEM	L. L. Harbin Bill F. Lund Roy K. Eggleston	4515 Calmont 1220 S. Owasso 1109 Vernon Drive
			Fort Worth 76107 Pulsa 20 Corpus Christi
CANADIAN DIVISION			
Maritime Ontario Quebec Alberta British Columbia Manitoba Saskatchewan	VE1WB VE3NG VE2DR VE6TG VE7FB VE3JY VE5QC	D. E. Weeks Richard W. Roberts C. W. Skarstedt Harry Harrold H. E. Savage M. S. Watson Mel Mills	170 Norton Ave. 62 St. Johns Rd. 1834-5th Ave. 4553 West 12th Ave. 249 Lanark St. 1012-10th St., East
			Harvey Station, N. B. Willowdale, Toronto, Ont. Pointe Claire Montreal 33, P. Q. N. Lethbridge, Alta. Vancouver 8, B. C. Winnipeg Saskatoon

* Official appointed to act temporarily in the absence of a regular official

15 KC BANDPASS

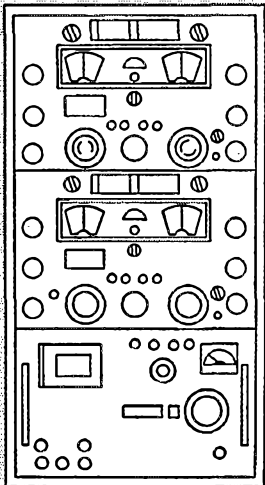


OVER THE
.54 TO 31.5 MC
FREQUENCY RANGE

IN THE *New*

GPR-91 RXD

COMMUNICATIONS RECEIVER



This new GPR-91RXD Communications Receiver has all of the features — selectivity, sensitivity and reliability — of our GPR-90RXD receiver.

AND IN ADDITION has 15 kc bandpass for ISB reception of four discrete voice channels or up to 64 teletypewriter channels, when used with our Model SBC-2, Sideband Converter.

Two of these receivers, with common oscillators, such as TMC Model VOX-5, (see line illustration at left) make one of the finest diversity receivers available on the market today.

Our engineering department will be happy to discuss ancillary equipment in our general catalog that may be used with this receiver to fill any of your requirements.



Request TB 3009

**THE TECHNICAL MATERIEL
CORPORATION** MAMARONECK, N. Y.

and Subsidiaries OTTAWA, CANADA • ALEXANDRIA, VA. • GARLAND, TEXAS • OXNARD,
CALIF. • SAN LUIS OBISPO, CALIF. • POMPANO BEACH, FLA. • LUZERN, SWITZERLAND

THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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



Past Presidents

- HIRAM PERCY MAXIM, W1AW, 1914-1936
EUGENE C. WOODRUFF, W8CMP, 1936-1940
GEORGE W. BAILEY, W2KH, 1940-1952
GOODWIN L. DOSLAND, W0TSN, 1952-1962
(President Emeritus)

Officers

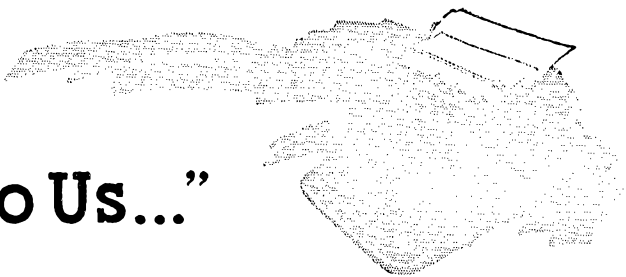
- President** HERBERT HOOVER, JR., W6ZH
900 Wilshire Blvd., Los Angeles, California 90017
- First Vice-President** WAYLAND M. GROVES, W5NW
1406 West 12th Street, Odessa, Texas 79761
- Vice-President** FRANCIS E. HANDY, W1BDI
225 Main St., Newington, Connecticut 06111
- Vice-President** ALEX REID, VE2BE
240 Logan Ave., St. Lambert, P. Q., Canada
- Secretary** JOHN HUNTOON, W1LVQ
- Treasurer** DAVID H. HOUGHTON
225 Main St., Newington, Connecticut 06111
- • • • •
- Secretary & General Manager Emeritus** A. L. BUDLONG, W1BUD
- • • • •
- General Manager** JOHN HUNTOON, W1LVQ
- Communications Manager** FRANCIS E. HANDY, W1BDI
- Technical Director** GEORGE GRAMMER, W1DF
- Assistant General Manager** RICHARD L. BALDWIN, W1IKE
- Assistant Secretaries** PERRY F. WILLIAMS, W1UED
RAYMOND HIGGS, K1FLG GARY L. FOSKETT, W1ECH
225 Main St., Newington, Connecticut 06111
- • • • •

- General Counsel** ROBERT M. BOOTH, JR., W3PS
1735 DeSales St., N. W., Washington, D. C. 20036
- Associate Counsel** ARTHUR K. MEEN, VE3RX
Suite 2212, 44 King St. West, Toronto 1, Ont.

DIRECTORS

- Canada**
- NOEL B. EATON VE3CJ
R.R. 3, Burlington, Ontario
- Vice-Director:** Colin C. Dumbille VE2BK
116 Oak Ridge Drive, Bale d'Urfee, Quebec
- Atlantic Division**
- GILBERT L. CROSSLEY W3YA
Dept. of E.E., Penna State University
State College, Pa. 16801
- Vice-Director:** Edwin S. Van Deusen W3ECP
3711 McKinley St., N.W., Washington, D.C. 20015
- Central Division**
- PHILIP E. HALLER W9HPG
6000 B. Tripp Ave., Chicago, Ill. 60629
- Vice-Director:**
- Dakota Division**
- CHARLES G. COMPTON W0BUO
1011 Fairmount Ave., St. Paul, Minn. 55105
- Vice-Director:** Charles M. Hove W0MXC
1611 1/2 East Lake St., Minneapolis, Minn. 55407
- Delta Division**
- PHILIP P. SPENCER W5LDH/W5LXX
29 Snipe St., Lake Vista, New Orleans, La. 70124
- Vice-Director:** Franklin Cassen W4WBK
925 North Trezevant St., Memphis, Tenn. 38108
- Great Lakes Division**
- DANA E. CARTWRIGHT W8UPB
2979 Observatory Ave., Cincinnati, Ohio 45208
- Vice-Director:** Charles C. Miller W8JSU
4872 Calvin Drive, Columbus, Ohio 43227
- Hudson Division**
- MORTON B. KAHN W2KRR
22 Birch Hill Rd., Great Neck, N. Y. 11020
- Vice-Director:** Harry J. Dannels W2TU/K
RFD 1, Arbor Lane, Dix Hills, Huntington, L. I.
11743
- Midwest Division**
- ROBERT W. DENNISTON W0NWX
Box 631, Newton, Iowa 50208
- Vice-Director:** Sumner H. Foster W0GQ
2315 Linden Dr., S.E., Cedar Rapids, Iowa 52403
- New England Division**
- MILTON E. CHAFFEE W1EFW
28 Reussner Rd., Southington, Conn. 06489
- Vice-Director:** Higelow Green W1EAL
236 Marlboro St., Boston, Mass. 02116
- Northwestern Division**
- R. REX ROBERTS W7CPY
837 Park Hill Drive, Billings, Mont. 59102
- Vice-Director:** Robert B. Thurston W7PGY
7700 31st Ave., N.E., Seattle, Wash. 98115
- Pacific Division**
- HARRY M. ENGWICHT W6HC
770 Chapman, San Jose, Calif. 95126
- Vice-Director:** Ronald G. Martin W6ZF
1573 Baywood Lane, Napa, Calif. 94558
- Roanoke Division**
- P. LANIER ANDERSON, JR. W4MWH
128 Maple Lane, Danville, Va. 24541
- Vice-Director:** Joseph F. Abernethy W4AKC
764 Colonial Drive, Rock Hill, S. C. 29730
- Rocky Mountain Division**
- CARL L. SMITH W0BWJ
1070 Locust St., Denver, Colo. 80220
- Vice-Director:** John H. Sampson, Jr. W7OCX
3618 Mount Ogden Drive, Ogden, Utah 84403
- Southeastern Division**
- THOMAS M. MOSS W4HYW
P.O. Box 20644, Municipal Airport Branch,
Atlanta, Ga. 30320
- Vice-Director:** Charles J. Bolvin W4LVV
2210 S.W. 27th Lane, Miami, Fla. 33134
- Southwestern Division**
- RAY E. MEYERS W6MLZ
Box R, San Gabriel, Calif. 91778
- Vice-Director:** Virgil Talbott W6GTE
1175 Longhill Way, Monterey Park, Calif. 91754
- West Gulf Division**
- ROMNER O. BEST W5QKF
P.O. Box 1656, Corpus Christi, Texas 78403
- Vice-Director:** Ray K. Bryan W5UYQ
2117 S.W. 61st Terrace, Oklahoma City, Okla.
73159

"It Seems to Us..."



STRENGTHENING I.A.R.U.

THE International Amateur Radio Union came into existence on April 17, 1925, when amateur delegates of 23 nations met in Paris for an international congress. A constitution was adopted, officers elected, and *QST* named the official organ. At first membership was by individuals; later the structure was changed to provide that membership would consist of national amateur societies.

Early activities of the Union were aimed at facilitating practical intercommunication between amateurs of the world. For example, since no international call sign table existed, there was an informal system of "intermediates" where the first self-assigned prefix letter indicated the continent, and the second the country (e.g., NC3AA — an amateur in North America in Canada).

Soon the Union membership realized that its work could be highly effective in coordinating efforts of the various national societies in their relationships with their administrations, and with particular accent on representation at international regulatory conferences. In recent years this has been a primary objective of the Union.

The Atlantic City conference of 1947 divided the world into three regions for regulatory purposes — I, Europe/Africa; II, North and South America; III, Asia and Oceania. Participating in this conference on behalf of the Union, representatives of the Radio Society of Great Britain saw the need for closer liaison among neighboring amateur societies. A resulting IARU Congress in Paris in 1950, and another at Lausanne, Switzerland, in 1953, set up a Region I Division of IARU which during the past ten years has functioned successfully in coordinating the aims and objectives of national amateur societies in the region.

With the 1962 election to the ARRL/IARU presidency of Herbert Hoover, Jr., W6ZH, a man of extensive background in international relationships, it was axiomatic that ARRL and IARU would be more completely directed toward strengthening the Union to meet the challenge of today's and future problems. Attendance by ARRL officials at the Region I meeting at Malmo, Sweden, in June of 1963 provided the springboard for a determination to see the member-societies of our hemisphere similarly welded into an

effective working unit. To the great delight of the League, the Mexican amateur society, LMRE, simultaneously of the same mind, proposed a congress in Mexico City in April this year to lay the ground work for a Region II division.

Late last year ARRL invited member societies in North and South America to undertake preliminary discussions at the Florida State Convention at Miami in January and, despite the rather short notice, representatives of nine societies were able to be present. The enthusiasm — and hard work — evident in several days of meetings and informal discussions shows that a Region II division organization is certain of success, and helped pave the way for more formal action at Mexico City. A highlight of the meetings was the presence, as guests of ARRL, of Harry Laett, HB9GA, and Per-Anders Kinnman, SM5ZD, respectively chairman and vice chairman of the Region I division, whose counsel and guidance were invaluable in our early planning.

Most encouraging to all parties concerned — and particularly to League officials — is the growing realization in organized amateur radio around the world of the seriousness of the regulatory problems which will face us at the next international conference. This growing recognition, and the serious determination to tackle the problem with the combined efforts of all of us, is another major step forward in an over-all plan to preserve the amateur radio service.

QST

GOLDEN ANNIVERSARY ESSAY CONTEST

As part of the ARRL's 50th Anniversary Year, each ARRL member is invited to submit an entry in a Golden Anniversary Essay Contest on the subject, "What ARRL Means to Me."

Winners will receive handsome trophies and cash awards of \$100 and \$50, and winning essays will be published in *QST*.

Any ARRL member is eligible. Entries should be received by the Essay Contest Committee by May 1. Complete rules appeared on page 48, Feb. *QST*.

QST

COMING A.R.R.L. CONVENTIONS

April 3-5 — Great Lakes Division, Detroit, Michigan

May 9-10 — New England Division, Swampscott, Massachusetts

June 12-14 — West Gulf Division, Brownwood, Texas

July 4-5 — West Virginia State, Jackson's Mill, W. Va.

August 21-23 — ARRL National, New York City

September 11-13 — Southwestern Division, Palm Springs, California

GREAT LAKES DIVISION CONVENTION

Detroit, Michigan — April 3-5

For the second time, Detroit will be host to the ARRL Great Lakes Division Convention, to be held at the Statler-Hilton Hotel on April 3-5.

Registration starts at 1:00 P.M. on Friday, April 3, and 8:00 A.M. on Saturday, April 4. The Michigan Room will be open for the ladies to get acquainted over coffee and doughnuts. Displays and demonstrations will cover all phases of amateur radio, including c.w., s.s.b., RTTY and live TV. Featured will be most of the major manufacturers and special exhibits by clubs and other organizations. Live TV cameras will be set up in the convention area and will feed the activities to a transmitter located on the roof of the Statler-Hilton Hotel operating on a frequency of 432 Mc. Special convention QSLs will be mailed to anyone confirming a pickup, with awards to the best DX. Activities will also be videotaped and played back later via closed-circuit TV.

For the ladies there will be many special attractions including a fashion show, tours, movies and other entertainment.

A special event scheduled for early Friday evening is the crowning of the Queen of the Convention. She will be chosen from among the applications submitted by radio amateurs or their families. A sideband dinner is also scheduled for Friday, at 7:30 P.M., in the Main Ballroom, featuring guest speakers Ed Clegg and Bob Heil of Clegg Labs. The main convention banquet will begin at 7:30 P.M. on Saturday; guest speakers include U. S. Senator from Michigan Philip A. Hart. At midnight the ancient ritual of initiation into the Royal Order of the Wouff Hong will be staged in the Main Ballroom. The mysterious "SWOOP Awards" for the ladies will also commence at that time in the Michigan Room.

Registration for all activities, except S.S.B. Dinner and Main Banquet, will be \$1.50. S.S.B. Dinner will be \$3.00 and Main Banquet will be \$3.50. Advance reservations may be made by mailing check or money order to Registration, Great Lakes Division Corporation, 23033 Vance, Hazel Park, Michigan. Special Convention rates for rooms at the Statler-Hilton are approximately

\$8.50 single and \$14.00 double. Advance hotel reservations can be made by writing directly to the Statler-Hilton Hotel, Grand Circus Park at Washington Boulevard, Detroit 31, Mich.

OUR COVER

You've seen those before-and-after slenderize advertisements? Well, this is something akin.

Our cover shows W1CUT's "VOX in a Box," described beginning on the next page, in two views. The top portion is the breadboard version, parts strewn from here to there (and it worked anyway); and the second is the slim, neat, final product.

The VOX in a Box is a transistorized, self-contained unit for a.m. and c.w., in addition to s.s.b.

ARRL Recommends . . .

In view of increasing congestion in our limited frequency assignments, caused by the steady growth of the amateur body, The American Radio Relay League urges upon all amateurs a more strict observance of the following principles:

1) To make a proper choice of bands below 30 Mc. appropriate to the distance to be covered.

2) To achieve equipment flexibility so that an adequate choice of frequency bands and powers for desired communications distances may be available.

3) To use minimum bandwidth, consistent with good engineering practice and compatible with the mode of transmission being employed.

4) To expand the use of v.h.f. for local contacts wherever possible, with the ultimate aim of conducting all short-distance communication in this portion of the spectrum.

5) To use the minimum power necessary for each communication.

Strays

An international mobile rally will be held in the Ardennes, Belgium, August 29-30. Temporary mobile licenses will be issued foreign hams for the event. Apply to the Director General of Radiocommunications, R.T.T., 42, Rue des Palais, Brussels 3, Belgium. More information from A. Lentz, Secretary, Luxembourg Section UBA, Rue de Neufchateau Villeroux-Sibret, Province of Luxembourg, Belgium.

Transistorized

VOX IN A BOX

BY E. LAIRD CAMPBELL,* WICUT

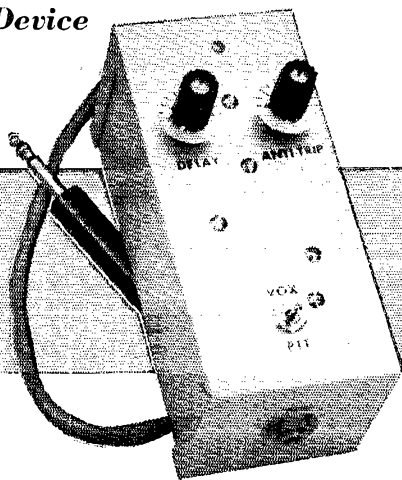


Fig. 1—The completed VOX unit. The gadget goes between the microphone and the transmitter. The miniature knobs are Johnson Collet type 116-603.

THE little gadget shown in the photographs is designed to give voice-operated break-in (VOX) capability to transmitters that now have only push-to-talk operation. Some of the economy one-band s.s.b. transceivers fall into this category, as do lots of combination a.m., s.s.b., and c.w. equipment. Except for educating your partner at the other end of the radio circuit, there is no reason why VOX can't be used with strictly a.m. equipment, too. For the c.w. man, the "VOX in a Box" can be used to turn on the transmitter with the first dot or dash, and will hold it on for a period of time (determined by the setting of a panel control) to give semibreak-in operation.¹

This VOX unit is not restricted to fixed-station use. In fact, its logical application is for mobile work—even for a.m.—especially from a safety point of view.

The Hookup

Operation of the VOX circuit is simple. Audio from any high-impedance microphone is amplified in several transistor stages, rectified, and applied to the base of a transistor that operates a relay. Contacts on the relay are connected to the push-to-talk circuit of the transmitter. Once the relay has closed, it will hold in for any desired amount of time, up to several seconds. In Fig. 2, transistor Q_1 is operated as an emitter follower to present a high impedance to the microphone and to act as a relatively low-impedance source for driving Q_2 . Transistors Q_2 and Q_3 are audio amplifiers. Audio output from Q_3 feeds into the VOX rectifier, CR_2 , which is part of a control circuit similar to that described by W3UWV several years ago.²

The negative bias developed at R_1 is applied to the base of Q_4 through CR_4 . This increases Q_4 's collector current and closes the relay, K_1 . Diode

CR_4 acts as a gate to prevent any positive-going signal from getting to the base of Q_4 .

To prevent signals from the shack speaker from triggering the VOX, an anti-trip circuit is built in. Some of the output from the receiver (which can be taken from the speaker connection at the receiver) is rectified by CR_3 , which is connected so that it produces a positive bias to buck the negative bias from CR_2 developed through the VOX stages.

Transistors used in this circuit can be most any of the available small-signal audio types. The ones shown here were chosen because they are all available for about 35 cents each.

Power for the VOX unit is a 15-volt battery, BT_1 , regulated at 10 volts by a Zener diode, CR_1 . It was found to be absolutely necessary to use the Zener diode, especially in mobile service, since the relay hold-in delay time will change with battery voltage. The Zener diode shown is a one-watt unit available for less than two dollars from Allied Radio. Actually, a $\frac{1}{2}$ -watt unit will do and can be used instead of the one specified. If the VOX device is to be used exclusively for mobile work, the car battery can be used instead of the dry-cell battery. The circuit is designed for voltages between 12 and 15 volts and for either positive or negative battery grounds.

Construction

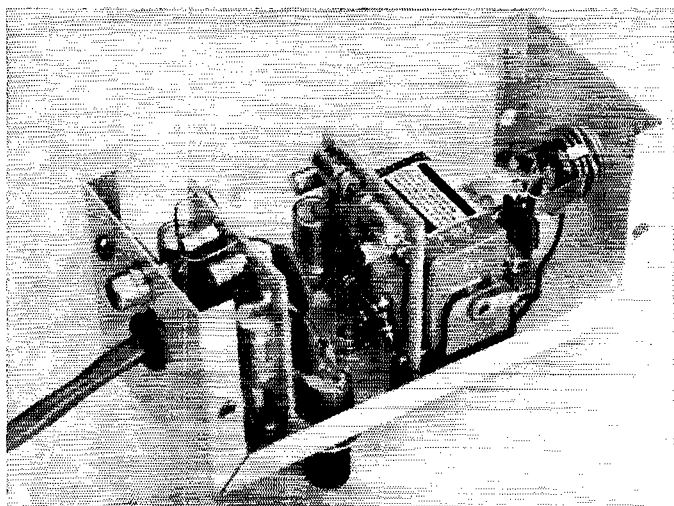
The box for the VOX is a Minibox that measures $2\frac{1}{4} \times 2\frac{1}{4} \times 5$ inches (Bud 3004A). Close inspection of Figs. 3 and 4 will show where most of the components are mounted although more conventional construction and layout can be used in a larger chassis or box. Only two lug-type terminal strips (H. H. Smith 830) were necessary. One is a strain reliever for the output cable and the other is a tie point for mounting the Zener diode. The battery holder is a modified Keystone type 166. Originally, this holder had a spring clip on both sides to help hold the battery in place. However, the battery used here is too wide for the holder and the side clips must be removed. We found that the end clips with

* Technical Assistant, ARRL.

¹ Campbell, "'Tattoo'—Automatic C.W. Transmitter Control," *QST*, August 1956, p. 18.

² Packham, "A Transistorized Control Unit," *QST*, November 1955, p. 32.

Fig. 4—The finished VOX unit with its cover removed takes on a compact look, although a large part of the space inside the chassis actually is taken up by the battery and its holder. This view also shows the phono connector and the output cable.



Heathkit audio generator simulating a microphone, we got our unit to close with as little as 3 millivolts input. Since most high-impedance microphones have at least 10 to 20 millivolts output, there should be no problem in driving the unit.

Delay between the time of the last word spoken into the mike and the time the relay opens can be adjusted from almost zero to several seconds with control R_2 . The time constant is determined by the value of capacitor C_1 and the resistance, R_2R_3 , across it. It may be necessary to juggle these values around somewhat to get the desired range of delay.

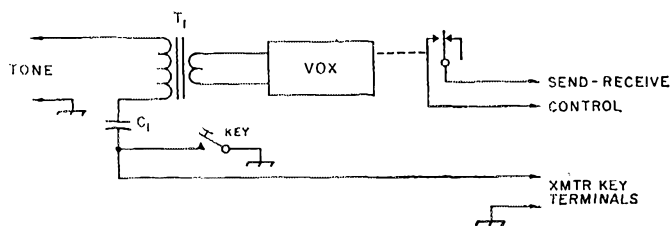


Fig. 5—A keyed tone, fed into the VOX unit, will give semibreak-in operation for the station c.w. rig. T_1 is a filament or output transformer. C_1 is .01 μ f.

To use the device for semibreak-in operation on c.w., connect the relay terminals to the send-receive control circuits of the transmitter-receiver. A tone source (code practice oscillator, signal generator, etc.) must be keyed in parallel with the transmitter. The keyed tone is fed to

the microphone input of the VOX unit. Fig. 5 shows a typical hookup for this kind of operation.

T_1 is a filament transformer or an output transformer with the low-impedance side connected to the VOX unit. This is necessary since the VOX will trip when its input is connected to an unshielded high-impedance circuit, because of hum or electrical noise pickup. Capacitor C_1 is used to isolate the d.c. keying circuit in the transmitter. The value of C_1 is not critical; something like 0.01 μ f. will do.

When using the VOX on c.w., the first dot or dash made with the key will close the VOX relay, turning on the transmitter. The relay will remain closed (the transmitter will stay on) between characters and words or even sentences, if desired. After a pause in keying, the relay will open and turn off the transmitter. The amount of delay is adjustable with the DELAY control. Other control circuits can be added to the system for receiver muting, antenna switching, or illuminating your on-the-air sign.

It is also possible to remove C_1 completely so that there is, for all practical purposes, no delay at all. When a keyed tone is fed into the VOX unit from a tape recorder or a receiver, the relay, K_1 , will be keyed along with it. This way, a tape recorder or receiver can key the station transmitter. QST

Strays

FEEDBACK

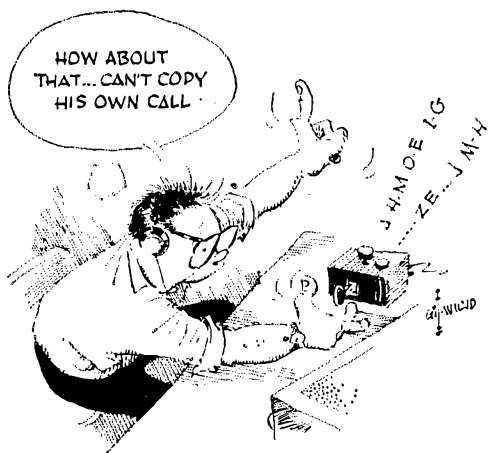
Tube life is short if you try to run a six-volt tube with twelve volts on the filament. The 6GJ5s in Fig. 2, page 39, January *QST*, should be 12GJ5s when the filament source is 12.6 volts.

The 6GE5s used as linear amplifiers in the Heathkit HW-12 transceiver (see Recent Equipment, page 50, *QST* for January, 1964) were called Novars, but are actually Compactrons (Duodecar type).

Love Them Dits . . .

But, Ohhhhhhhhhh

Them Dandy Dahs



BY JOHN G. TROSTER,* W6ISQ

“YEAH Charlie, this is what us c.w. boys call a keyer. Saves all kinds time and trouble. Sure . . . just exactly like a bug, only it sends the dahs automatically too. So it's twice as easy . . . ha! Yeah, that's right, Charlie, if ya loved them dits, you're gonna *really* love them dandy dahs!

“Sure, I can make dahs now as fast as I used to make the dits. See, first, I press this way and . . . EEEEEEEEEEEEEEE . . . just love to hear them dits rrrriiiipppppp like that, don't you, Charlie?”

“Now listen, press the other way and dahdah-dahdahdah — my gosh, listen to that . . . wow. Speed 'er up and dadadadada . . . ya see, makes 'em almost as fast as dits, eh, Charlie?”

“That's right. I don't have to push the paddle every time for a dah . . . just hold 'er down. Sure it's better. Listen how fast I can send my call . . . ditdahdahdah dahdahditditditdit ditdahdahdah — my gosh, listen to that . . . wow! holy smoke . . . what do ya think of them dahs? Pretty dandy, eh, Charlie?”

“Maybe I'd better ease up just a bit on the dahs though, Charlie. Some of them lids out there in radio land might not be too sharp on the old c.w., eh? Haw!”

“Oh . . . you had trouble with the dahs too? Well, don't feel too bad, Charlie. When ya get a little more c.w. experience . . . a little extra dah here and there . . . small matter . . . abhh . . .

“You know how ya can tell the good ops, Charlie? Well, with the good ops, you can save

all the dahs till the end, and then send 'em all at once. Yeah . . . then the good ops is the ones that can put all the dahs back in the right place. Pretty good, eh, Charlie?”

“Oh ya don't, eh? Well, after ya been kicking the old paddle around for as long as . . . OK, OK . . .

“Now, just to show ya how simple it is, tune across here . . . we'll find us a CQ . . . Ahhh, here's one . . . 'CQ de W4GF AR K'.

“OK, let's call . . . J . . . (ooooops) . . . J . . . (oh, well) . . . J/H-M/O-E/I-G/ . . . (darn dahs get away from me just a little) . . . ZE . . . J/M-H/IS/O-W/ . . . /W-P/ . . . /W-P/ . . . (close enough) . . . /M-W/G . . . /M-W/G . . .”

“QRZ? J? J? de W4GF.”

“ . . . (hmmmm, must be some QRM) . . . J/H-M/O-E/I-G/ . . . ZE . . . J/M-H/IS/O-W/ . . . /M-W/G . . . /M-W/G . . .”

“QRZ J or W7IS? de W4GF . . . sri no epi ur el . . . rst 579 nr Wash . . . name Bill . . . pse ur el agn . . . W? J? 7IS? de W4GF K”

“ . . . (I'll be darned. That's the trouble with some of them old two-letter call fellas. Spend all their time on fone and forgot the code 25 years ago . . . not even his own call . . .)

“J/H-M/O-E/I-G/ . . . ZE . . . J/M-H/IS/O-W/ . . . (oh well, few extra dahs . . . good op could out 'em out and put 'em back . . .)

“ . . . P P P . . . M/I-M/ . . . /M-M/O . . . I-M/P . . . PSM . . . 5/0-E/0-E/ . . . /O-W/ MH . . . GP . . . S/I-G/ . . . GWOE . . . 1W/ (I-G/M-W/ . . . (ooooops) . . . JAC? . . . (close) . . . HJ . . . WP . . . J/H-M/O-E/I-G . . . ZE . . . J/M-H/IS/O-W/ . . . /M-W/G . . .”

“W6 or W7IS? de W4GF . . . sri om no epi . . . think u hve trouble wid ur keyer . . . (what makes him think I got a keyer?) . . . mebe not adjust rite yet . . . tri agn . . . BK”

“J/H-M/O-E/I-G/ . . . ZE . . . J/M-H/IS/O-W/ . . . P P P . . . /W-S/W-S/W-S/ . . . (OK, I'll give him a break . . . back to a little of that good old-fashioned solid bug copy . . . VE . . . VE . . . VE . . . EEEEEEEEEEEEEEE . . . them bug dits is still pretty good, eh, Charlie? . . . EEEEE . . .) . . . W4GF de W6IVK . . . (nuts) . . . W6IV . . . (darn . . . push out the weights to help out these slow fellas and it throws the bug outa whack!) . . . de W6ISQ . . . RST 599 QTH nr SP name Jack hw AR W4GF de W6ISQ KN”

“W6IVK . . . EEEEEEE . . . (that ain't funny, Bill . . . my bug's outa correlation) . . . EEEEEEE . . . W6ISQ de W4GF tux om . . .

(Continued on page 148)

* 45 Laurel Ave., Atherton, Calif.

EACH year a new group of Novices joins the amateur ranks. Many of these fellows have high enthusiasm, but are without the cash to match. Since I was one of this group myself, I had to find out just how far a dollar could be stretched. By making maximum use of the junk box, discarded TV and b.c. sets, and my powers as a diplomat, I was able to build the 60-watt two-band rig shown in the photographs for an actual cash outlay of only \$11.00. You may not be able to duplicate this figure, but it should be possible to come reasonably close if you make an effort. You may have to pay more for some items than I did. On the other hand, you may be able to pick up others for less. It all depends on which way the wind blows in your part of the country.

Circuit Details

The 6AG7 used in the grid-plate crystal-oscillator circuit is an item found in many of the older TV receivers. It also happens that it makes an excellent crystal-oscillator tube. Because of its high power sensitivity, good output can be obtained with relatively little crystal current. Low crystal current means less crystal heating and better frequency stability. The plate circuit of the oscillator is untuned on 80 meters. On 40 meters, RFC_2 is approximately self-resonant, which helps to keep the oscillator output up to the desired level on this band.

The 6146 used in the amplifier stage is not a tube that you will find in a TV set, but it is a popular one among hams. For this reason, you stand a good chance of striking a bargain with one of the older hams in your town who has gone to higher power or a manufactured rig. The amplifier output circuit is in the form of a pi network with values suitable for working into a low-impedance feed line. The fixed capacitor C_4 provides the extra capacitance needed on 80 meters.

RFC_4 is a safety precaution. If C_2 should break down, the high voltage will be shorted through the choke, and the fuse in the primary of the power transformer will blow. This avoids the dangerous situation of high voltage appearing on the feed line and antenna.

Z_1 is needed to prevent a parasitic oscillation in the v.h.f. range that would ruin the operation of the amplifier. Almost all r.f. power amplifiers require this suppressor.

The two stages of the rig are keyed simultaneously in the common cathode circuit. The meter reads amplifier cathode current and is used as a tuning and loading indicator.

The power supply uses a full-wave rectifier and a capacitor-input filter. Normally, this is the most expensive part of a transmitter. However, an old TV receiver will supply most of the components, including the rectifier tube and the line cord and plug. Once in a while you will find a chassis with a burned-out transformer. You can usually spot this by the odor. If your nose tells



This inexpensive 60-watt transmitter covers the 80- and 40-meter bands. Along the bottom of the panel are the power switch, key jack, crystal socket and power warning lamp. Above, and to the right of the meter, are the tuning lamp, control, band switch and loading control.

Two-Band Sixty-Watt for the Novice

80 and 40 Meters at Low Cost

BY ROBERT E. ANDERSON,* KITVF

you that the transformer has probably burned out, look for another chassis.

Components

Sources where you may expect to save money on some of the major components have been mentioned. Old TV chassis and broadcast receivers will also supply most of the smaller parts,

* 103 Hillcrest Ave., New Britain, Conn.

such as resistors, capacitors, tube sockets, terminal strips, hookup wire, rubber grommets and other hardware. Even the power switch on a volume control may be used for S_2 , and an octal tube socket will serve as a crystal socket, since any pair of odd- or even-numbered socket holes has the same spacing as the crystal-holder pins.

Don't worry too much about exact values. The fixed capacitors labeled 0.001 $\mu\text{f.}$ may have any value from 0.001 to 0.01 $\mu\text{f.}$ Any value in this range can also be made up of smaller values in parallel. Combinations of resistors in series or parallel may be used to arrive at the resistance values specified. As examples, a 47K 2-watt resistor may be approximated sufficiently closely by connecting two 100K 1-watt resistors in parallel, or two 24K 1-watt resistors in series; for a 10K 2-watt resistor, two 22K 1-watt resistors may be connected in parallel, or two 4700-ohm 1-watt resistors in series. Other combinations of two or more resistors may be used; if you don't know how to calculate the resistance and wattage ratings of various combinations, the ARRL *Handbook* will tell you how to do it.

The variable capacitors used for C_2 and C_5 are quite inexpensive even if bought new. Similar capacitors may be found in broadcast receivers of older vintage, but they will usually have one or two large sections plus one smaller section. For

C_2 , use one of the large sections and make no connection to other sections. C_5 requires at least two sections; if your capacitor has three sections, connect all three sections in parallel.

Don't overlook the bargain pages of radio-dealers' catalogs. You may find just the item you are looking for at a rock-bottom price.

The cabinet measures 14 $\frac{3}{4}$ inches wide, 7 $\frac{1}{4}$ inches high, and 8 $\frac{3}{4}$ inches deep. It houses a 13 $\frac{1}{2}$ X 8 X 2 $\frac{1}{4}$ -inch chassis. I picked this item up at a sale. The cabinet and chassis you use need not be this exact size, but make sure they are large enough to accommodate the components without undue crowding.

Construction

The various components should be mounted in the relative positions shown in the photographs. The layout isn't critical to within an inch or so, so chassis drawings aren't necessary. You will find a lot of useful information on making layouts and cutting large holes with simple tools in ARRL's *Understanding Amateur Radio* and in the workshop chapter of the ARRL *Handbook*. The mounting holes for the transformer can be spotted accurately by first cutting the large rectangular hole, and then removing the four long mounting screws temporarily while you place the transformer in the opening and spot the mounting

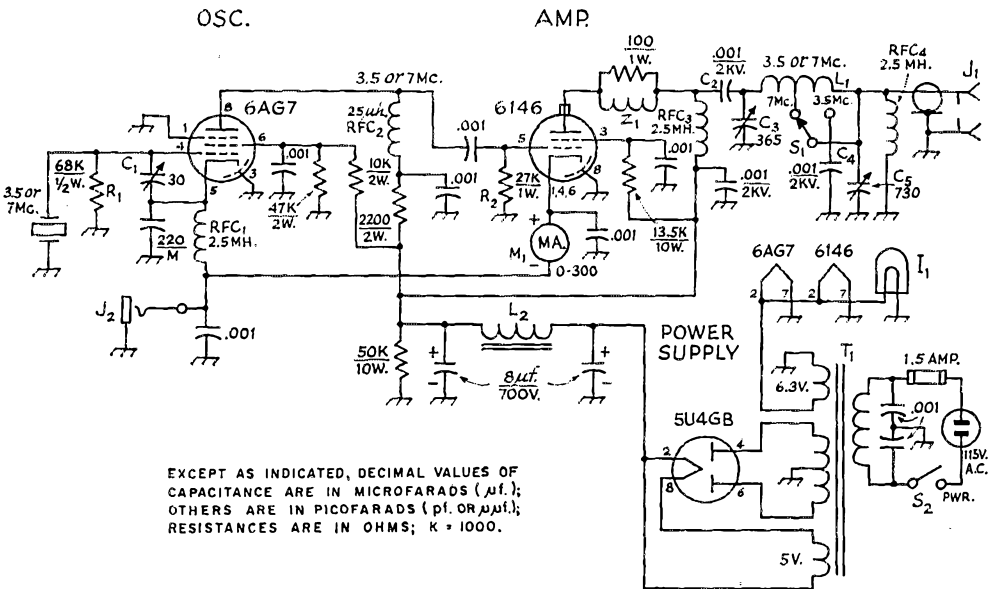
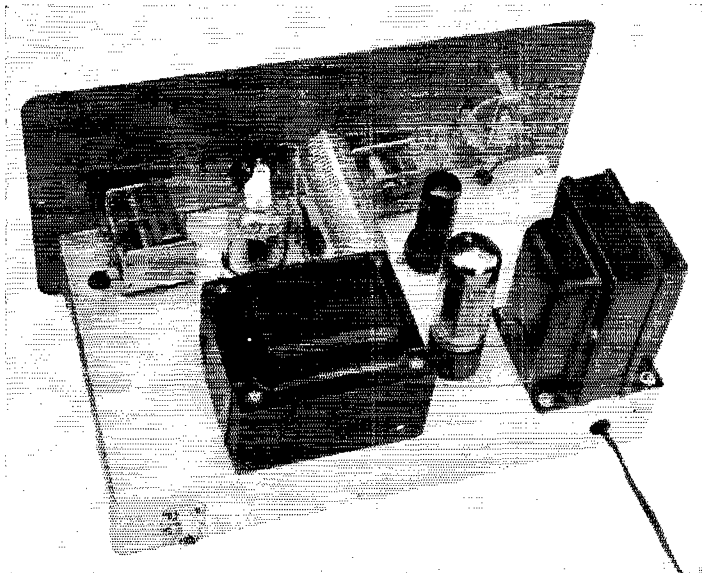


Fig. 1—Circuit of the beginner's 60-watt transmitter. Fixed capacitors are disk ceramic except where M indicates mica and polarity indicates electrolytic. Component labels not found below are for text-reference purposes.

- C_1 —3-30-pf. ceramic trimmer.
- C_3 —Single-section air, variable, broadcast-replacement type.
- C_5 —Dual-section air variable, broadcast-replacement type.
- I_1 —6-volt dial lamp.
- J_1 —Chassis-mounting coaxial receptacle (SO-239).
- J_2 —Open-circuit jack.
- L_1 —29 turns No. 16, 1 $\frac{1}{4}$ -inch diam., 3 $\frac{3}{8}$ inches long (B&W Miniductor 3018 or Airdux 1008T).

- L_2 —Filter choke, 2 henrys or more, 150 ma. or more.
- M_1 —0-300-ma. d.c. meter (Shurite type 850).
- RFC_1 , RFC_4 —2.5-mh. r.f. choke (National R-50).
- RFC_2 —25- $\mu\text{h.}$ r.f. choke (Millen 34300-25).
- RFC_3 —2.5-mh. r.f. choke (National R-100).
- S_1 —S.p.d.t. rotary switch (Centralab 1460 or similar).
- S_2 —S.p.s.t. toggle switch.
- T_1 —Power transformer: 600 to 800 volts c.t., 150 ma. or more; 6.3 volts, 2 amp. or more; 5 volts, 3 amp.
- Z_1 —10 turns No. 18 wound on 100-ohm 1-watt resistor.



Interior view of the 60-watt Novice transmitter. Near the panel, from left to right, are the loading capacitor C_5 , the 6146, the output coil L_1 , tuning capacitor C_3 , the 6AG7 and the meter. At the rear of the chassis are the coaxial connector, power transformer, rectifier tube, filter choke, and power cord.

holes on the chassis, using a ball-point refill dropped down through the holes.

Except for the two grid resistors, R_1 and R_2 , the various resistors may be located anywhere under the chassis, but don't just let them dangle from the wiring. Mount the resistors on or between insulated tie-point strips as shown in the bottom-view photograph, and connect your wiring to the terminals on these strips, soldering the resistor leads to the terminals at the same time. R_1 and R_2 should be close to the grid terminals. Solder one end of these resistors to the tube-socket terminal and ground the other end to a lug fastened under one of the socket-mounting screws.

The 0.001- μ f. bypass capacitors should also be mounted close to the terminals to which they are shown connected in Fig. 1, with the ground connection made to the nearest convenient point on the chassis.

RFC_1 is mounted under the chassis, suspended by its leads between the key jack and Terminal 5 on the 6AG7 socket. One end of RFC_2 is soldered to Pin 5 of the 6AG7 socket. The other end goes to a tie-point strip. RFC_3 is mounted on a tie-point strip fastened to the top side of the chassis in the space between the coil L_1 and the 6146 tube. RFC_4 is soldered between the center terminal of the coax connector and one of the connector-mounting screws. The front end of coil L_1 is supported by soldering it to the stator terminal of C_3 . A small ceramic cone insulator supports the other end.

If the transformer leads are not long enough to reach the points to which they must be connected, mount a tie-point strip near the transformer, connect the transformer leads to the terminals on this strip and proceed with the wiring from this point.

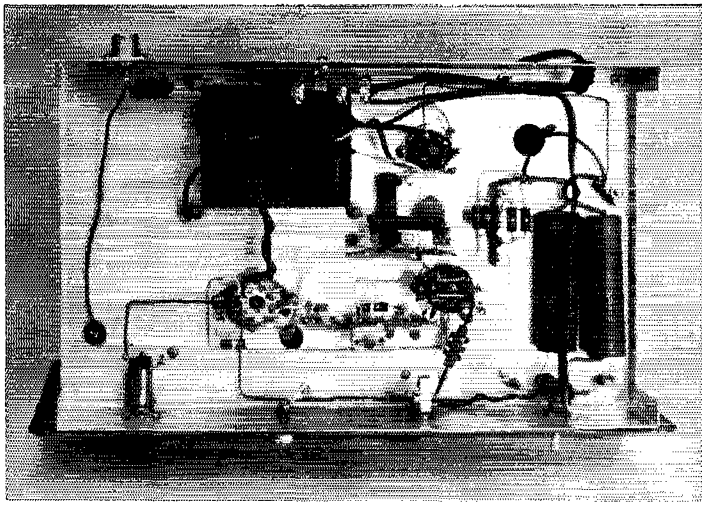
Testing

The transmitter will work on either 40 or 80 meters with 80-meter crystals and, of course, will work on 40 with 40-meter crystals. However, some 40-meter crystals do not key as well as most 80-meter crystals so, if there is a choice, it should usually be in favor of 80-meter crystals for both bands. If 80-meter crystals are used, make sure that the doubled frequency falls within the proper segment of the 40-meter band.

Before turning on the power supply, remind yourself that the voltage this supply delivers is sufficient to be lethal. *Always keep your hands away from the interior of the transmitter until you are sure that the power supply has been turned off.*

Connect a 60-watt lamp bulb across the coax output connector, either by clipping to the wire going to the center contact underneath the chassis, or by inserting a No. 8 machine screw about one inch long into the center-terminal hole outside. The other side of the lamp goes to chassis. Plug a crystal into the crystal socket and make sure that the key is open.

Now you can turn on the power supply. After waiting 30 seconds or so, check to see that the pilot lamp and the filaments of all tubes, including the rectifier, are lighted. Turn S_1 to the band you want to check and set C_5 at maximum capacitance. Now close the key. The meter should read 150 ma. or more. While you hold the key closed, adjust C_3 . At some point in the range, the cathode current should decrease, and the 60-watt bulb should start to light. Adjust C_3 to the point where the meter indicates minimum cathode current. If the current at this point is less than 150 ma., turn C_5 to a slightly lower capacitance. This will cause the cathode current to rise. Adjust C_3 again for minimum reading. The mini-



Bottom view showing the power transformer mounted in a rectangular cutout at the upper left and the filter capacitors lower right. Tie-point strips serve as mountings for most of the small components.

imum reading should be higher than it was before. Repeat this process, if necessary, setting C_5 to a smaller value and retuning with C_3 . Eventually you should arrive at a point where the cathode current is 150 ma. after C_3 has been tuned. Always adjust C_3 for minimum cathode current as a final step in the adjustment.

As you have been making these adjustments, the lamp should have been getting brighter, indicating that the transmitter is putting out more power as the transmitter draws more current from the power supply. Also notice that as you adjust C_3 for minimum cathode current, the lamp is brightest at approximately the same point where the plate current is lowest. If you adjust C_3 to one side or the other of this point, the cathode current increases, indicating that the transmitter is drawing more power from the supply. However, also notice that the lamp grows dimmer, indicating that there is less power output from the transmitter. Under this misadjustment, the extra power being drawn from the power supply is simply wasted in excessive heat in the amplifier tube. Always keep C_3 adjusted for resonance — the point where cathode current is at its lowest point for any selected setting of C_5 .

If you have other crystals you wish to check, follow the same procedure. Remember to turn S_1

if you go from one band to the other.

To check your keying, disconnect the antenna from your receiver. Turn the audio gain to maximum and the r.f. gain down and/or adjust the antenna trimmer to the point where your signal can be picked up at a comfortable level. Key the transmitter, and adjust C_1 for best keying.

Working into an Antenna

The choice of an antenna and the method of coupling the transmitter to it are beyond the scope of this article. An excellent treatment of both will be found in *Understanding Amateur Radio*. However, regardless of the type of antenna selected, it should be emphasized that no attempt should be made to operate the transmitter without proper harmonic-suppression circuitry, either in the form of a transmatch (antenna tuner) or half-wave filters, as described in the publication mentioned above.

I certainly hope that those of you who try this little rig will get as much out of building and operating it as I have. There is much satisfaction to be gained by the knowledge that you have built your own transmitter. If there are any questions concerning the rig, I'll be most happy to answer them if a self-addressed stamped envelope is included.

Q57—

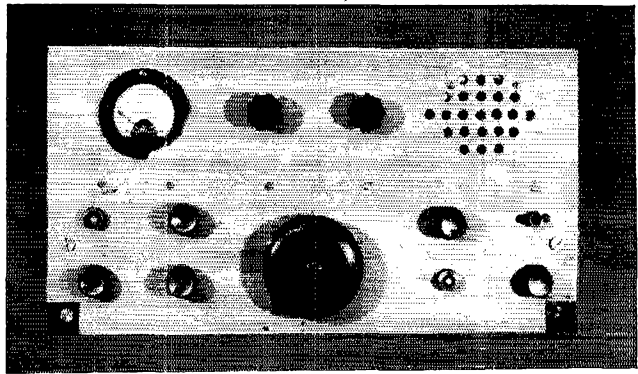
Strays

The 177th Army Security Agency company is the sole support agency for the Shin Seng Orphanage in Ansong, Korea, and is asking for parts and equipment to help give their charges vocational electronics training. Send your parcel post packages to Commanding Officer, 177th USASA Co., APO 71, San Francisco. Thanks from HL9TG and the kids at Shin Seng.

K7RQX, whose shack was recently destroyed by fire, would like to receive replacement QSLs from stations he QSOed since February 1962.

The Radio Club of Budapest is now offering award certificates and streamers for verified HA5 and HG5 QSOs after January 1, 1959. Details and applications from HA5AW.

Fig. 1—The s.s.b. transceiver built by VU2NR made use of available materials. Gadget at bottom center of panel is dial drive for a four-gang tuning capacitor.



A Sideband Transceiver, VU2 Style

Getting the Most Out of the Material at Hand

BY B. A. N. RAJU,* VU2NR

I AM not carrying coal to Newcastle. This article is written just to show how I faced the problem of putting a reasonable s.s.b. signal on the air. I hope it will be of interest to some of the foreign amateurs who have similar problems.

Having realized the potentialities of this wonderful medium of communication that is s.s.b., I migrated to the top end of 14 Mc. during 1960. I made a crude exciter with low-frequency crystals borrowed from VU2RM and put, now to think of it, an apology for an s.s.b. signal on the air. The bands were wide open and VU2 was still rare and I had a large clientele. Although the chaps said, "Very fine signal, OM," I knew it was only flattery, perhaps to get a quick QSL. My NC-240 was not able to cope with the traffic.

Consequently, I built another transmitter and modified my NC-240 with a product detector and a front-end converter and did a satisfactory job on the Laccadives DXpedition, VU2NRM. But a lot more was desired. The guys were not keen on a ragchew with me, since the quality of my signal was not pleasant. The bands seemed to me to be crowded, because my receiver was not selective enough.

I looked into the back issues of *QST*, *CQ*, and other magazines, and was impressed with the article by W3HEC in the October, 1960, *QST*. As luck would have it, shortly thereafter my friend VU2VA opened to me his treasure of FT-243 crystals, ARC-5 components, resistors, disk-

ceramic capacitors and so on, along with an article by W3TLN on a mobile transceiver. Designs flashed into my mind; I quickly settled for making a compact transceiver for VU2VA and, with the rest of the components, a transceiver for myself. It meant a lion's share of the components for me, but VU2VA was a sport.

On the basis of W3TLN's design, I built a transceiver in about six weeks, on a 5 × 11-inch chassis exclusive of v.f.o., and worked it through the winter months of 1961. I was so pleased with its performance that when I had to part with it to VU2VA I hated going back to my old rig. So I was QRT until I came out with a new rig, which is to be described below.

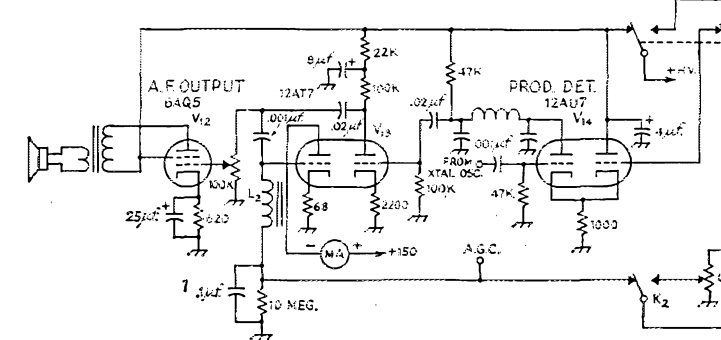
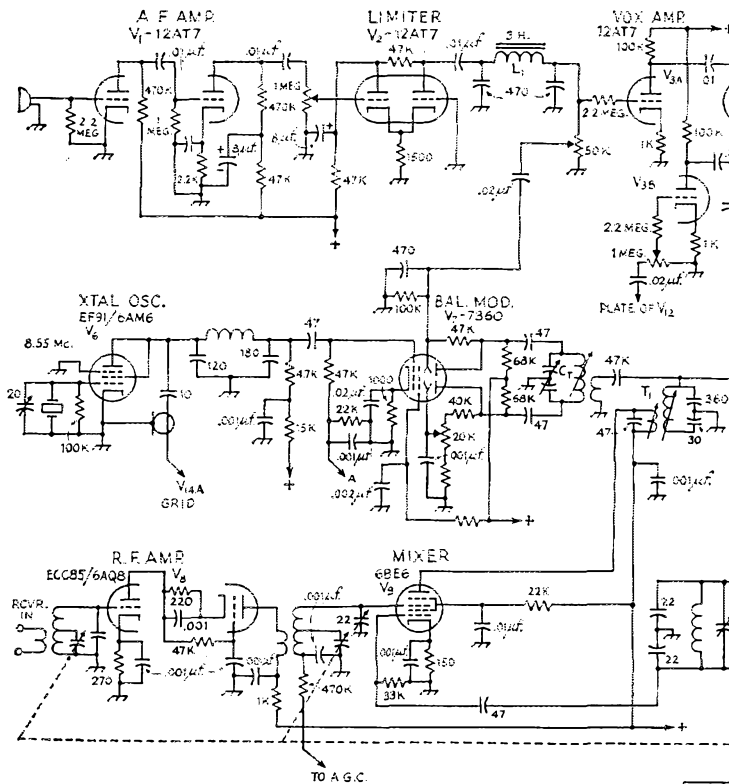
I make no claims that the new rig is the best that one could make at home, but I do suggest that this is the best one that came out of the junk that VU2VA and I pooled together!

The Circuit

Referring to the circuit diagram, in the receive condition the incoming signal goes through a cascode amplifier stage, V_8 , to the mixer, V_9 . The converted signal on 8.55 Mc. goes through the mixer output transformer, T_1 , to the W3HEC-type filter. From the filter the signal is amplified in two i.f. stages, V_{16} and V_{15} . The second stage is neutralized by a pickup wire at the cold end of the plate coil for V_{16} (not shown in diagram). The i.f. coils are modified i.f. coils from a BC-455A. A.g.c. is applied to the mixer grid and to the two i.f. amplifier grids. The output of the i.f.

* A.T.O., Safjardung Airport, New Delhi 3, India.

With the abundance of gear to choose from in this country, we sometimes forget what amateur radio is like in other parts of the world. Even if you don't know which end of a hot soldering iron to hold, we think you will find this account an interesting one. The home constructor will find many useful hints and kinks, although he may have to use his imagination and ingenuity on some of the components and their exact values.



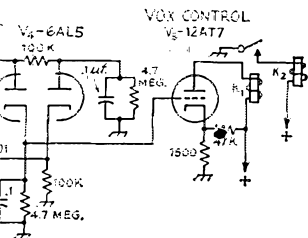


Fig. 2—Circuit diagram of the VU2NR transceiver.

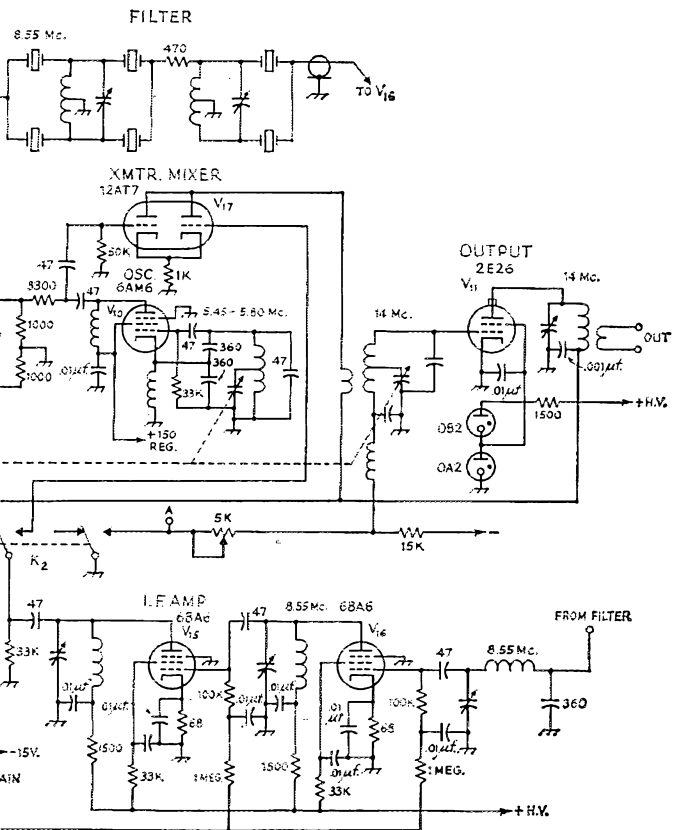
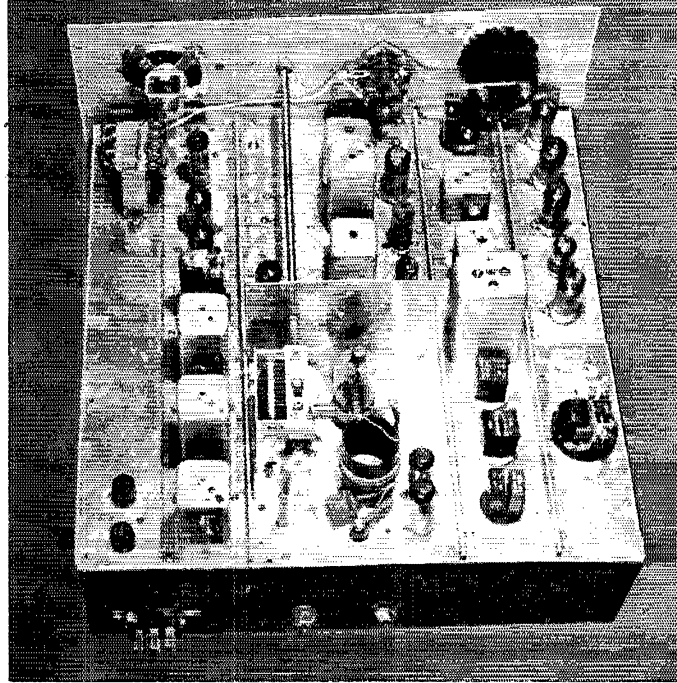


Fig. 3—The transceiver is built on various strips and then assembled after the strips have been tested individually. Strip on extreme right is speech amplifier and VOX, next is carrier oscillator, balanced modulator and filter; next is receiver front end (near panel) and output stage; next is i.f., transmitter mixer and output audio.



amplifier goes to a product detector, V_{14} , which uses the carrier crystal oscillator, V_6 , for the b.f.o. The audio signal is amplified by one triode of V_{13} before it is passed on to the audio output stage, a 6AQ5 that drives a 4-inch loudspeaker. A.g.c. is obtained by grid rectification in the other triode of V_{13} , and an S-meter indication is provided by the changes in plate current of this rectifier tube. The plate current dips when signals are received; the meter is calibrated for low signal levels but calibration naturally gets congested at high signal levels.

In the transmit condition, the crystal oscillator, V_6 , furnishes excitation for the 7360 beam-deflection balanced modulator. The modulator circuit is conventional and its double-sideband output is loosely coupled to the mixer coil through a 47-pf. capacitor and a one-turn pickup coil. The filter removes the unwanted sideband and passes the signal to the i.f. stages. The output of the i.f. stages is passed on to the transmitter mixer, V_{17} , which also receives v.f.o. output. Mixing action takes place, and the resultant 14-Mc. signal is coupled to the grid of the output amplifier, a 2E26. This stage is neutralized (not shown in diagram) with a capacitor formed by a wire running near the plate of the tube. The grid bias is adjustable through the 5K potentiometer; I use it set at -20 volts. The screen voltage is stabilized at +150, and the plate voltage is +300. The output of the stage is approximately $3\frac{1}{2}$ watts on single tone. The corresponding input is 30 ma. at 300 volts; the idling plate current is 6 ma.

In the audio section, V_1 is a conventional cascade audio amplifier. V_2 is a triode speech clipper, followed by a single-section low-pass filter to remove some of the unwanted high-frequency products. V_3 , another twin triode, serves as the VOX

and anti-trip amplifiers, whose outputs are rectified in V_4 , the VOX and anti-trip rectifiers. One triode of V_5 is used for the relay control tube, and some day the other section will be wired as an audio oscillator, for c.w. operation. The VOX relay controls the coil current for the multiple-contact transmit-receive relay, K_2 .

Construction

The transceiver is built in several subassemblies on $2\frac{3}{4}$ -inch wide aluminum plate, and one (central) $5\frac{1}{2}$ -inch plate (wider because it had to take the variable capacitors). These subassemblies were fixed to aluminum T sections. The T sections were made by bending thin aluminum strip into shape. Later the various units were wired together for power, input, output, etc. This facilitated easy handling during the construction and testing of each unit. The whole assembly was then fixed to the chassis.

Circuit Peculiarities

Having given a brief description of the various parts of the circuit, I would like to go into the details of some peculiar components and circuits in this rig.

Toroid Coils: The crystal filter is tuned by means of toroid coils (and capacitors) as is the normal practice. But these toroid coils are made out of slugs from a BC-458 Command transmitter v.f.o. and p.a. tank coils. The slug is removed from the aluminum shaft and the diameter of the hole increased to $\frac{3}{16}$ inch by drilling. A bifilar coil of 22 turns is wound on it, and it takes a 30-pf. trimmer to peak at 8550 kc.

Differential Capacitor: This capacitor, C_T in the balanced-modulator output, came out of the b.f.o. assembly of a BC-454 Command receiver. I slipped the drive gear and adjusted the ca-

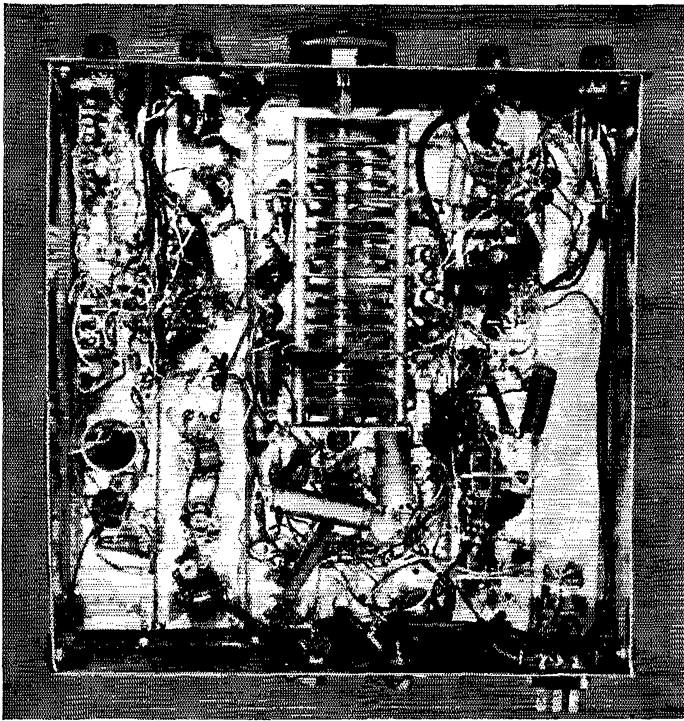


Fig. 4—Most conspicuous object under the transceiver is the four-gang capacitor, "rescued" from an old receiver.

capacitors so that one is fully meshed when the other is fully out. I then engaged the drive gear and the differential capacitor was ready.

VOX Relay: The 5000-ohm relay, K_1 , is from an SCR-522 receiver.

Audio Chokes: Audio chokes L_1 and L_2 are 3-hy. filter chokes from BC-454 receivers.

Four-Gang Capacitor: The four-gang capacitor is the bandspread capacitor from an SX-28 receiver.

Mixer Transformer: Transformer T_1 in the receiver mixer plate circuit was made from an SCR-522 i.f. transformer, rewound to tune to 8550 kc. with 30-50 pf.

Tuning Capacitor: The 2E26 plate tuning capacitor is the oscillator trimmer capacitor from a BC-459 Command transmitter; the shaft is the b.f.o. shaft from a BC-779.

Control Relay: The send-receive relay, K_2 , has a 300-ohm coil; if it had a 2000-ohm or higher-resistance coil it could have been used in place of K_1 .

S Meter: The S meter is a 0-500 milliammeter with the shunt removed. It can be switched between the a.g.c. rectifier plate lead and the V_{11} screen (not shown on diagram).

Band Hopping: Band hopping is possible by changing the plug-in coils in the four stages controlled by the four-gang capacitor. These coils are standard r.f. coils of Command receivers modified to suit the frequency.

The Crystal Filter

I have taken about eight FT-243 crystals nominally on the same frequency and checked

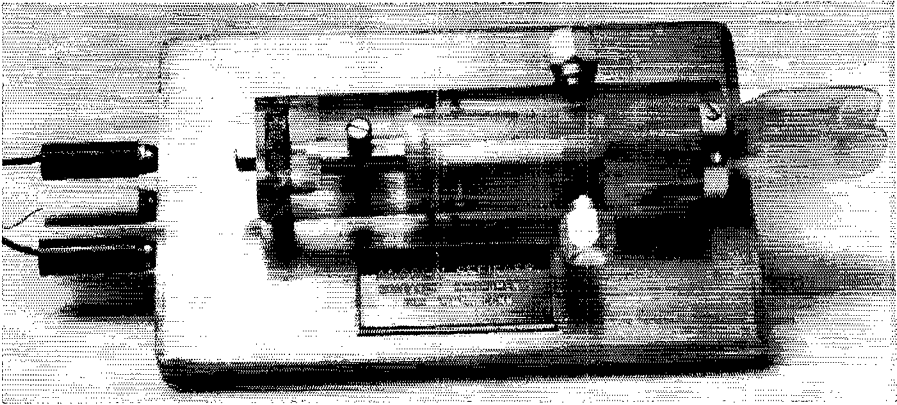
their resonant and anti-resonant frequencies with a BC-221 source and an NC-240 receiver for the indicator. Plenty of tap water, detergent powder, a touch of fine lens-grinding compound and a bit of solder were used to bring three of the crystals to resonate at the same frequency. Three more crystals were worked on to bring their anti-resonant frequencies to the same as the resonant frequencies of the first three. The two frequencies were not exactly coincident, but they were within 50 cycles so I left them alone. If by chance a crystal were ground a little high, a light smear of lead (solder) on the crystal face pulled the frequency down. After every operation, the crystal was washed and dried and tested. It was a full Sunday operation. The remaining two crystals were ground for operation as carrier crystals.

Test Equipment

Most of the alignment was done with a signal generator, a multimeter and the station receiver. Better-equipped fellows can do a quicker job. The BC-221 was necessary for building the filter.

Conclusion

In conclusion, I should point out that the filter frequency I selected was not good. It requires a v.f.o. frequency of 5450 to 5800 kc. The fourth harmonic of the oscillator heterodyned signals in the 13.25- to 14.65-Mc. range to the i.f. of 8550 kc. I realized this after a great deal of testing, and finally got around the difficulty by putting a stop-band filter in the plate of the oscillator, which now prevents frequencies around 21 to 24 Mc. from reaching the 6BE6 mixer. QST



The original K1KLO "Magnamatic" key is beautifully machined from Lucite rod, heavy brass and stainless steel. No springs are used to center the arm.

The Magnamatic Key

BY ANDREW PFEIFFER,* KIKLO

When Andy Pfeiffer showed us his beautiful "Magnamatic Key" we admired it and allowed that it was a pity that someone would need a machine shop to duplicate it. Andy thought it would be easy to apply the same principle to a key made from a surplus J-38. We challenged him to do just that and, sure enough, in a few weeks he was back with the ingenious key described on these pages. The basic principle (patent applied for) is not confined to a key, of course, and we think you will find it as interesting as we did.

MANY electronic-keyer circuits have been devised and described since the first "electronic bug" was described by Beecher in the April 1940 *QST*. Almost as many different s.p.d.t. center-off switches, or "keys," have been designed and described to accompany the electronic circuitry. However, whether elaborate or simple, they have all used *elasticity* in one manner or another to return the switch arm (or arms) to the center-off position. Some of these keys have been rather formidable in design, involving several linkages and a multiplicity of adjustments. The "Magnamatic" design, we submit, is a considerable simplification, since it has only *one* moving part and a total of three adjustments.

Principle

The Magnamatic's one moving part, the lever, maintains its neutral, or center-off, position by simple magnetic attraction. Referring to Fig. 1, there are two magnets in the unit. One is fixed to the lever, and the second is fixed to the base. This second magnet can be moved along its axis so that its proximity to the first can be adjusted and then locked. The distance between the two

* Box 450, RFD 1, Old Lyme, Conn.

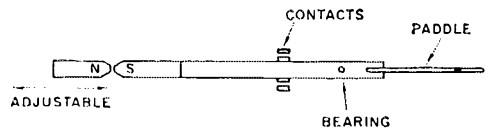


Fig. 1—Basic principle of the Magnamatic key, showing the use of two fixed magnets to create the restoring force. Narrow pole faces increase restoring force and accuracy of centering.

magnets determines the amount of manual force necessary to displace the lever. When the magnets are close together (in the neutral position) it takes more force to displace the lever than it does when they are farther apart.

Building the Key

The J-38 straight key, available in surplus, is a convenient starting point for a simple version of the Magnamatic Key. A reasonable home workshop, with a good collection of drills, taps and dies, is also required. A grinding wheel is not essential, but it is necessary to have access to one when it comes time to grind the faces of the magnets.

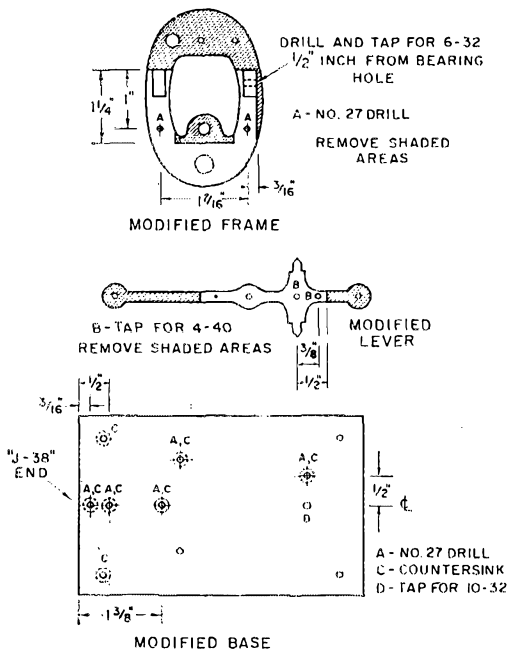


Fig. 2—The frame, lever and base of the original J-38 are modified as shown.

Fig. 2 shows the modifications required in the frame, lever and base plate of the J-38 key. The frame is prepared by removing portions of the original, drilling two clearance holes and tapping a new hole on the right-hand post. The lever is readied by removing metal from each end and tapping two holes that will take the screws holding the paddle. The original contact can be filed away at this time.

The base is modified by drilling several new holes (see Fig. 2) and tapping one original hole for a 10-32 thread. Note that several of the new

holes are countersunk *on the underside* to provide clearance between the heavy base plate and the various flat-head mounting screws.

The heavy base (see photograph) was made from a piece of $\frac{1}{2}$ -inch-thick brass, but it might be made from any heavy piece of metal (e.g., old flat-iron). Alternatively, it could be dispensed with if the key were bolted or clamped to the table. In our case the base was secured to the brass plate by the flat-head screw under the two magnets (see photograph) and the screw for the "cold" binding post.

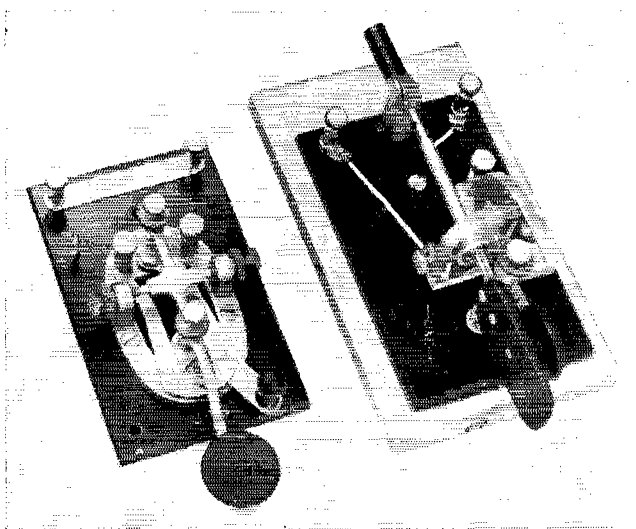
Details are given in Fig. 3 for the several plastic pieces required for the key. The paddle can be to the operator's taste; we utilized a piece of bakelite and the original J-38 knob. A little work with fine steel wool will bring the paddle down to the requisite smoothness.

The contact mount requires a central clearance hole for the lever, a pair of 6-32 tapped holes to secure the mount to the modified frame, and a pair of 8-36 tapped holes to take the contact screws. While the mount can be made from $\frac{1}{4}$ -inch-thick plastic, a thickness of $\frac{3}{8}$ -inch gives a little more strength and margin for error.

The magnet support requires a hole that will provide a slide fit for the magnet, with a saw slot down to it that permits clamping the magnet in the desired position. The 6-32 screw used for the clamping action is from a binding post; a flat washer should be used under the head of this screw. Here again $\frac{1}{4}$ -inch-thick plastic can be used but the thicker plastic will be stronger.

Still further details of construction are shown in Fig. 4. As illustrated in Fig. 4-A, one magnet is pressed into a banana-plug insulator, which serves as a convenient handle. The other magnet is held to the lever by a short length of brass tubing; the press fits at each end are quite adequate in strength.

Before installing the magnets, however, they must be faced on a grindstone. To insure accurate grinding, a square cross-section block of



A J-38 key (left) before alteration, and the "Magnamatic" that can be made from the parts and only a few additional pieces.

hardwood (Fig. 4-C) is used as a grinding jig. The magnet is clamped in the block, and the block is laid on one side as the magnet is held against the grindstone. Just before the magnet is ground halfway across, the jig is turned over and the other half is ground. The angle between the two ground faces should be 90 degrees; the end face that is left should be $\frac{1}{32}$ inch wide.

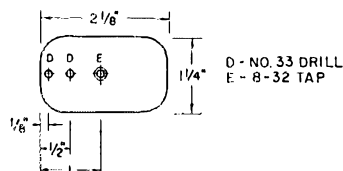
The exploded sketch in Fig. 4-A shows the movable magnet with its narrow face at right angles to the plane of the key lever. This is not the way the key is assembled; the magnet face must be in the same plane as the key paddle (see Fig. 1 and the photograph).

Fig. 4-B shows the assembly of the contact mount. The two screws are those originally used for the stop and spring adjustments on the J-38 key; they are modified by running an 8-36 die over the threads (and an 8-36 tap through the stop nuts). Then the tips are filed and the contacts soldered to them.

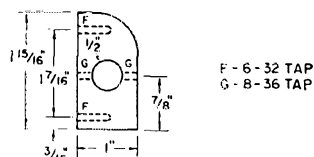
Fig. 4-D shows the head removed from one of the bearing screws, so that the screw can be used as the bottom support for the lever.

Not shown in any of the sketches is a small strip of thin brass that is used as the connection between the modified frame and the "cold" binding post. A portion of it is visible in the photograph.

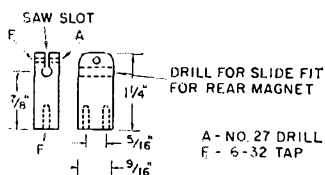
Final assembly consists of putting the various pieces together with suitable hardware. Omit the heavy base until the final adjustment of the bottom lever-bearing screw has been set to position the lever properly.



PADDLE $\frac{1}{8}$ INCH BAKELITE



CONTACT MOUNT
 $\frac{3}{8}$ INCH LUCITE OR BAKELITE



MAGNET SUPPORT
 $\frac{3}{8}$ INCH LUCITE OR BAKELITE

Fig. 3—Details of the paddle, contact mount and rear magnet support.

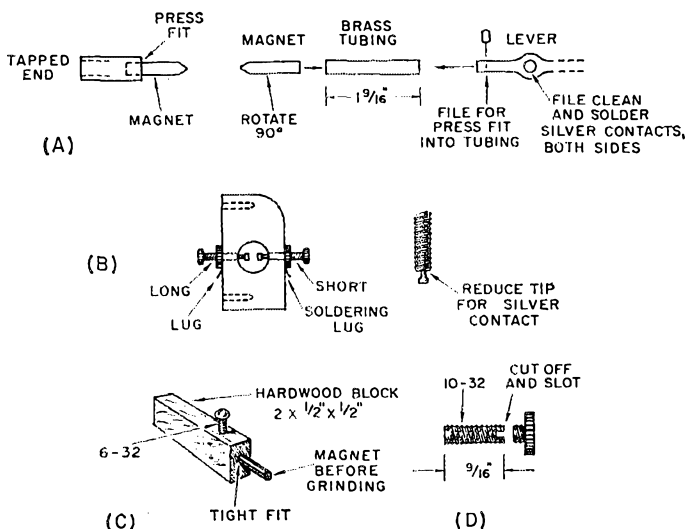


Fig. 4—(A) Assembly of the centering magnets. The fixed magnet is pressed into a banana-plug insulator, and the movable magnet is pressed into a length of $\frac{1}{2}$ -inch o.d. 0.014-inch-wall brass tubing (available as "telescope brass tube" from Whitehead Metals, Inc., and some hobby shops). The Alnico V magnets are 1 inch long, $\frac{3}{16}$ -inch diameter (available from Owen Morris & Co., Dept. AP, 39 West 32nd Street, New York 1, N. Y.) (B) Fixed contacts are made from the two set screws removed from the J-38 lever. Tips of the screws are filed down, and silver contacts are soldered to the ends. Screws are 8-40 and must be rethreaded to 8-36. (C) Jig for holding magnets while tips are faced on grindstone is made from hardwood block. Magnets are faced at 45-degree angle to leave $\frac{1}{32}$ -inch-wide tips (D) Lower lever-bearing screw is modified by removing the head and sawing the screwdriver slot.

CQ CQ CQ de W1UED W1UED K"
"W1UED W1UED W1UED de 5H3JI
5H3JI 5H . . ."

"VVV VVV VVV QRA de OLU OLU OLU."

Frustration? It's the rottenest of the rotten! Here's a rare one, coming back to my CQ of all things, and then that \$'%'&#\$\$ "commercial" blasts in S9 and takes 5H3JI right off the 15-meter band.

If you work the bands below 30 megacycles, it's almost a certainty that this sort of thing has happened to you. Were The Old Man around today, Kitty would be spat upon at least twice.¹ It's a feeling somewhat akin to being brushed by a car fender while standing in a safety zone. *Next* time it may be much more serious.

The cooperation of all amateurs is needed to help rid our bands of improper operation by other services.

Your Help Needed to Clear Our Frequencies

INTRUDERS IN THE AMATEUR BANDS

BY PERRY F. WILLIAMS,* W1UED

Intruder Reports are Needed

The representatives of governments of the world assemble at intervals of several years, divide up the spectrum by radio services and sign a treaty agreeing to stick to the resulting allocations table. But there is a general "fudge" factor applying to all these allocations: a country may assign any frequency to any radio service so long as such stations operating "out-of-band" do not cause harmful interference to stations of other countries operating within the agreed allocations table (of course, there is the exception for stations being operated in the national defense of a country.) From the amateur standpoint, therefore, in practical terms this means that

* Assistant Secretary, ARRL.

¹ Hiram Percy Maxim, beloved Co-founder and first President of the League, wrote — in the teens and early twenties — a series of articles called "Rotten Radio" under the pseudonym The Old Man. Whenever T.O.M. was distraught, he took it out on the poor old cat, who was identified only as Kitty in the series.

despite the fact that (for example) 21,000–21,450 kc. is agreed internationally as an exclusive amateur band, Czechoslovakia or Sikkim or any other country can assign government or commercial stations a frequency in this band and continue such operation *so long as there is no complaint of interference to amateurs.*

Reports by government monitors (even if they had time to watch every amateur band) do not qualify as reports of interference, under the international rules. It is therefore a responsibility of the amateur service to log and report instances of intruders in the amateur bands. *Without* such reports, out-of-band activity may exist for years, causing continuing interference and — more important — providing a foot-in-the-door basis for attacks on the amateur bands at a subsequent conference ("You haven't complained about the interference so there shouldn't be any problem of making use of the frequency as part of the allocations table!") *With* such reports, the Federal Communications Commission files formal complaints and in a majority of cases the operation is discontinued or moved to a more appropriate frequency.

ARRL acts as a clearing house for reports of non-amateur operation in amateur bands and forwards to FCC for action data on stations actually found to be operating in violation of the allocations table.

What QRM to Report

Since the international conferences which decide the frequency allocations represent in the end the net result of pulling and hauling among varying needs and pressures, allocations sometimes are influenced by political and economic considerations. So it is with amateur allocations. Many of our bands have the potential for international and interregional communications, yet are assigned on a regional and sometimes national basis, in an attempt to keep everybody happy. For example, the band 3500–4000 kc. is shared between the fixed service (point-to-point commercial and government communications, mostly c.w. and RTTY), the mobile service (ships, land vehicles, aircraft except scheduled airlines) and the amateur service. In the rest of the world, there is still further subdivision of the band.

Amateurs using the bands may occasionally hear a broadcasting station on 80: If it is operating below 3900 kc. from Asia or Oceania, or below 3950 kc. from Europe, Africa, Russia, or the Near East, or is operating anywhere in the band from the Western Hemisphere, it should be reported to the League. Most of the non-amateur stations heard in the band will probably be fixed or mobile, however, and (outside Canada and the U. S.) these stations have an equal right to the band with amateurs.

The 160-meter band is shared in the Western Hemisphere by the amateur, fixed, mobile (except aeronautical mobile) and radionavigation services. The loran system of radionavigation has priority, and the other services must not interfere

with it. In Canada and the United States, only Loran and amateurs may use the band, the latter under a complicated sharing arrangement. (See page 60, *QST* for July, 1963; or any copy of the *License Manual* shipped from Headquarters since July; or send ARRL a stamped, self-addressed envelope for a copy of Form S-15, *The Amateur Frequency Bands*.)

The 7000-7300 kc. band is exclusively amateur in the Western Hemisphere, but only 7000-7100 kc. is available to amateurs elsewhere (except in South Africa, whose amateurs may use 7100-7150 kc.). The band 7100-7300 kc. is allocated to broadcasting in Europe (including Russia), Africa, Asia, and Oceania. Amateurs should report any fixed or mobile stations anywhere in the band, any broadcasting originating in this hemisphere anywhere in the band, and any broadcasting below 7100 kc. (Location, not ownership, governs in this case; thus, we can't do anything about Voice of America stations located in Tangier or elsewhere outside this hemisphere.)

Once we get above 14,000 kc., things get simpler. The allocation is exclusively to the amateur service, worldwide, with only one exception: The U.S.S.R. may operate point-to-point stations in 14,250-14,350 kc. Russian fixed stations on frequencies below 14,250 kc. and any other non-amateur stations, regardless of country or nature of service, should be reported to ARRL.

The ten- and fifteen-meter bands are exclusively amateur; report all non-amateur stations in these bands.

How to Report

When you hear a non-amateur station you believe is illegally operating in the amateur bands (as explained above; see also Table I), please send Hq. a written report as soon as possible. We consolidate reports here, and pass them on to FCC. The next step is verification by a Commission monitoring station. Then the Commission forwards verified complaints to the foreign administration responsible for the station. If your circumstances permit calling one of the FCC monitoring stations (see Table II) while the interference is in progress, so much the better; work load permitting, the FCC monitors can take a fix on the spot thus speeding up the whole process. A confirming report and complaint should still be sent to the League, however.

What to Report

Information desired in these reports includes as many as possible of the following items: the date

Table I
What to Report

<i>Band</i>	<i>Frequencies</i>	<i>Nature of Services</i>
160 m.	1800-2000 kc.	Broadcasting. Any U. S. or Canadian non-amateur, except loran.
80 m.	3500-3900 kc.	Broadcasting.
	3900-4000 kc.	Any U. S. or Canadian non-amateur.
40 m.	7000-7100 kc.	Western Hemisphere Broadcasting. Any U. S. or Canadian non-amateur.
	7100-7300 kc.	Any non-amateur station.
20 m.	14,000-14,250 kc.	Western Hemisphere Broadcasting. Any non-amateur station other than Broadcasting.
	14,250-14,350 kc.	Any non-amateur station.
15 m.	21,000-21,450 kc.	Any non-amateur station except fixed stations in the U.S.S.R.
10 m.	28,000-29,700 kc.	Any non-amateur station.

Table II

Primary Monitoring Stations

- Federal Communications Commission, P.O. Box 89, Allegan, Michigan, 49010.
- Federal Communications Commission, P.O. Box 788, Grand Island, Nebraska, 68801.
- Federal Communications Commission, P.O. Box 632, Kingsville, Texas, 78363.
- Federal Communications Commission, P.O. Box 31, Laurel, Maryland, 20810.
- Federal Communications Commission, P.O. Box 311, Livermore, California, 94551.
- Federal Communications Commission, P.O. Box 374, Canandaigua, New York, 14424.
- Federal Communications Commission, P.O. Box 5165, Portland, Oregon, 97216.
- Federal Communications Commission, P.O. Box 98, Powder Springs, Georgia, 30073.
- Federal Communications Commission, P.O. Box 5126, Santa Ana, California, 92704.
- Federal Communications Commission, P.O. Box 1035, Waipahu, Hawaii, 96797.

Secondary Monitoring Stations

- Federal Communications Commission, P.O. Box 810, Fairbanks, Alaska, 99701.
- Federal Communications Commission, P.O. Box 5098, Fort Lauderdale, Florida, 33315.
- Federal Communications Commission, P.O. Box 251, Chillicothe, Ohio, 45601.
- Federal Communications Commission, Ambrose Monitoring Station, P.O. Box 6310, Denison, Texas, 75021.
- Federal Communications Commission, Winter Harbor Monitoring Station, P.O. Box 64, Prospect Harbor, Maine, 04669.
- Federal Communications Commission, P.O. Box 191, Spokane, Washington, 99200.
- Federal Communications Commission, P.O. Box 1101 Douglas, Arizona, 85607.
- Federal Communications Commission, P.O. Annex, Box 6303, Anchorage, Alaska, 99502.

and Greenwich Mean Time of the intercept; estimated or measured frequency; RS or RST report; mode of emission; language; call or other indication of identity; calls of amateurs being interfered with; direction of the station from you; your receiver type and model; and your complete name, call and address.

Images

Some of the few reports already received at ARRL have been on images: that is, signals which appear to be within the amateur bands but actually are not. Image response is a receiver short-coming, and *no* receiver is completely immune: it depends on relative signal strengths, input selectivity and the frequency of the i.f. amplifier. Even the best will sometimes show an image if the signal is strong enough at the receiver antenna. Briefly, a superheterodyne receiver uses a high frequency oscillator, tracked a fixed number of kilocycles from the frequency to which the receiver is tuned. The signal from the h.f. oscillator beats against the incoming signal to produce a third signal at the intermediate frequency of the receiver. The difficulty lies in the fact that both sum and difference frequencies may appear at the i.f. For example, an amateur receiver is tuned to 21,045 kc. The h.f. oscillator may then be operating at 21,500 kc. to produce an i.f. of 455 kc. If there is a strong broadcast signal coming into the first mixer stage at 21,955 kc., it may also beat against the 21,500-kc. signal to produce a new signal at 455 kc. It would then appear to listeners that the broadcast signal was within the amateur band, when it was actually 910 kc. away, in its proper place. An easy test is to zero beat the v.f.o. on your transmitter with the suspect signal and detune the receiver slightly. If the signal being checked appears to move in the opposite direction from the v.f.o. signal, it is an



image. For a further discussion of the image problem, and a partial cure, see "How to Fight Your Image Battle" by McCoy, page 18, December 1963 *QST*.

Summary

The amateur bands are already crowded enough without the addition of signals from other radio services which don't belong there. This isn't a project which can be left to "George" or to Headquarters; skip being what it is, the chances are you'll be bothered by a different set of intruders than the amateur in a neighboring state or the operators at WIAW. When next OLU or someone else busts up a QSO for you, write all of the data you have, if possible phone it to the FCC monitoring station while the station is active, and in any event send your report along to Headquarters. Your report will help to clear the bands now, and it will help ARRL and the government to build a stronger case for the future.

QST

• New Apparatus

Jackson Brothers (London)

Epicyclic Through Spindle 4111/RV

HIDING behind that imposing title is one of the slickest little devices we have seen in some time. Let's face it; the English are well ahead of us in offering decent shaft drives and dials, and this is further proof.

The "epicyclic through spindle" is a one-knob *two*-speed drive that mounts in a $\frac{3}{8}$ -inch diameter hole. Flatted $\frac{1}{2}$ -inch diameter shafts extend out either side of the mounting bushing. A 1:1 drive ratio is obtained by turning the drive shaft far enough in one direction or the other to engage shoulders on the drive and driven shafts. However, when the direction is reversed the shoulders disengage, and for slightly more than 270 degrees rotation of the drive shaft the driven shaft turns at 1/5 the rate of the drive (knob) shaft, through a compact planetary drive concealed in the mounting bushing. The 1:1 drive is fairly stiff, but the 5:1 drive is quite free and smooth.

The drive would seem to be a "natural" for a v.f.o. The tuning could be swung quickly to the part of the band one

was interested in, and then a tuning rate 5 times slower would be available for careful "zeroing" on target. M. Swedgal Electronics, 258 Broadway, New York 7, New York, handles Jackson Brothers products in the United States. Arrow Electronics, Inc., and other distributors carry a stock. — B.G.



Strays

Stolen Equipment: Stolen from WA2DCA's locked car in Moorestown, N. J., a National NCN-31, serial number 426252; and a Knight s.w.r. bridge, a microphone, and speaker, serial numbers unknown. Contact WA2DCA, Crooked Lane, Cherry Hill, N. J., if you have any information about this gear.

V.H.F. Antenna Facts and Fallacies

Part III — The How and Why of Matching Devices

BY EDWARD P. TILTON,* WHDQ

AS WE have seen, there is a wide variety of antennas and transmission lines available. Feed lines most often used are of three impedance values, roughly 50, 72 and 300 ohms. Lines may be bought in 90-, 150- and 200-ohm types also, though these are not often used in amateur work. Lines classified as "300-ohm open-wire" are more often 400 to 450 ohms actual impedance. Homemade open-wire lines are usually 400 ohms or more, some being as much as 600. You can determine the impedance of your line from simple data in the *Antenna Book*.

It would be nice to know the impedance of the antenna, but this is subject to so many variations that it is seldom possible to put a very precise value on the impedance our line will have to work into. Some kind of adjustable matching device is, therefore, a very useful tool. Matching may take many forms, as any reader of antenna literature knows, but all perform the same basic functions. They are supposed to act as impedance transformation devices, so that the transmission lines will "see" impedances similar to their own regardless of what the actual antenna impedance may be.

Matching may be combined with other functions, such as conversion from an unbalanced line (coax) to a balanced load (center-fed antenna element). The balanced to unbalanced conversion, or vice versa, may be built into the matching system, or done with a separate component. In either case, the thing that does the job is usually called a *balun*. Details of the balun construction were given in Part II. (Incidentally, for such a simple word, this one is perhaps the most misspelled and mishandled in all radio talk.)

Matching also may be teamed up with phasing of the bays of large arrays, and the matching system may serve still another purpose: that of tuning the antenna or phasing system to resonance, as well as matching it to the transmission line. We'll get to examples of all these methods shortly, but first a little more about what we're going to do with them.

* V.H.F. Editor, *QST*.

About Antenna Impedance

This was discussed briefly in Part I, but to review, a half-wave dipole in free space has an impedance of about 72 ohms. When the dipole is close to ground, or objects that simulate ground, its impedance changes. In the first half wavelength from the ground up, the impedance swings from a few ohms near ground, through the free-space value near 0.25 wavelength to as much as 100 ohms at 0.3 wavelength, and then back to 72 ohms at the half-wave point. Beyond here it drops off to 60 ohms and rises through 72 ohms again to nearly 85 ohms, then drops back to 72 again at one wavelength. The effect of ground on impedance becomes relatively insignificant beyond two wavelengths, but it can be seen that in situations most hams encounter in putting up antennas the impedance of a dipole is anything but a sure thing.

Ground is only one factor. Adding parasitic elements drops the impedance, but how much is anyone's guess, especially in arrays with both reflector and director elements. Length, diameter and spacing of these elements can effect great changes in the impedance of the driven element, to the point where it is almost impossible to predict what the feed impedance of a Yagi array will be. The best course, then, is to make the antenna first, determine its impedance by experiment, and then make a matching device to fit the requirements. If we can make a reasonable guess at the impedance, we can make an adjustable matching device of small range that will do the job.

If our antenna is just a half-wave dipole, Fig. 1A and B, we can assume 72 ohms, knowing that it cannot vary much more than 30 ohms either way. Adding a reflector will bring the impedance down — to 40 or 50 ohms, on the average. Putting on directors will lower it further, to something around 20 ohms. All these are for the fed point of the split dipole, A. At the center of a dipole that is unbroken, Fig. 1B, the r.f. voltage between the element and ground is zero. This point can thus be grounded, as in all-metal arrays, and the impedance matched by tapping the line out on the element in various ways.

In the two previous parts of this series we discussed v.h.f. antennas and transmission lines used to feed them. In conclusion we will consider the means available for making these two parts of the antenna system work together effectively. Some antennas are designed so that they may be fed directly with suitable transmission lines, but most employ some form of matching. Thus it is important that we understand how these matching systems work, and know how to adjust them for optimum performance, if we would get the most out of our investment in ham gear.

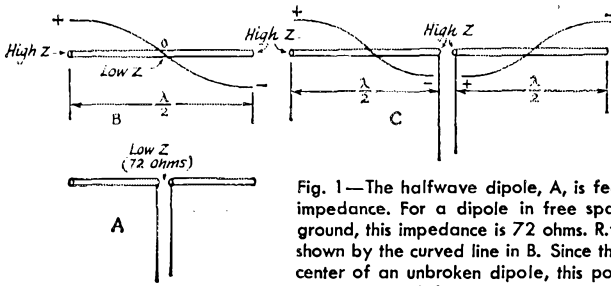


Fig. 1—The halfwave dipole, A, is fed at its center, the point of lowest impedance. For a dipole in free space, and at certain heights above ground, this impedance is 72 ohms. R.f. voltage on a halfwave dipole is shown by the curved line in B. Since there is no voltage to ground at the center of an unbroken dipole, this point can be grounded to the metal support. R.f. voltage and impedance are high at the ends of two collinear dipoles in phase, as at C.

R.f. voltage and impedance at the ends of half-wave elements are very high. So is the feed impedance of two dipoles fed in phase at their inner element ends, Fig. 1C, the simplest collinear array. The feed impedance of an "H" array of four half-waves in phase is somewhere around 600 ohms. The popular v.h.f. collinear 16-element array (8 halfwaves in phase as in Fig. 5, but with reflectors) gets down to around 200 ohms—*maybe!* Remember that there are modifying factors, including that of coupling between elements, but 200 ohms is a good starting point for setting up a matching system for this type of array.

All these assumptions are valid approximations only for the frequency at which the system is resonant. If the array is out of tune all bets are off. We then must have some means of tuning the system before we can match it.

Common Matching Methods

We will not describe all kinds of matching systems, but will consider only those commonly used in v.h.f. work, or those that should get more attention. First there is the *delta* or *Y-match*, Fig. 2A. Here the transmission line is fanned out and tapped onto the driven element at points equidistant from the center. The taps can be adjusted until an impedance match is achieved, and then fastened permanently in place. One of the first impedance-matching devices ever employed, it still has its merits, not the least of which is simplicity. Chief fault is the likelihood of some radiation from the fanned-out portion of

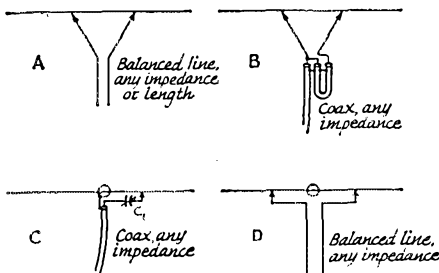


Fig. 2—The transmission line and antenna impedances may be matched by tapping the feedline out on the dipole in various ways. The delta or Y-match is shown at A. A variation for coaxial feed, using a balun, is given at B. The gamma match, C, is popular where coax feed is used. The T-match, D, may be fed with balanced line, or through a balun as in the case of B.

the line. It is also quite frequency-sensitive.

The delta works well with a balun made of coax, or an antenna coupler of some kind. A coaxial balun connected at the base of the delta is shown at B. If this is made of 72-ohm coax there could be a 300-ohm line of any convenient length between the balun and the delta. Adjustment is very easy when the delta is combined with coax feed. You merely insert an s.w.r. bridge in the coaxial line near the balun and adjust the delta spread for zero reflected power. If the balun or balanced line is connected directly to the delta as shown in Fig. 2A and B, the lines can be of any impedances commonly available.

Variations of the tapping-out idea are seen in the *gamma* and *T-match*, C and D of Fig. 2. The gamma is fine for coaxial feed, while the T is most often used with balanced line. A balun and coaxial feed could be used with the T, of course, just as with the delta. The series capacitor, C_1 , is used to tune out the inductive reactance of the gamma arm. Without it the gamma system cannot be made to work perfectly, as a slight unbalance is always present. The gamma arm is usually made of tubing of about the size of the driven element, and a sliding clip is used between the two, to facilitate adjustment. The capacitor can be at either end of the arm.

Once the proper value is found for C_1 it can be removed and a fixed capacitor substituted. An assumed value for your line can be taken, and only the point of connection of the arm made adjustable. Suitable fixed values for 50 ohms are as follows: 50 Mc. — 65 pf., 144 Mc. — 20 pf., 220 Mc. — 15 pf., 432 Mc. — 8 pf.

Strictly speaking, series capacitors should be used with the T system too, but since omitting them does not upset the balance of the dipole, as it would with the one-sided gamma, they are not always used.

One of the most commonly-used matching devices is the *folded dipole*, shown in various forms in Fig. 3. When a single conductor is bent around as shown at A, the impedance seen by the transmission line is quadrupled. Thus a folded dipole made from one size of conductor throughout has an impedance of 4×72 , or 288 ohms, and it can be fed with 300-ohm line, or with a balun and 72-ohm coax, without appreciable mismatch. The dipole element can be made from a piece of Twin-Lead, with each outer end shorted and one conductor broken at the midpoint, for connecting

the transmission line. This is a convenient arrangement for temporary or indoor use.

Additional impedance step-up can be obtained by making the unbroken portion of the dipole of larger cross-section than the fed portion, as at 3B. This is widely used in parasitic arrays, where the impedance of a split dipole would be less than 72 ohms. Impedance step-up depends on the ratio of conductor sizes, and the spacing between the conductors. Information on this is given in chart form in the *Antenna Book*. The practical limit of step-up is of the order of 15 to 1.

A problem with folded dipoles is that one must know the impedance to be matched in order to make the system work properly. Educated guesses suggested earlier may come close enough for most practical purposes. For example, if we assume the feed impedance of a Yagi array to be 20 ohms we can use a folded dipole with a 15-to-1 step-up as the driven element, and feed the array with 300-ohm line. The mismatch will be slight, even if the dipole impedance turns out to be 15 ohms, or 25 ohms, instead of 20. The s.w.r. will be only about 1.2 to 1 in either case. We could use a 10-to-1 dipole and 50-ohm coax with a balun equally well.

The folded dipole is easy to make, and it is somewhat more frequency tolerant than some other matching systems. It is very useful in stacked-Yagi arrays having open-wire phasing systems. Here a fairly high value of dipole impedance is desirable, but the exact value is not particularly important, as matching to the main transmission line will be taken care of where it connects to the phasing system.

A quarter wavelength of transmission line has the property of acting as a matching transformer between two different impedances. Such a transformer is called a "Q" section, and an example is shown in Fig. 3C. Here a 300-ohm folded dipole is matched to a 500-ohm line by using a "Q" section whose impedance is equal to the square root of the product of the two impedances to be matched. A 375-ohm section is required here, but the principle may be applied to many v.h.f. matching problems. The impedance obtainable with various conductor sizes and spacings is given in chart form in the *Handbook* and *Antenna Book*. Our 375-ohm transformer could be two No. 10 wires $1\frac{1}{4}$ inches apart, or two $\frac{1}{4}$ -inch rods $2\frac{3}{4}$ inches apart, to show two typical examples.

An adjustable "Q" section is a convenient way of matching impedances that are known only approximately. Two $\frac{1}{4}$ -inch rods can be made to provide impedances from 210 to 400 ohms, by varying their spacing from $\frac{3}{4}$ to 3 inches. The system can be used to step up or down, and it may be used with coaxial conductors as well. There will be examples of this later.

Probably the most useful device of all is the universal stub of Fig. 3D. Because the matching stub must be a half wavelength or more to start with, it is cumbersome at 50 Mc. and lower, but it is ideal for 144-Mc. and higher bands. No impedances need be known to utilize it, and

within limits the system to be matched does not even have to be resonant. The short on the line section is adjusted to tune the system to be fed, and then the transmission line is tapped onto the stub at the matching point. The load can be any impedance, and the stub can be any convenient wire or tubing size, and any spacing. The feed line can be coaxial or balanced, any impedance. A balun is used with coax, as shown in the sketch. The shorting bar can be grounded, and the unused portion of the stub cut off, once adjustment is completed.

Two variables are involved, which complicates the adjustment procedure a bit, but with a standing-wave bridge in the line the job is quite simple. You merely move the position of the short and the point of connection of the transmission line until zero reflected power is indicated on the s.w.r. bridge. It will be recalled that this

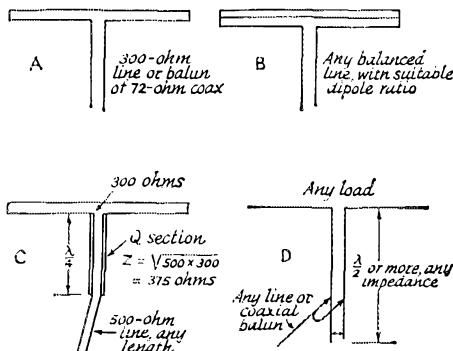


Fig. 3—A single conductor may be bent as at A to form a folded dipole, giving an impedance four times that of a simple split dipole. It may thus be fed with 300-ohm balanced line, or 72-ohm coax and a balun. Higher impedance step-up can be achieved by making the unbroken portion of the dipole of a larger conductor, as at B. A quarter-wavelength matching transformer, or Q section, is shown at C. A matching device that is useful for any balanced load is the universal stub, D. The transmission line can be coax or balanced line, any impedance.

principle was used in the open-wire experiments detailed in Part II.

Using the S.W.R. Bridge

Coaxial feed is recommended, if only for the reason that it permits easy monitoring of the matching process. You merely connect a standing-wave bridge in the coaxial line and adjust the matching device for lowest possible reflected power. This should be zero, or very close to it. All that is left then to make your antenna radiate effectively is to adjust the coupling at the transmitter for maximum forward power on the bridge meter. Note that you do *not* adjust the matching device for maximum forward power; you adjust for *zero* reflected. The forward-power indication is meaningless unless the reflected is zero.

Where the bridge is inserted in the line is important. Many hams are happy about their antenna systems because a bridge connected in the line at the transmitter output shows zero

reflected power, but they may be in a fool's paradise. If the transmission line is long in terms of wavelength, and lossy (all coaxial lines are lossy enough to throw us off) the line may, in effect, be self-terminating. That is to say you can have the world's worst mismatch at the end of a 100-foot run of RG-8 on 432 Mc. and you'll never know it if the bridge is connected at the transmitter. Try a direct short on the end of your line, or disconnect the antenna entirely, and see how little difference it makes on *your* line. The bridge must be connected at or near the antenna, when making matching adjustments.

There is no way to adjust an antenna properly without a bridge. Repeat — *no way!* Don't try

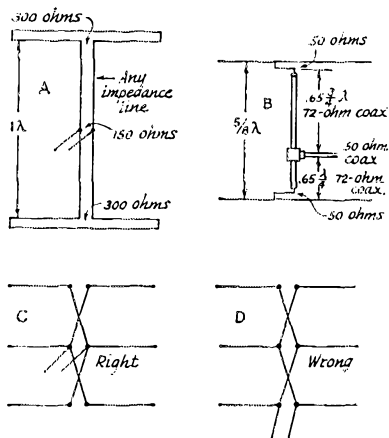


Fig. 4—In phasing bays of a stacked array, any impedance can be used for the connecting line, if it is a half wavelength or multiple thereof from the feed point to each of the driven elements. The feed impedance is half that of either bay, when two are connected as shown at A. A combination phasing and matching system for 50-ohm antennas is shown at B. Coaxial sections electrically $\frac{1}{4}$ and $\frac{3}{4}$ wavelength long, of 72-ohm coax, joined at a T fitting to a 50-ohm line. The bays are spaced $\frac{5}{8}$ wavelength apart, though this is not particularly critical, so long as the lines are the correct length. In arrays with large numbers of driven elements it is important to feed at the center of the system, as at C, rather than at the top, or bottom, as at D.

to do without one, for it is probably the most important instrument you can own. It need not be fancy or "commercial." A very simple unit was described by the writer in September, 1961, *QST*.¹ It works well from 50 through 450 Mc., and it costs only a few dollars to make. Its meter is rigged up so that it is available for other transmitter test jobs as well.

Feeding Stacked and Phased Arrays

If individual bays of a stacked array are properly designed they will look like resistors to the matching system that connects them up. If a phasing line is a half wavelength or any multiple thereof, the impedance connected at one end is

¹ "Two-Band Station for the V.H.F. Beginner," Part III, September, 1961, *QST*. This issue is sold out, but reprints of the entire series of four articles are available from ARRL Headquarters for 50 cents per set.

repeated at every half-wave point. Thus, in Fig. 4A our two 300-ohm dipoles are effectively in parallel at the feed point, and the impedance to be matched there is 150 ohms. (It will be slightly less than that, due to coupling between the dipoles, but we can ignore this for all practical purposes, at the 1-wavelength spacing shown.) The impedance will be near 150 ohms so long as there is a half wavelength or multiple thereof on both sides of the feed point.

So we see that if we have two Yagis that are designed for 300-ohm feed we can space them one wavelength apart, connect them with balanced line of any kind, and the impedance at the midpoint will always be near 150 ohms, regardless of the impedance of the line connecting them. This is important to remember in making up a phasing harness for a stacked array. Since open-wire phasing lines are short in terms of wavelength, we need not worry about their losses, so any convenient type of line may be used if the electrical length is right.

The velocity factor of the line has to be taken into account here, and it is wise to make a resonance check on any phasing line system, to be sure that it is resonant in the middle of the range the antenna is to work over. This can be done very readily with a dip-meter, as outlined in Part II, whether the line is Twin-Lead, open-wire or coax. A half wavelength of line is resonant with both ends open or shorted, though both-ends-shorted is usually more convenient for a dip test. A quarter wavelength is resonant with one end shorted and the other open. Resonances can be found for the various odd harmonics, also. That is, a quarter wavelength of line at 144 Mc. is very close to three-quarters of a wavelength at 432 Mc., and often may be used for either frequency. Matching sections requiring quarter-wave lines can be any *odd* multiple thereof. Half-wave lines can be *any* multiple of a half wavelength. Due to variations in velocity factor and the loading effects of terminations, lines cannot be measured off by theory only and be entirely accurate. Better make the dip check and be sure!

The impedance transformation property of quarter-wave lines can be employed in combined matching and phasing systems. An example is that of two 50-ohm loads matched to a 50-ohm line, as shown in Fig. 4B. The phasing system is, in effect, two "Q" sections, one a quarter wavelength and the other three quarters. Made from 72-ohm coax, such a phasing and matching system works out very nicely for bays that should be electrically one wavelength apart, but mechanically only $\frac{5}{8}$ wavelength. Coaxial phasing lines may be wrapped around a metal support, or otherwise coiled up if too long mechanically for the job at hand. (You might want to put two halos or dipoles only a half wavelength apart, for example.)

In arrays having several bays, it is important to feed the system at its center, so that current distribution may be the same to all parts of the system. Fig. 4C is favored over 4D on this ac-

count, and the principle is even more important with larger numbers of driven elements. No more than 8 driven elements should be connected to one line terminal. A curtain of 12 driven elements should be broken up into two sets of 6 each. Even the familiar 8 half waves in phase, usually connected as shown in Fig. 5A, may be broken up advantageously as shown in 5B. Note that the latter enables the builder to make his entire driven system out of four pieces of wire or rod stock.

Lazy-Man Method

The thought of making matching adjustments at the top of a tower is often a bit staggering to the budding big-antenna enthusiast. Fortunately, such a high-wire act is not really necessary, but there are right and wrong ways to do the job on the ground. We've already mentioned the effect of ground on antenna impedance, so it is easy to see that matching adjustments made close to the ground could easily be quite a bit off when the array is boosted to 60 or 70 feet up. Furthermore, with a high-gain beam objects quite some distance out in front of the array may reflect enough energy back into the antenna so that an appreciable reflected-power indication results.

The solution to this problem is obvious, but not too many antenna workers seem to think of it: aim the beam straight up, with the reflectors close to ground. The writer has adjusted several stacked beams that way, including a 66-element, 220-Mc. stacked-Yagi system,² and it works every time.

How Important is Matching?

Due mainly to over-exposure to the term, a good many hams tend to worship perfect matching. To have a 1-to-1 s.w.r. is the ultimate achievement, for them. But is it so very important? Not necessarily! It depends on what you're going to do. An s.w.r. of 2:1 won't kill you with losses. In fact, a 100-foot line of RG-8 coax at 144 Mc. will have its loss increased by less than 0.5 decibel with a 2:1 s.w.r. compared to a perfectly-matched line. If the loading on the transmitter is adjusted properly and the line is trimmed for length, if necessary, a listener at a distant point would not be able to tell the difference. Note that this line trimming is to achieve a resonant condition and proper loading. *It does not affect the s.w.r.!*

Mismatch is important in some ways, and it can tell you things about your antenna system. Make a frequency run, measuring s.w.r. at 144, 144.5, 145, 145.5, 146 and so on. If your s.w.r. dips to near 1:1 at 147 Mc., and is 3:1 at 144, you need some work on your array. You're almost sure to be getting less than top performance at the low end, and if you're the typical 2-meter DXer that's not good. But if 2:1 is as

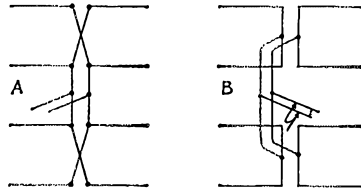


Fig. 5—In phasing large arrays no more than 8 elements should be connected to one line terminal, as at A. Even with 8 half waves in phase, it may be desirable to break the system up into two parts, as at B, joining their midpoints with a phasing line. The phasing harness so used should be $\frac{1}{2}$ half wavelength or multiple thereof each side of the main feed point. The universal stub, Fig. 2D, is very useful for feeding such a system.

low as you can get, and it is around the frequency you work most often, you don't need to worry too much if the transmitter loads satisfactorily.

With high power a high s.w.r. runs you into the danger of flash-over of the line, but this doesn't happen very often in v.h.f. circles, at least with any coax worth using.

Exact matching is important in making measurements of antenna performance. If you would learn anything from attempted gain measurements you have to know *exactly* how much power you're putting into the antenna, or at least you have to know that you're using the same power every time. Forward-power readings with the usual s.w.r. bridge are useless for antenna evaluation purposes, unless the system is perfectly matched. This means adjusting for *zero* reflected power, every time a comparison or measurement is made.

The writer is convinced that much of the conflicting evidence reported in articles on antennas over the years has resulted from a lack of understanding of the importance of this precaution. Just putting up a field-strength meter and then pruning the elements or adjusting their spacing for maximum meter reading may result in your having a fairly good antenna, but it is a wholly unreliable way to make measurements. If you find the element lengths and spacings recommended in much of the literature on antennas confusing, failure to keep the radiated power constant, or inability to determine it accurately, may well be at the bottom of most of the inconsistencies.

So we come to the end of an involved discussion of v.h.f. antenna, transmission line and matching problems. The technically well-informed reader will have found little really new here, but we hope that the rest, who may be long on ambition but short on experience, will have been encouraged to try to improve the performance of their v.h.f. beams. There is more to the antenna game than going out and buying a Golden Super-Twelve, hooking it to a TV line, and then hoping for the best. The watts you save may be your own, and in ham radio at least, it's what's up *top* that counts!

QST

² "A 66-Element Stacked-Yagi 220-Mc. Array," January 1959 QST.

THE idea that the t.d. (transmitter distributor) unit in an RTTY installation can be used to provide the Morse identification required by FCC has probably not occurred to many RTTY operators. The revision to accomplish this is not a difficult one.

Before a t.d. unit can be used for c.w., some provision must be made to eliminate the automatic stop and start pulses from the tape mechanism. This is simply a matter of disconnecting the STOP contact from the coding contacts. At rest, the t.d. will then have an open circuit instead of the normal closed circuit. With the stop-start mechanism out of the circuit, we have only the five coding contacts in operation and can work out a keying code to create Morse characters.

hand, if the dots are too long, it will be difficult to distinguish between dots and dashes. For this reason, a compromise must be made, and a dot of two time units seems to work out best. There are four combinations of two consecutive time units that can be used to form dots—the first and second (letter A), the second and third (letter I), the third and fourth (letter N), and the fourth and fifth (letter O).

Spacing

It is desirable to keep the spacing between different elements in any given code group as uniform as possible, but complete uniformity is not always possible. Two consecutive dashes will have two time units between them, but combinations requiring dots may have from two

C.W. Sign-Off With RTTY Tape

Using the T.D. Unit

for Dual Identification

BY KENNETH N. SAPP,* W4AWY/A4AWY

If you have been annoyed by the dual-identification rule in RTTY operation, here is one way of making compliance virtually painless.

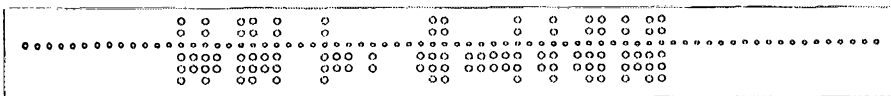


Fig. 1—Specimen c.w. tape. The same reads, "CQ de W4AWY."

Dashes

There are seven units of time in each cycle of the t.d. cam, and two of these, previously used for stop and start, are now open circuits. We can make the remaining five coding contacts either open or closed. The longest closed-circuit time interval we have occurs when all five of the coding contacts are closed during the rotation of the cam, as happens when the LTRS key is struck. The LTRS key will therefore be used to make dashes. Thus, for dashes, we have five units of time with the circuit closed, and two units of time with the circuit open.

Dots

There are several combinations of coding contacts that will produce an acceptable dot, and they will be discussed in detail. It must be kept in mind that each dot or dash requires one revolution of the t.d. cam, consuming seven units of time. For the dash, as we have seen, the circuit is closed for five units and open for two units. If we make the dots too short, the space between a dot and the next character will be too long, destroying the rhythm of the code. On the other

to five time units of spacing, depending upon which dot arrangement is selected. Readable code can be made by using the LTRS key for the dashes and either the I or N key for all dots. The code group for each character is always terminated by punching the BLANK key to provide spacing between them. The BLANK key is punched three times after each word or similar group, and five or more times after each sentence. A specimen tape is sketched in Fig. 1. In this example, the N key was used for all dots. For the perfectionist, the chart of Fig. 2 shows suggested key combinations for each letter or other character, with the spacing between elements.

T.D. Modification

If the same t.d. unit is to be used for both RTTY and c.w., a switch should be provided so that the STOP contacts may be switched in and out of the circuit as desired. In Fig. 3, two suggested switching arrangements are shown. Fig. 3A requires a 4-circuit double-throw switch, and completely isolates the t.d. from the RTTY circuit when the switch is in the c.w. position. This arrangement is designed for regular make-break c.w., but it can be adapted to any type of keying desired. In the RTTY position, S_{1A} and

* P.O. Box 3034, St. Andrews Branch, Charleston, S. C.

Fig. 2—Table showing suggested key combinations that will form c.w. characters for letters, numerals and punctuation marks. The colons represent open-circuit time units normally used for stop and start of the tape mechanism in RTTY operation; the periods indicate open coding-contact time units. The long and short dashes represent closed coding-contact time units. The time units providing space between letters and made by striking the BLANK key are not shown.

	KEYS	TIME INTERVALS
A	N-LTR	•••••
B	LTR-N-I-A	•••••
C	LTR-N-LTR-I	•••••
D	LTR-N-I	•••••
E	N	•••••
F	N-I-LTR-N	•••••
G	LTR-LTR-A	•••••
H	O-N-I-A	•••••
I	N-I	•••••
J	O-LTR-LTR-LTR	•••••
K	LTR-N-LTR	•••••
L	I-LTR-N-I	•••••
M	LTR-LTR	•••••
N	LTR-N	•••••
O	LTR-LTR-LTR	•••••
P	O-LTR-LTR-A	•••••
Q	LTR-LTR-N-LTR	•••••
R	N-LTR-I	•••••
S	N-I-A	•••••
T	LTR	•••••
U	N-I-LTR	•••••
V	O-N-I-LTR	•••••
W	O-LTR-LTR	•••••
X	LTR-N-I-LTR	•••••
Y	LTR-N-LTR-LTR	•••••
Z	LTR-LTR-N-A	•••••
1	O-LTR-LTR-LTR-LTR	•••••
2	O-N-LTR-LTR-LTR	•••••
3	O-N-I-LTR-LTR	•••••
4	O-N-I-A-LTR	•••••
5	O-N-I-A-A	•••••
6	LTR-O-N-I-A	•••••
7	LTR-LTR-N-I-A	•••••
8	LTR-LTR-LTR-N-A	•••••
9	LTR-LTR-LTR-LTR-A	•••••
0	LTR-LTR-LTR-LTR-LTR	•••••
SLANT	LTR-N-I-LTR-N	•••••
PERIOD	N-LTR-N-LTR-N-LTR	•••••
COMMA	LTR-LTR-N-I-LTR-LTR	•••••
QUERY	N-I-LTR-LTR-N-I	•••••

S_{1B} connect the t.d. to the f.s.k. line, S_{1C} closes the keying circuit to put the transmitter on the air, and S_{1D} closes the STOP contact circuit. In the c.w. position, S_{1A} and S_{1B} disconnect the t.d. from the f.s.k. circuit and close the line circuit to prevent the RTTY printer from running open, while S_{1C} and S_{1D} transfer the t.d. to the c.w. keying circuit and open the STOP contact circuit.

The circuit of Fig. 3B requires only an s.p.s.t. switch, S_2 , which opens or closes the stop contact circuit as desired. With the switch open, the t.d. may be used for normal f.s.k. c.w. The unkeyed carrier will be on the normal space frequency and, when keyed, will shift to the normal mark frequency. The RTTY printer will still be in the circuit, however, and, if the motor is running, the machine will make garbled copy which in no way affects the c.w. transmission. It can be eliminated by cutting off the printer motor, provided that you do not simultaneously stop the frequency shift by cutting off the d.c. power.

It is not difficult to make up a tape for each QSO which will provide the necessary identification in both c.w. and RTTY modes. I usually make this tape while receiving the first transmission of the station which I am working.

The t.d. used at this station is a Model MDX-14 driven by a synchronous motor. However, a governed motor may be used. This unit as originally constructed is in the shape of an L, with the motor forming the short leg of the L, and a long shaft driving two or more t.d. units forming the long leg. Each t.d. unit has its own clutch and may be operated independently of the others as long as the common motor is running. This shaft was shortened to drive only one t.d. unit, and the components were rearranged to make a more compact unit.

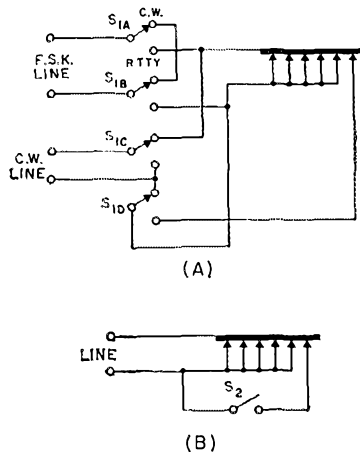


Fig. 3—A—Switching connections for make-break c.w. operation. B—Switching connections for f.s.k. c.w. operation. S_1 is a 4-pole double-throw switch of toggle, rotary or lever type. S_2 is an s.p.s.t. toggle.

In an earlier version using only a synchronous motor and a single MXD t.d. unit, the two were geared together using a 35-tooth gear and a seven-tooth pinion, reducing the motor speed of 1800 r.p.m. to a cam speed of 360 r.p.m. These gears are the same as used for a governed motor and main gears on a Model 15 printer at 60 w.p.m. The t.d. camshaft is larger than the main drive shaft of the Model 15 printer, so it was necessary to ream out the hub of the main gear. Cam speed is not critical for c.w., but for RTTY it should be as close as possible to 368 r.p.m. Resulting code speed is about 15 w.p.m.

QST

Converting the Knight C-100 CB Transceiver to 50 Mc.

Short-Range Communication at Low Cost

BY EDWARD C. PIENKOWSKI,* W8BEB

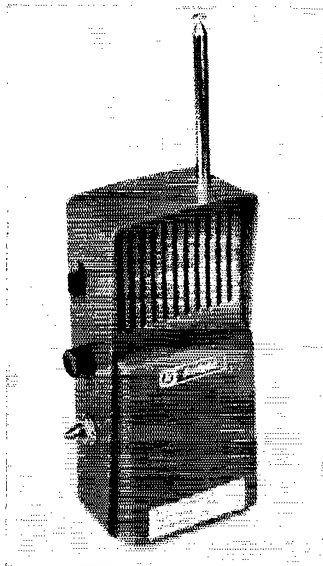


Fig. 1—The Knight Kit C-100 transceiver, as it looks when converted for 50-Mc. operation. Only visible change is installation of a regeneration control adjustable from the outside of the case.

Following the appearance of the description of a tiny self-contained 50-Mc. transmitter by W8BEB in November 1962, *QST*, he received many requests for more information. Seems lots of people are interested in low-cost, easy-to-build portable gear. To satisfy this demand, Ed searched the market for the simplest and most inexpensive Citizens Band rig he could find, and then converted it to the 50-Mc. band. You won't work the world with one of these handfuls, but they're very useful and lots of fun.

If you're beginning to feel bad about all the fun you're missing by not having a battery-portable rig for 6 meters, particularly when the guy next door with a CB job kids you about it, this transceiver may be for you. It represents the absolute minimum investment, and it can be assembled easily in one evening. But one word of warning: if you're thinking of working some choice 50-Mc. DX, this one *isn't* for you. It will give about a half-mile range in conjunction with a low-powered 6-meter mobile station, and 1 to 3 miles with an ordinary fixed station.¹

But in spite of its limited range, a very light compact portable station of this type comes in very handy for camping or fishing trips, work on antennas and many other uses. The transceiver is so small it can be carried in a coat pocket, and you can be radio-equipped without your non-ham friends realizing it.

Reason for the choice of the Allied Knight-Kit C-100 transceiver was not necessarily that it was one of the best electrically, but rather its very low price. There are several other comparable designs in the low-price field, but conversion of them to 50-Mc. service has not been generally satisfactory.

* 3839 Dempsey Road, Westerville, Ohio.

¹ The W8BEB transceiver was taken along on a September V.H.F. Party trip to a 2200-foot elevation in western Massachusetts. With just its whip antenna, the little box pulled in signals from as far away as northern New Jersey, some 125 miles distant. — Editor

Assembly and Conversion

Assembly instructions that come with the C-100 kit are excellent, and these should be followed except for the substitutions indicated below. Only one point seems to have been missed in the kit information: where the whip antenna runs down *inside* the case there is some trouble with it rubbing against capacitor C_3 , unless the leads to that item are left just a bit longer than necessary, to permit bending it slightly to one side. To make for clarity in interpreting the instructions and making the modifications, we are using the parts designations given in the kit instructions, though they in some instances do not follow standard *QST* style.

Five changes are made during assembly. The antenna loading coil, L_1 , is changed to 8 turns No. 30 wire, closewound on the same form. The collector coil, L_2 , is changed to $4\frac{1}{2}$ turns closewound on the original form. The oscillator transistor, TR_1 , should be a 2N1742. The original transistor will work, but with reduced efficiency at 50 Mc. If the original is used, L_2 should have one less turn than specified above. The crystal should be for the desired frequency in the 50-Mc. band. Crystals for 8.4 or 25 Mc. will not work in this circuit. Finally, a 5600-ohm resistor, R_{11} , should be connected to terminal 3 on the back of the circuit board, as shown in Fig. 2. This resistor is not absolutely necessary, but without it there may be settings of the regeneration control where the transmitter will not work, especially when battery voltage is low.

The original regeneration control was very hard to adjust, so a miniature control of the same re-

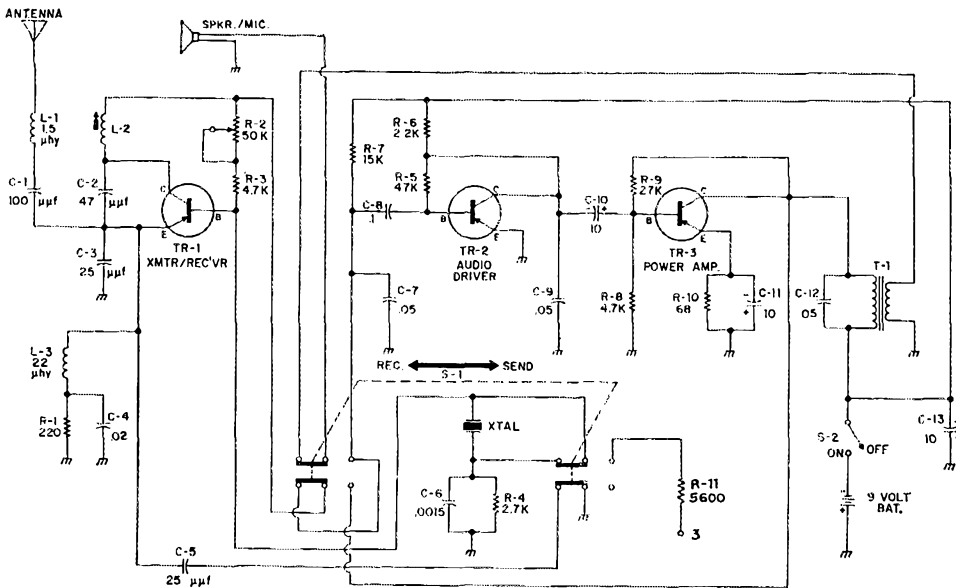


Fig. 2—Schematic diagram of the transceiver, in its converted form. Parts designations are left as given in the supplier's instructions for assembly. Only addition to the circuit is R-11, a 5600-ohm 1/2-watt resistor.

sistance (50,000 ohms), but equipped with a screwdriver adjustment, was fitted onto the side of the case, as may be seen from the interior photograph. This is not necessary, but is very handy.

Adjustment and Use

Tuning is very simple. With the antenna attached and extended, adjust the regeneration control for maximum hiss. Then adjust the position of the slug in L_2 with a plastic tuning tool until you can receive on the desired frequency. Start with a nearby station, then have the operator reduce power or turn his antenna away, or move your unit to a greater distance, and readjust the tuning and regeneration for best reception. Like all superregenerative detectors, this one takes a little juggling for best results.

If you've never built anything with transistors before, this project will give you a chance to get your feet wet without going in over your head. If you decide you like the water, the C-100 kit will give you a basic case and antenna for more advanced conversions and improvements. It's about time that more amateurs joined in the fun that is to be had with simple hand-carried equip-

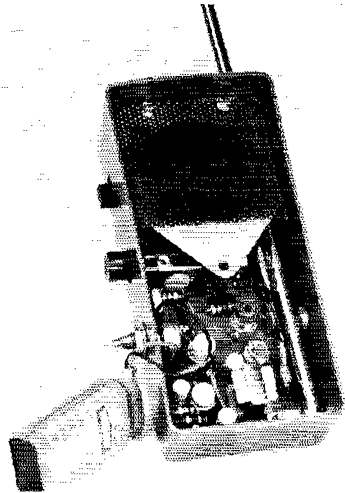


Fig. 3—Interior of the converted transceiver.

ment. This is an easy first step that requires little time, money or skill. If you come up with a really good "advanced conversion" or second step, let's hear about it!

QST

Strays

The National Bureau of Standards has appointed a ham the director of all NBS antarctic Central Radio Propagation Laboratory projects. He's widely-traveled KØYKJ, who's also held exotic calls from Palmyra to Pennsylvania (he's ex-W3CRW, KP6AA, KH6AEX, KG6AEX, KL7BFW, KC4USB, and KC4AAE).

W5RPH, son of ARRL West Gulf Director W5QKF, has been named Corpus Christi, Texas,

"Outstanding Young Man of 1963" by the Junior Chamber of Commerce in that city. He was cited for outstanding work with the National Police Foundation, the Lions Club, the Jaycees, the Chamber of Commerce, and much, much more. Congratulations!

The first dozen or so takers get free *Callbooks*, 1959-1963 issues, from W2QQ, Box 4, Bowmansville, New York.

The Flying Spot—I

How Patterns Get

on the Oscilloscope

BY GEORGE GRAMMER,* W1DF

To read an oscilloscope pattern accurately you have to know its "language"—just how and why a particular design could have got on the tube face. This article takes up the question of how the electron beam is manipulated to generate pictures that correspond to familiar types of graphs.

TREATISES on television servicing often make the point that the best test instrument is the picture tube itself; abnormalities in the picture help single out a faulty receiver section. But these freely-offered clues are meaningless to anyone without good grounding in both the principles of television and the specific characteristics of the TV signal and the TV receiver.

* Technical Director, ARRL.

Amateur gear is not conveniently equipped with a built-in oscilloscope, as is the TV receiver. We have to provide our own. But having done so, the information the scope offers will be meaningless, too, if the operator doesn't understand what his communications equipment and the scope are both supposed to be doing. The oscilloscope is a demanding instrument, as we said at the outset of the first article,¹ and the No. 1 demand it makes is that you know something about how the pattern on the tube face got there. Of course, a few standard patterns can be memorized, but if the picture you get from *your* equipment and *your* scope doesn't conform to the standard, what then?

The basic fact can be stated very simply: at any single instant, the location of the luminous spot on the face area of the tube is determined by two separate and independent forces acting on the electron beam (the spot can be at only *one* place at a given instant, since there is only one electron beam). These forces arise from the instantaneous voltages applied to the two pairs of deflecting plates. This may seem very elementary, and it is; but it is often overlooked. Even quite complex displays become understandable when examined in the knowledge that the pattern can be broken down into separate horizontal and vertical forces acting on the beam.

Fig. 1 should help to ram the point home. The diagram at the upper left labels the voltages applied between the pair of deflection plates that produces the horizontal displacement of the spot and between the pair that produces the vertical displacement. We have called these voltages E_H and E_V , respectively. To the right is a diagram showing the reference or starting

¹ Grammer, "Meet the Oscilloscope," *QST*, Jan. 1964.

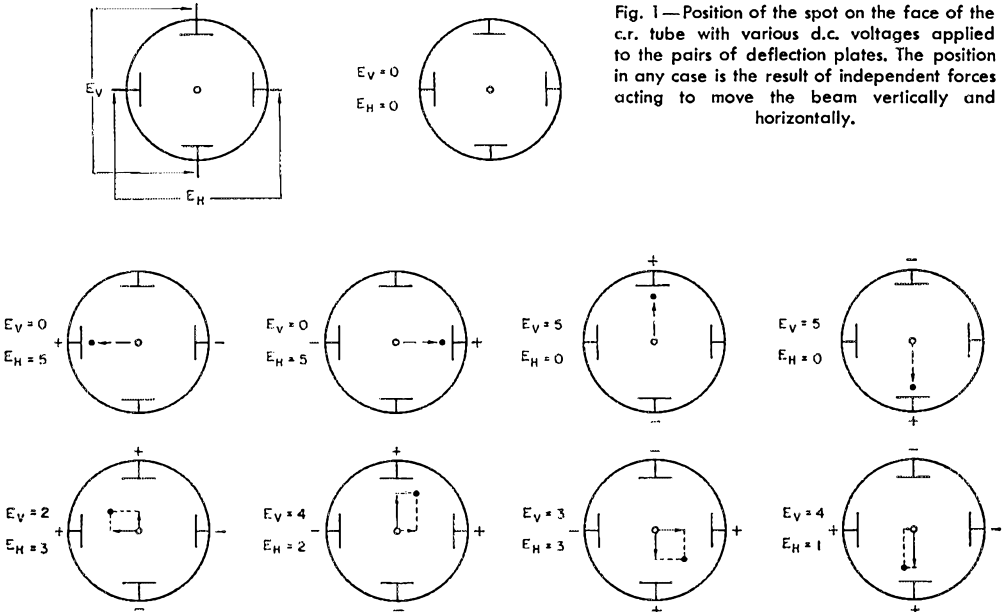


Fig. 1—Position of the spot on the face of the c.r. tube with various d.c. voltages applied to the pairs of deflection plates. The position in any case is the result of independent forces acting to move the beam vertically and horizontally.

position of the spot, indicated by the small circle in the center of the tube face. It is assumed that the spot has been centered by means of the positioning controls, which merely bias the plates appropriately — somewhat like grid bias on an ordinary tube. Thus the spot is centered when E_V and E_H , which are the signal voltages, are zero. All patterns start from the center — something that should always be kept in mind even though you might never guess it.

In the two rows of sample spot positions we have arbitrarily taken 5 units to represent the voltage that will move the spot far enough from the center to give a full-sized picture. Since the electron beam is always attracted by the positive plate and repelled by the negative plate, it is necessary that the voltage applied to a pair of plates have one polarity to move the spot, say, to the left, and the reverse polarity to move the spot in the other direction. In the first two diagrams in the first row, the voltages are the same, but the polarity of the voltage applied to the horizontal plates is one way in the first figure and reversed in the second. In the third and fourth figures the polarity reversal is in the voltage applied to the vertical plates. The second row shows examples of voltages of different amplitudes and polarities applied to both sets of plates.

A.C. Deflection

You can duplicate any of these drawings by manipulating the centering controls on your scope. The spot will assume fixed positions like these when only d.c. voltages are applied to the plates. An a.c. voltage, however, is continuously changing in amplitude and its polarity reverses periodically. In response to these changes in amplitude and polarity the spot keeps in continuous motion, giving the impression that it is not a spot at all but a series of lines or a lighted area on the tube face. (If the frequency is very low — a cycle or two per second — and the pattern is a simple one, the actual moving spot may be seen, but this is very rare in applications of the scope in amateur testing.)

When an a.c. voltage is applied to *only one* set of deflection plates the trace is simply a straight line. This is true no matter what the waveform of the a.c. voltage may be, since in the absence of a deflection voltage on the other plates the electron beam just moves back and forth over the same path. The action here is easily visualized. Fig. 2 shows a simple type of a.c. signal, a sine wave, applied to the horizontal plates in the left-hand drawing and to the vertical plates in the one at the right. Whenever the a.c. voltage passes instantaneously through zero the spot has to be in the undeflected or reference position, assumed to be at the center of the tube face in this case. Thus the starting point for an a.c. trace is at the *center* of the screen, not at one edge. This is somewhat contrary to ordinary experience, since our habits of reading tend to lead us to scan pictures from left to right and top to bottom. The starting point in Fig. 2 is

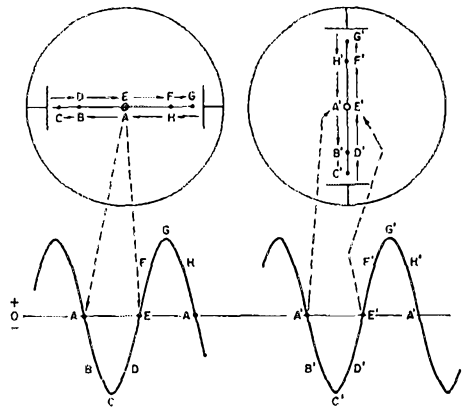


Fig. 2—Applying an a.c. voltage to one set of plates, but not the other, causes the spot to move back and forth in a straight line. The straight-line pattern is formed under these conditions no matter what the waveform of the a.c. voltage.

the point marked *A* on both the voltage curve and the screen. At this point the voltage is passing through zero and starting out with the polarity conventionally called negative in the representation of a sine wave. (Positive and negative in the sine-wave drawing do not indicate the specific polarity at the terminals where the voltage appears; they simply indicate that the polarity above the axis is the opposite of that below the axis. Don't try to associate these plus and minus signs with the actual voltage polarities at the deflection plates; if you do, you'll be struggling with the problem of how the "negative" half of the a.c. cycle can attract the beam to the left, as in this drawing, when the deflection plate at the left actually has to have a positive charge on it to do so. Plus and minus on the voltage curve simply mean a reversal; we have chosen the actual polarities at the deflection plates to be such that on the "positive" half cycle the right-hand plate is positive and the left is therefore negative, while on the "negative" half cycle the left-hand plate is positive and the right is therefore negative.)

The spot position in relation to the center corresponds to the instantaneous amplitude of

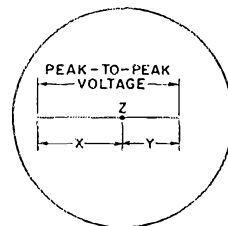


Fig. 3—With a straight-line pattern formed as in Fig. 2, it is possible to determine the relative peak-to-peak voltage of the waveform, and also something about its symmetry. The wave is unsymmetrical when the distances *X* and *Y*, both measured from *Z*, the position of the undeflected spot, are not equal.

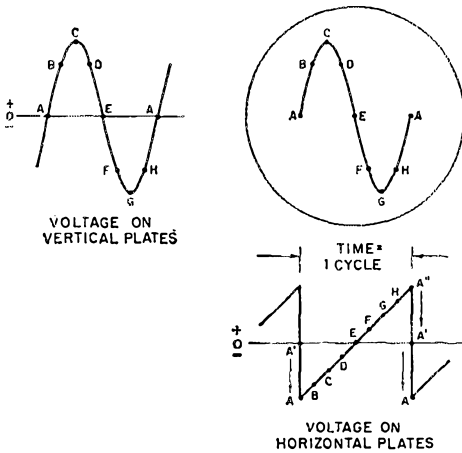


Fig. 4—Pattern formed by a linear time base synchronized to display one cycle of the waveform applied to the vertical plates.

the voltage. Starting from *A*, the spot moves to the left through *B* to *C*, where the voltage has its maximum value. The voltage then begins to decrease, and the spot accordingly moves in the direction of *A*, going through *D* to *E*, where the voltage passes through zero. At this instant the polarity reverses, causing the spot to be attracted to the right, so it continues in the same direction on the right-hand side of the screen. As the voltage rises, it and the spot pass through *F* to *G*, again a maximum of both voltage and deflection. As the voltage then declines, the spot travels back toward the center through *H* until the voltage reaches zero at *A*. At this time the spot is again in the center reference position and the cycle repeats. This continues as long as the voltage is applied.

If the a.c. voltage is placed on the vertical plates while the horizontal plates are left at zero voltage, the spot moves up and down as in the

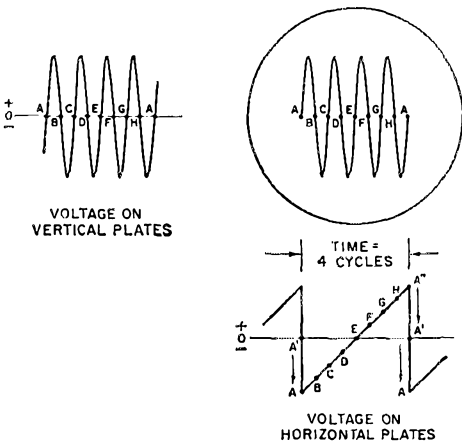


Fig. 5—Pattern formed by a linear time base synchronized to display four cycles of the waveform applied to the vertical plates.

right-hand drawing. In both cases the movement gives the appearance of an unbroken line.

Deflection Speed

Fig. 2 tells us more about deflection than just the position of the spot with relation to the amplitude of the voltage applied to the plates. The factor of *time* is also inherent in the picture. Point *B* on the voltage wave is at the $\frac{1}{8}$ -cycle point, exactly midway between *A* (zero) and *C* (maximum) in terms of time. However, the amplitude and hence the spot position at *B* are more than halfway between zero and maximum. The speed at which the spot moves across the face of the tube is proportional to the rate at which the voltage is changing.² The spot moved faster in going from *A* to *B* than it did in going from *B* to *C*, and corresponding relationships occur throughout the rest of the cycle.

But the back-and-forth motion results in just a straight line, when there is no voltage on the other deflection plates. You can't tell much about the rate at which the spot is moving, or about other features of the waveform applied to the deflection plates, by looking at a simple straight line. Of course, the length of the line will be proportional to the peak-to-peak amplitude (distance between *C* and *G*) of the waveform. Also, if the line extends further on one side of center than it does on the other the wave is unsymmetrical. See Fig. 3. But this is about all the information that can be extracted readily.

Waveform Plotting

If a picture of an a.c. waveform is what is wanted, we have to cause the spot to draw the actual waveform on the tube face, just as we might plot it on graph paper if we knew the amplitude and polarity of the voltage throughout the cycle. Now waveform graphs such as the sine-wave drawings in the lower part of Fig. 2 are nothing more than plots of the amplitude at all times throughout the cycle. That is, the horizontal axis is measured off in units of time³ and the vertical axis is calibrated in units of amplitude — usually voltage amplitude, although current or power sometimes are substituted. Note that both axes are calibrated linearly; that is, equal distances anywhere along the horizontal axis represent equal amounts of elapsed time, and equal distances along the vertical axis represent equal amounts of voltage.

To represent a waveform properly on the scope we have to provide two axes at right angles, and their calibrations must duplicate the linearity of the graph. The two axes, of course, are available from the two sets of deflection plates at right angles to each other. The amplitude linearity is built in; as we have seen, the distance the spot is moved by the voltage on the deflection plates is directly proportional to the voltage.

² This feature was touched on in connection with horizontal sweeps or time bases in the first article.

³ The time scale in such graphs is rarely expressed in minutes or seconds, but uses the length of time occupied by one cycle as a unit. It is often expressed as an angle, with 360 degrees equaling one cycle.

However, the time linearity is up to us; the tube does not generate the deflection itself, but simply reproduces, in motion of the beam, the voltages on the deflection plates.

The phosphor on the face of the tube does not store up light and display it for a long period of time. The appearance of a still picture is simulated by "printing" the same picture in exactly the same way on the tube face over and over again, the repetition being so rapid that our eyes and minds think the picture is displayed continuously. To simulate a graph, the beam has to move at constant speed horizontally across the face of the tube. Having done this once and having reached the end of the picture, it must then jump back to the beginning so rapidly that no part of the waveform is missed or improperly displayed. Meanwhile, the signal under examination has been operating on the beam to deflect it up and down. The combination of the two deflections, one from the horizontal plates and the other from the vertical, produces a complete picture of the waveform just like the one we would draw on cross-section paper.

An example is shown in Fig. 4, for one cycle of a sine wave applied to the vertical plates. The waveform on the horizontal plates must be in the shape of a sawtooth, as explained in the first article, to give us a deflection that is linear with respect to time. The letters on the plots represent corresponding times, and it can be seen that the resultant trace on the screen reproduces the actual form of one cycle of the voltage on the vertical plates.

In this illustration (and in Figs. 5 and 6) the deflection starts at the left at the exact time that the "vertical" voltage is passing through zero and rising on the plus side of its axis. This exact synchronism will not always be the case in practice, although the synchronizing controls on the scope usually are capable of locking the two voltages together in this way when properly set.

Multiplying and Dividing the Time Limit

In Fig. 4, the two voltages have the same period; that is, the time occupied by one complete cycle is the same for both voltages. Numberless other combinations are possible. The linear time base in most scopes can be locked to the vertical voltage over a large range of multiples and submultiples of the vertical period.

Fig. 5 shows the horizontal timing adjusted so that the spot moves horizontally only one-fourth as fast as in Fig. 4. As a result of slowing up the horizontal speed, four complete cycles of the vertical voltage appear in the pattern. The slowed-up horizontal sweep is very frequently used for waveform examination.

On the other hand, the sweep can be speeded up; Fig. 6 shows the pattern that results when the spot moves horizontally at four times the speed of Fig. 4. Only one-fourth of each vertical cycle is shown in one complete horizontal sweep, so there are four separate lines in the pattern before the cycle is complete and the spot retraces it. The various points are identified in the

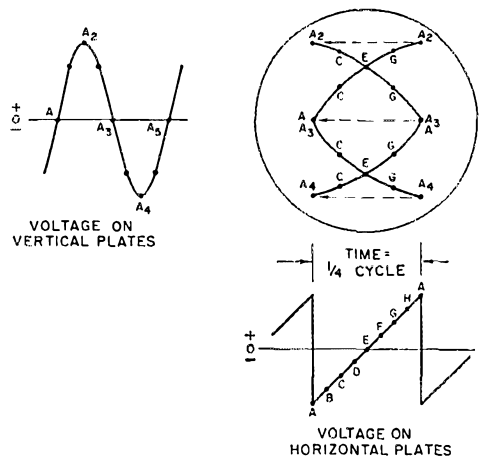


Fig. 6—Pattern formed when the linear time base frequency is four times the frequency of the a.c. signal applied to the vertical plates.

pattern. The fast horizontal sweep breaks up the vertical pattern into four consecutive parts. This pattern would not be recognized immediately as a sine wave, but the fast sweep is sometimes useful for "magnifying" parts of a complex waveform for closer study.

Synchronizing Point

The effect of locking the start of the horizontal sweep at some other point on the vertical voltage than the beginning of the cycle is illustrated in Fig. 7. Here the two voltages are locked in such a way that the vertical voltage has reached the $\frac{1}{8}$ -cycle (45-degree) point when the sweep begins at the left.

The locking could take place at any point in the cycle. A complete cycle is traced in every case, when the horizontal-sweep period is the same as the vertical-sweep period, but the trace does not start and finish on the horizontal axis as it did in Fig. 4.

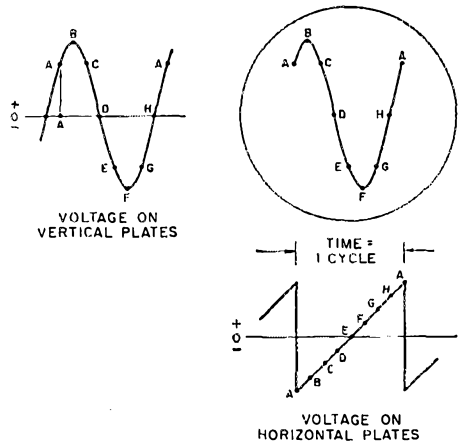


Fig. 7—This figure corresponds to Fig. 4, except that the sweep is locked in such a way as to start during the vertical-frequency cycle rather than at its beginning.

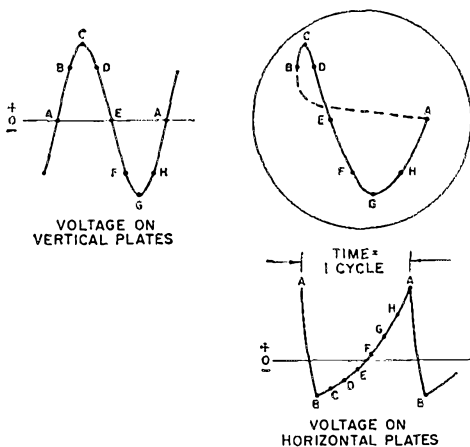


Fig. 8—Distorted pattern resulting from lack of linearity in the horizontal sweep, plus finite time and nonlinearity in the flyback. Note that the zero axis of the horizontal waveform is not midway between the positive and negative voltage peaks, indicating that this waveform is not symmetrical (see Fig. 3).

Practical Sweeps

To simplify the presentation of principles, all of the discussion so far has been based on ideal conditions, particularly a time base with absolutely constant deflection speed and with the beam getting back from the finish to the starting point in an infinitesimally small length of time. Practical circuits for linear time bases are not that good. There is always some variation in speed as the spot crosses the screen, and it takes a finite amount of time for the horizontal voltage to change enough to move the beam back to the starting point after a sweep is completed. As a result, the pattern presented on the screen is not a true representation of what is going on at the vertical plates.

Fig. 8 is a somewhat exaggerated example of the kind of distortion that is typical of linear sweep circuits. The details of these circuits are outside our present scope, so it must suffice to say that alternate charging and discharging of an *RC* circuit usually is part of the process of generating the sawtooth wave. This charge and discharge are not wholly linear. In Fig. 8 the complete cycle includes the flyback or return section, *AB*,

and the sweep section, *BCD*—*A*. Part of the display is lost to the flyback (dashed line) which starts out rapidly but ends up (at the left) going more slowly. The sweep itself starts out somewhat slowly and then gathers speed, the last half being considerably more linear than the first. As in the earlier figures, the letters indicate equal time intervals, their positions on the pattern being proportional to the instantaneous voltage.

The sweep-voltage curve has an essentially straight portion, roughly *B* to *A*, in Fig. 8, and if the sweep frequency is made low compared with the frequency of the signal on the vertical plates, the signal will cause a number of complete cycles to appear in the pattern during the constant-speed part of the sweep. It is for this reason that the slow-sweep type of pattern, Fig. 5, is particularly useful.

In a reasonably well-designed oscilloscope the pattern will be distorted as badly as the drawing in Fig. 8 only at frequencies from a few thousand cycles up. At these frequencies the flyback time becomes an appreciable fraction of a cycle (it is $\frac{1}{3}$ cycle or 45 degrees in Fig. 8), but at the lower audio frequencies it is proportionately much less. The reason is that the actual time required for flyback is much the same at all frequencies (although it depends on the range setting of the sweep-frequency control) and therefore occupies a larger portion of a cycle at high frequencies than at low.

If the a.c. voltage for vertical deflection is amplified before being applied to the plates there is inevitably some distortion in the signal itself, in addition to distortion caused by a nonlinear sweep. In well-designed scopes this waveform distortion is kept to a low level so long as the amplifier is operated well below its overload point. Nevertheless, it is necessary always to be on the alert for aberrations introduced by the oscilloscope itself, and the best way to detect them is to know, first, how the patterns are formed by the c.r. tube, and second, where the possible deficiencies lie in the auxiliary equipment that delivers the deflection voltages to the tube plates. Unless scope troubles are recognized when they appear, a good deal of time is likely to be wasted in using the instrument for checking communications equipment.

QST

(The third article in this series will appear in an early issue. — Editor.)

• New Apparatus

The Cesco Halo-Matcher

Though the maker's literature does not say so, the Halo-Matcher seems to have been designed with the popular Saturn Six Halo in mind. Its purpose is to convert this 50-Mc. mobile antenna to gamma feed, thus eliminating the need for the bazooka system usually employed.

The plate shown at the right side of the picture is drilled to fit the bolts on the Saturn Halo, the two outside holes going over the bolts to which the feed-line connection is ordinarily made. The fed portion of the halo is thus converted to a solid conductor. The curved gamma arm and hardware then provide a means of tapping onto the center



element of the three-ring halo. The clip is moved along the arm and element for lowest s.w.r., and meanwhile the series capacitor (inside the plastic sleeve adjacent to the coax connector) is adjusted to tune out the reactance of the gamma arm.

Improved reception as a result of lessened noise pickup by the transmission line is claimed. Manufacturer: Continental Electronics and Sound Co., 6151 Dayton Liberty Road, Dayton 18, Ohio. — E. P. T.

THE success of the subcarrier frequency-modulation slow-scan tests reported in January and February 1961, *QST* led this writer to build a compact, self-contained monitor which gives high-quality reproduction of received s.c.f.m. slow-scan pictures. The unit described here uses standard off-the-shelf components throughout. This makes it readily reproducible, though perhaps somewhat more expensive than if surplus components had been used. The monitor features a self-contained power supply with an accessory output to power an external flying-spot scanner if desired. A 5-inch diameter flat-faced cathode-ray tube is used and the unit is designed to take a commercially available light-shield hood. The accelerating potential on the cathode-ray tube is about 3 kv., insuring adequate brightness. Since subcarrier frequency modulation is used, the unit will accommodate a wide range of input level variation with no picture degradation. The monitor requires no adjustment in the course of normal operation.

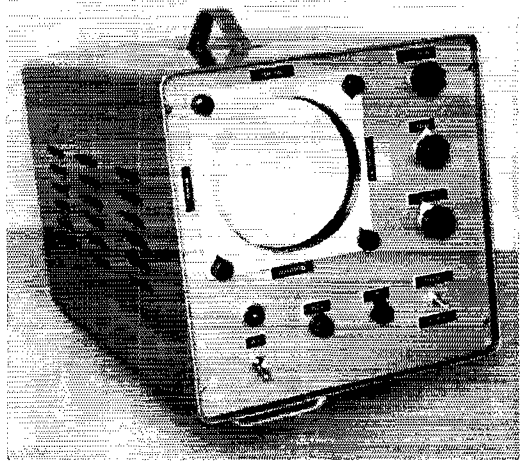
Circuit Description

A block diagram of the monitor is shown in Fig. 1. The complete schematic diagram is shown in Fig. 2. An s.c.f.m. signal from communications-receiver output, tape recorder, or other source, is fed to the grid of the first limiter stage, V_{12} , through transformer T_1 . The output of V_{1A} is amplified by V_{1B} and again by V_{2A} . When the audio input level is greater than 10 millivolts or so, one or more of these first three stages will limit, rendering the output level at the plate of V_{2A} , one third of a 12BR7, constant regardless of input level variations.

The limiter output is fed to the video and sync discriminators, similar to those described previously.¹ The output of the video discriminator is amplified by V_{1B} , detected, filtered, and used to modulate the beam current of the 5ABP7 (or 5ADP7) cathode-ray tube, thereby producing brightness variations. The output of the sync discriminator is amplified by V_3 and rectified by V_{2B} . The rectified 1200-cycle subcarrier voltage appearing across R_2 is used to control triggering of V_4 , the horizontal monostable multivibrator. V_9 is the vertical trigger multivibrator and re-

¹ Macdonald, "S.C.F.M.—An Improved System for Slow-Scan Image Transmission," *QST*, February 1961.

The picture-display system described in this article will operate on the output of the audio amplifier of a receiver, after detection of a subcarrier frequency modulated (s.c.f.m.) slow-scan TV signal operating according to the standards outlined in an earlier *QST* article. It can also be used for monitoring a slow-scan TV generator as the composite signal is transmitted.



The slow-scan monitor, a complete sync/video and display system for working on either a received signal or the output of a camera or flying-spot scanner.

A Compact Slow-Scan TV Monitor

Visual Display of S. C. F. M. Signals

BY COPTHORNE MACDONALD,* WA2BCW

ceives its triggering signals from the output of integrating network R_3C_1 . The low-pass filter action of the integrating network prevents the short horizontal sync pulses from triggering V_9 , but permits the longer vertical sync pulses to do so.

Referring to the horizontal sweep circuit, V_4 acts to deliver a positive drive pulse to the horizontal discharge tube, V_5 . The horizontal sawtooth voltage is generated across C_2 by the charging current through R_5 . R_6 and V_6 form a protection circuit which keeps the voltage across C_2 from rising above 90 volts or so, in the event that synchronization signals are not being received. V_{7A} is a cathode follower which provides correct bias and a sawtooth of proper amplitude

* Westinghouse Electric Corporation, P.O. Box 284 Elmira, N. Y.

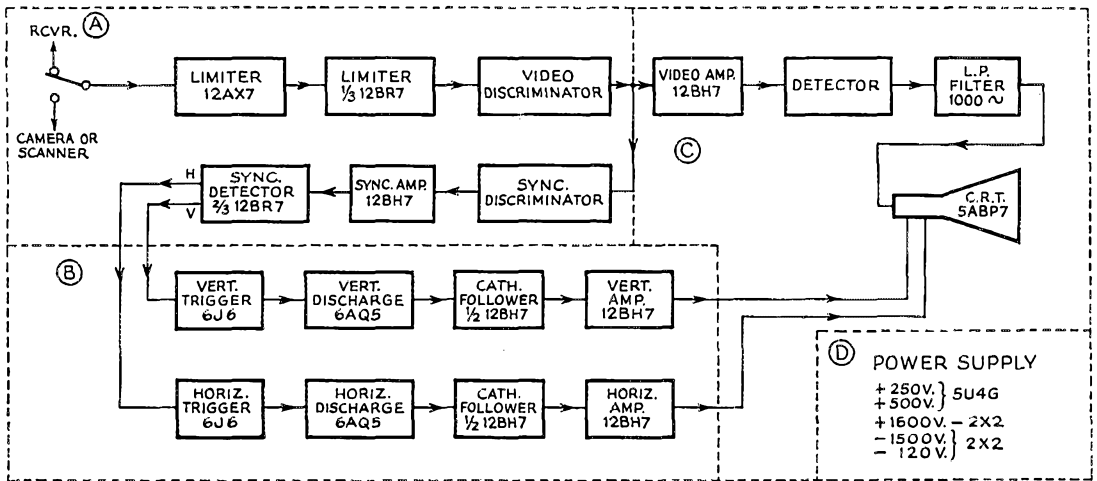


Fig. 1—Block diagram of the slow-scan monitor. Circled letters indicate section of Fig. 2 in which circuits shown will be found.

for the horizontal sweep amplifier, V_8 . V_8 is a cathode-coupled amplifier or "long-tailed pair" which gives direct-coupled push-pull output with single-ended drive.

The operation of the vertical sweep circuitry is quite similar, the vertical discharge pulse being somewhat longer.

The power supply is quite conventional. Power at various voltages is brought out to J_4 . A dummy

plug, P_1 , wired as shown, must be used when the unit is not supplying power to an external unit. The reason for this is that the dropping resistor, $R_{21}R_{22}$, for the neon-bulb regulators would be replaced by the normal flying-spot scanner c.r.t. and photomultiplier bleeder resistors in an external flying-spot scanner. R_{24} is adjusted to produce 250 volts across C_4 with normal load on the +250-volt bus.

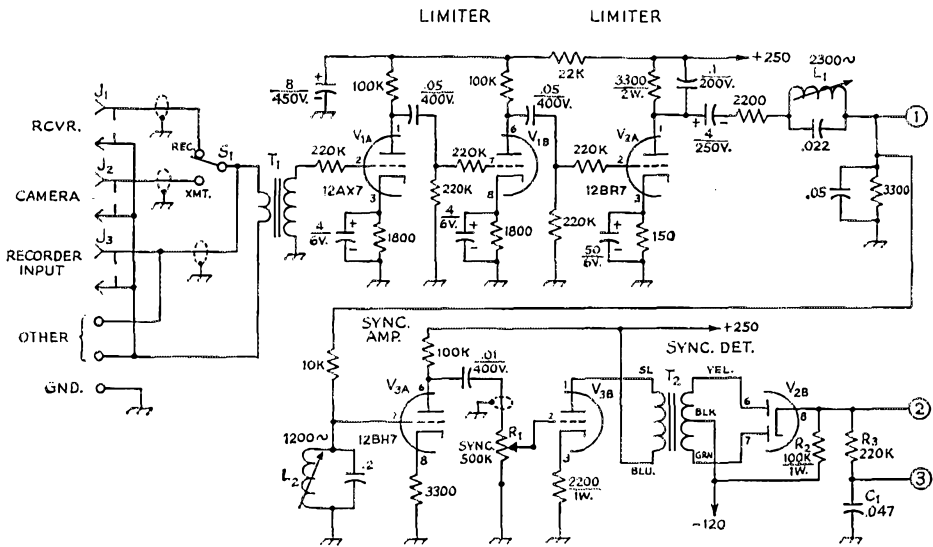


Fig. 2A—Limiter and sync section. In this and the following sections, capacitances are in μf .; capacitors with polarity marked are electrolytic, others are paper tubular, ceramic or mica as convenient. Resistances are in ohms; resistors are $\frac{1}{2}$ watt except as indicated. Circled numbers connect to identically-labeled points in other sections of circuit. Component designations not listed are for text reference.

- J_1, J_2, J_3 —Shielded jack, microphone type (Amphenol 75-PC1M), mounted with insulating washers.
- L_1, L_2 —Approx. 200 millihenrys (Stancor WC-14, slug fully inserted).
- R_1 —0.5-megohm linear control.

- S_1 —S.p.d.t. toggle.
- T_1 —600-ohm line to grid transformer (UTC A-12).
- T_2 —Audio, push-pull plates to push-pull grids; 3 to 1, secondary to primary (Thordarson 20A19).

Mechanical

The monitor is housed in an 18 × 11 1/8 × 11-inch Bud Portacab (WA 1543). The parts are mounted on a 17 × 10 × 4-inch chassis. Layout is relatively noncritical, with the exception of transformer placement and high-voltage considerations. To prevent a.c. magnetic field deflection of the cathode-ray-tube beam, an annealed Mumetal shield (Millen S0805-HZ) is used. Power transformers T_5 and T_6 should be mounted well away from input transformer T_1 to minimize hum pickup. They should be mounted as far from the cathode-ray tube as possible — preferably toward the rear.

High-voltage wire is used to wire the +1600- and -1500-volt circuits. The focus and brightness pots are mounted with Millen 39023 insulated high-voltage couplings. T_3 , T_4 , L_3 and associated small components are mounted on a sturdy bakelite insulating board under the chassis. These parts are floating at approximately -1500 volts, so care should be used to avoid personal contact during checkout of the unit.

While not high-voltage circuits, excellent insulation must be used in the sawtooth-forming networks because of the high impedances involved. Individual Teflon or ceramic standoffs are recommended at the junction of R_{10} , R_{11} and C_3 , and at the junction of R_5 , R_6 , and C_2 . Ceramic tube sockets are preferred for V_5 , V_7 , and V_{10} .

A Tektronix viewing hood, bezel, and yellow light filter are used in front of the cathode-ray tube. These items are Tektronix parts No. 016-



Here's a sample of the kind of definition the slow-scan s.c.f.m. system is capable of giving. The photograph is a time exposure of one complete frame, taken off the c.r. tube screen from a signal tape-recorded after a 500-mile transmission. The original was a live pickup using a Vidicon camera.

001, 200-025, and 378-502, respectively. Total price for all three items is about \$6.15. The sweep size and centering pots are mounted in the four corners of the bezel. To do this, it is necessary to make cutouts in the four mounting ears of the tube shield with a "nibbler" tool. Mounting the pots directly in the holes is impossible because of mechanical interference between the pots and the mounting brackets. Standoff bushings are used

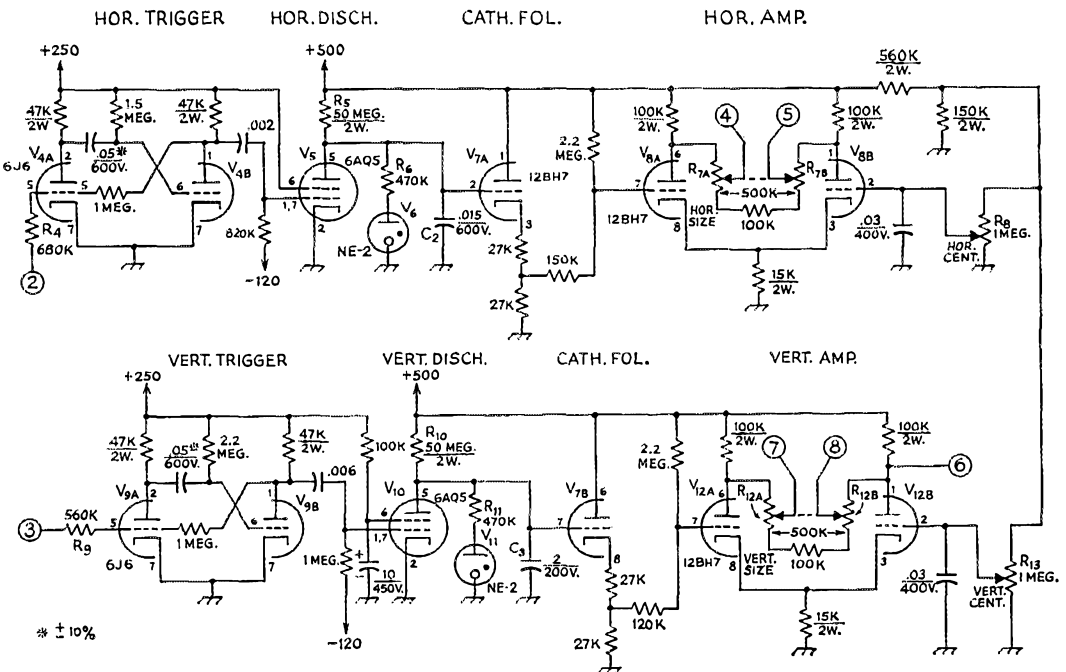
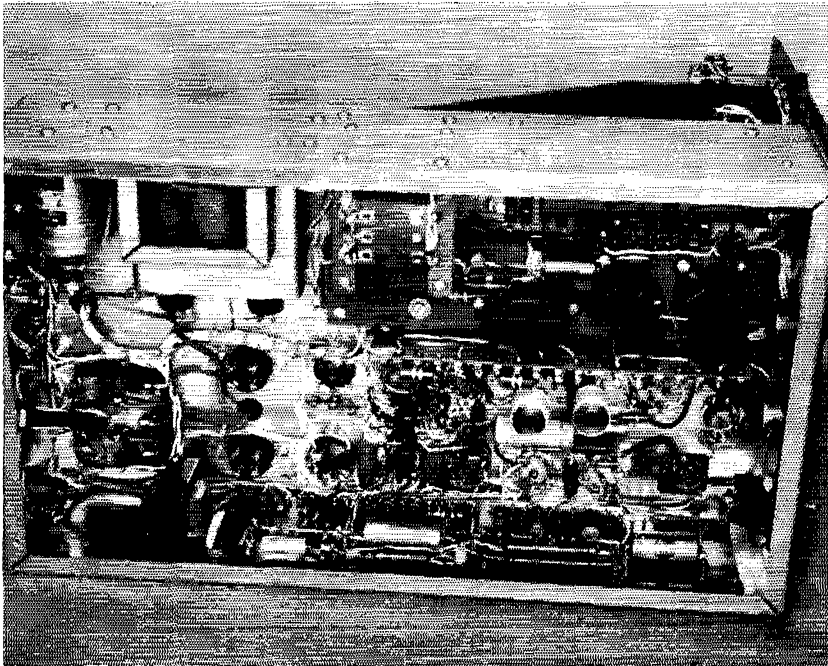


Fig. 2B—Vertical and horizontal deflection circuits.

R_7 , R_{12} —Dual 0.5-megohm control, linear taper.

R_8 , R_{13} —1 megohm control, linear taper.



Mounting boards have been used liberally in the underchassis assembly. Since there are no frequencies higher than the usual upper limit for communications-quality voice, layout is not critical except for hum considerations.

to space the pots away from the front panel. A U-shaped equipment handle with banana plugs attached to the two ends is used as a removable foot to raise the front end of the monitor to a more convenient viewing angle.

Operation

The input signal, from a communications receiver or other source, should have an amplitude

somewhere between 10 millivolts and 10 volts, for proper operation of the monitor. Brightness and contrast controls are set to give desired brightness when a 2300-cycle tone is being received, and beam cutoff (zero brightness) when a 1500-cycle tone is being received. Focus and astigmatism controls are adjusted for best overall focus. Size and centering controls are adjusted for the desired raster size.

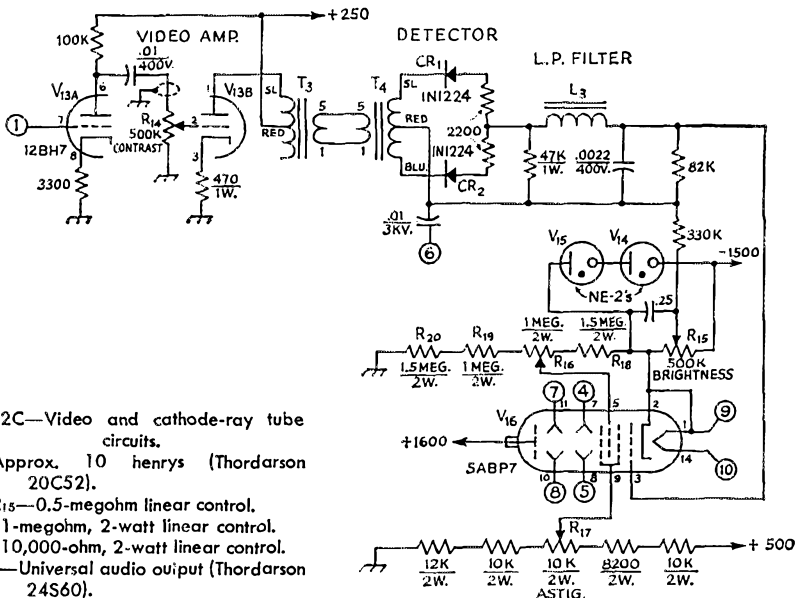


Fig. 2C—Video and cathode-ray tube circuits.

L₃—Approx. 10 henrys (Thordarson 20C52).

R₁₄, R₁₅—0.5-megohm linear control.

R₁₆—1-megohm, 2-watt linear control.

R₁₇—10,000-ohm, 2-watt linear control.

T₃, T₄—Universal audio output (Thordarson 24S60).

The sync control is adjusted for proper triggering of the vertical and horizontal sweep circuits. The sweep circuits should trigger properly as the sync control, R_1 , is adjusted over a considerable range of values. If they do not, or if horizontal and vertical sweeps do not trigger at the same settings of R_1 , the values of R_4 and R_9 , or both, should be modified to produce horizontal and vertical trigger ranges that overlap. (Variation of component values within their normal tolerances is the reason why this trimming may be necessary. Designing the unit to guarantee tracking of the trigger circuit would have required the use of expensive precision components.) If the transmitted signal has the proper subcarrier frequencies for sync, black, and white, and if the sync pulses are close to the proper duration,² the controls will not have to be touched during operation. A considerable deviation from perfection in the transmitted signal can be accommodated through adjustment of the controls. The main precautions to observe with regard to communications-receiver operation are that carrier insertion is at the proper frequency when using s.s.b., and that receiver audio output (noisy as it may be) does not drop below 10 millivolts even during a severe fade.

² Horizontal pulse — 5 milliseconds; vertical pulse — 30 milliseconds. See page 31, January 1961 *QST*, for a complete outline of standards.

The sweeps are of the driven type; that is, a received sync pulse is necessary to initiate each scan. This system has the advantage that if a sync pulse is missed, the scanning beam moves off the screen and stays there until the next pulse comes along. The phosphor screen is thus not covered with out-of-sync picture information during deep fades. Because of this driven sweep arrangement, no raster will appear on the cathode-ray tube unless a slow-scan signal is being received.

Modifications

A number of modifications could be made to reduce the cost of the unit significantly. The magnetic shield may be eliminated if the power supply is built on a separate chassis and if the cathode-ray tube is located at least three feet from any power transformer. Less expensive tubes may be used; a 5CP7A or 3FP7A would require no modification of the circuitry. If a 5CP7, 3FP7, or 5JP7 is used, the c.r.t. bleeder must be modified to supply additional current to the tube. If R_{15} , R_{16} , R_{18} , R_{19} , and R_{20} are made one-half of the indicated resistance values, and R_{21} and R_{22} are doubled, defocusing with modulation should not be excessive.

T_1 may be eliminated if an audio signal of at least 0.1 volt is available, and if connection to circuits carrying d.c. is never anticipated.

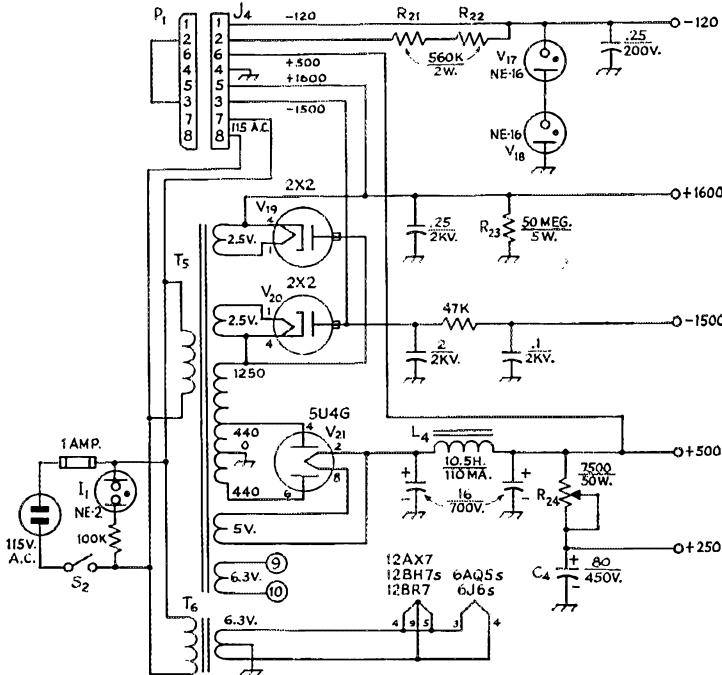


Fig. 2D—Power supply circuits.

I_1 —Pilot lamp, NE-2.

J_4 —Octal socket.

L_4 —10.5 henrys, 110 ma. (Stancor C-1001).

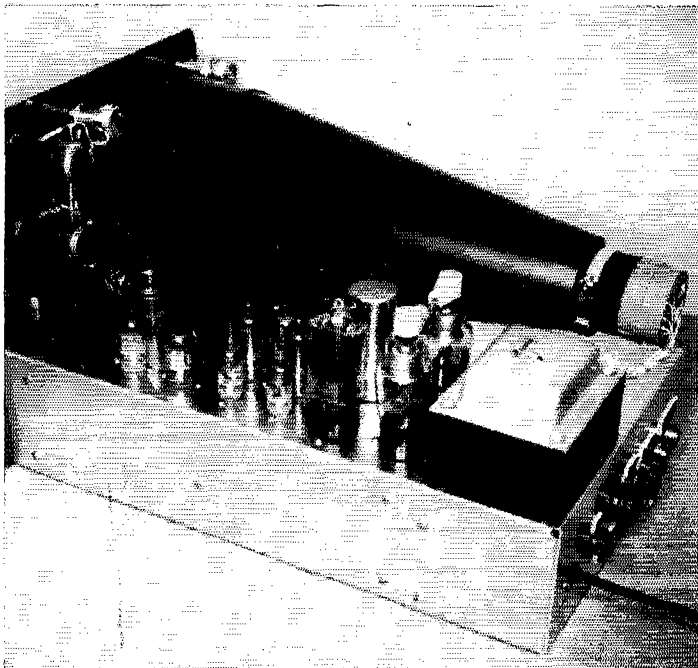
R_{23} —50 megohms, 5 watts (five 10-megohm 1-watt resistors in series).

R_{24} —7500-ohm 50-watt slider; set for 6000 ohms.

S_2 —S.p.s.t. toggle.

T_5 —Oscilloscope power transformer; 880 volts c.t., 125 ma.; 1250 volts, 5 ma.; 2.5 volts, 1.75 amp.; 2.5 volts, 1.75 amp.; 5 volts, 3 amp.; 6.3 volts, 0.6 amp. (Triad R-41C).

T_6 —Filament, 6.3 volts, 6 amp. (Stancor P-3064).



As this monitor was built in portable form, no chassis space goes unused. If portability is not a consideration, the circuits can be spread out more and the power supply can be separate.

Cabinet style is, of course, unimportant and the unit may be packaged in any desired manner. The viewing hood should be retained, however, if the unit is to be operated in a normally-lit room.

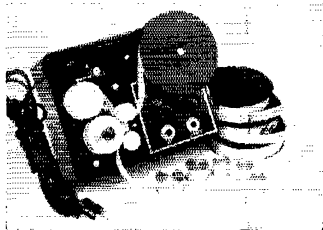
One final suggestion: bushings for recessed

mounting of the size and centering pots can be fashioned easily from electric-lamp hardware available at any electrical supply store. The standard thread is $\frac{3}{8}$ -32, the same as used on pots, and the threaded tubing has an inside diameter somewhat greater than $\frac{1}{4}$ inch. **QST**

● *New Apparatus*

Automatic Code Sender and Keyer

THE Atko Mini-Keyer shown in the photograph is designed to send code signals for instruction automatically.



The unit can also be used as a code-practice oscillator or to key other tone sources or a transmitter.

A built-in transistor oscillator/amplifier provides the audio tone, which is adjustable in pitch and has sufficient output to drive the

built-in speaker. A jack is provided for connecting an external speaker or headphones. Another jack on the unit is furnished so that a hand key may be used to send code to oneself for code practice.

For automatic tape sending, a standard Wheatstone tape is drawn through a keying head by means of a friction drive mechanism, which consists of a speed capstan and idler wheel. As the tape is drawn through the keying head, a pair of "pecker points" mounted on a rocker arm fall into the holes of the tape perforations. When the pecker points fall

into the holes, the opposite ends of the rocker arms make electrical connection with contact points and key the oscillator. The keyer drive motor is a 117-volt 60-cycle synchronous motor. The power consumption of the entire unit is about 10 watts (at 115 volts).

By using different combinations of capstan sizes and tapes of different spacings (normal, double and triple spaced), code speeds in increments of about one w.p.m. are available, between 4 and 25 w.p.m. One 16-w.p.m. capstan and three tapes are supplied with the keyer. With this combination, code speeds of $5\frac{1}{8}$, 8, and 16 w.p.m. result. Seven different speed capstans are available as accessories (as are other tapes) from the manufacturer.

The triple- and double-spaced tape can be used for so-called "imitative sending." That is, a hand key plugged into the Mini-Keyer can be used to key the oscillator and mimic the automatic sending. The keyer forms a character and then pauses, giving the operator time to imitate the character. The machine then proceeds with the next.

The Mini-Keyer can be used to key an external circuit, such as a transmitter, through a built-in relay. Special tapes, such as CQs, call signs, etc., are available from the manufacturer. When the tape ends are joined to make a loop, the tape forms an endless belt which will automatically repeat the signals.

The Mini-Keyer comes in a suit-case type box that measures $6\frac{3}{4}$ -inches long, $5\frac{1}{4}$ -inches deep, and $4\frac{3}{4}$ -inches high. It weighs 4 $\frac{3}{4}$ pounds. The lid has storage facilities for extra capstans, take-up reel, etc. An instruction manual and several "lessons" are supplied with the keyer.

The Atko Keyer is manufactured by the Automatic Telegraph Keyer Corp., 33 W. 42 St., N. Y. — *B. L. C.*

Resolve to Build Something

BY FRANCIS M. YANCEY,* W8DRU

I HAVE just been looking through my copy of *The American Boys' Book of Electricity*. This book is nearly as old as ARRL itself, having been published in 1916. Perhaps some of your older hams can remember searching this book for information on a silicon detector, a double-slide tuner, a loose coupler, a helix or an oscillation transformer. They are all described.

The book starts out with a very interesting Preface. It tells the story of two boys who were neighbors. The two boys were about the same age and interested in the same things. The main difference between them was that one had spending money in plenty; the other had to scrape pretty closely for his dimes.

They became interested in telegraphy and made plans for a telegraph line between their houses. For the well-to-do boy it was simple. He bought all the things he needed and he was ready. The boy in the small cottage planned for a week and then he bought a few ounces of insulated wire. After another week of hammering, filing and soldering, he too was ready. The two boys were again equal — almost. One had not only learned how to build an instrument, but how to use his hands and head as well. The other had learned only how the instruments looked, how they were connected and how to use them.

Two typical American boys; the boy who has things done for him, and the one who does them for himself. It is easy to say which one had the most satisfaction from his hobby.

Let us pause here and classify ourselves. In the pursuit of our hobby, are we willing to do the necessary things? Things like learning the code, learning enough theory to pass a written examination, learning enough about our equipment to hook it up, use it and make necessary repairs? We are obligated to advance ourselves in technical skill and knowledge. Are we doing it?

One other statement the author makes is of particular interest. "In making drawings for the pages of this book the idea has been more to illustrate the principle and appearance of the finished article than to supply exact dimensions." Is it possible there were *orthographermantiacs* nearly fifty years ago? (Technical Topic, "The New Breed," *QST*, page 61, December 1963).

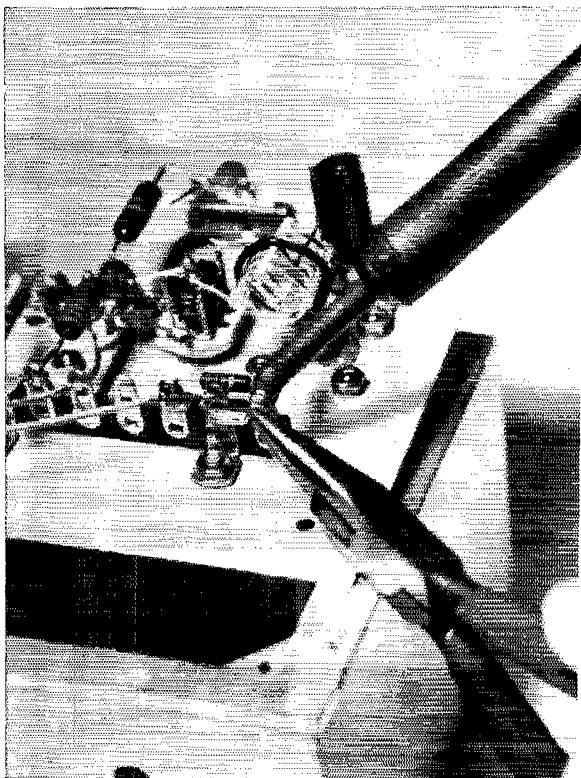
It has been common knowledge from the very beginning of ham radio: there is more personal satisfaction gained from building a piece of ham

equipment than there possibly could be buying it.

Now, at the very beginning of this 50th Anniversary Year of ARRL, let each of us resolve to build some piece of radio equipment before the end of the year. We will be increasing our technical skill and gaining the knowledge needed to keep our station up with the present state of the art. Then too, we will get satisfaction from using that piece of equipment that would never come from buying the same piece of manufactured equipment, or for that matter, a kit either.

If you haven't built equipment before, it needn't be something complicated for a starter. There are many useful and needed pieces of equipment that are right simple to build. Look over your shack and see what you need: absorption frequency meter, secondary frequency standard, r.f. current measurement meter, r.f. voltmeter, field-strength meter, s.w.r. bridge, impedance bridge. There are dozens of things you can build to make your station more efficient and your operating more enjoyable. You can find all the directions you need in the *Handbook*.

(Continued on page 154)



* 203 8th Avenue, Hinton, West Virginia



(left) From Forsyth County, N. C., W4RXG (standing), W4YLU (center) and W4IRE handle 2- and 6-meter traffic. (right) At Louisville, Ky., Red Cross base are W4WVY, net control on 50.7 Mc., and W4HOJ, net control on 53.6 Mc.

Simulated Emergency Test—1963

A Short, Uncomplicated Summary of a Long, Complicated Operation

BY GEORGE HART,* WINJM

THE 1963 SET was widely heralded as the one in which the National Traffic System would be used for all long-haul traffic, an acid test of the system's suitability for handling such traffic on an emergency basis. The system had been used in prior years to some extent. This year, however, the entire NTS was alerted in advance, assigned extra sessions and functions and instructed concerning its specific duties in connection with the national week-end exercise. Unfortunately, it was not possible to get such instructions into the hands of NTS net managers sufficiently in advance for complete preparedness, and we understand one or two at region level never did get the instructions. This may introduce an element of doubt as to the significance of the results, but let's go along with them, whatever they are. NTS is a regular, not especially an emergency, facility, and should be ready any time to spring into emergency action.

Of course the SET has several other facets, too. Primarily, it is a test of local AREC plans under the local emergency coordinator, an SCM-appointed AREC leadership official. During the Oct. 5-6 week end, over 300 ECs put on an emergency test of one kind or another and reported it to us by mail or radio or both; this is far above the maximum number of reports ever

received before. In addition to local traffic handled for served agencies such as the Red Cross, civil defense, safety agencies and utilities, members originated messages to their section emergency coordinators, ECs reported to ARRL by radio, Red Cross chapters reported to ANRC headquarters in Washington and to area offices, and civil defense directors notified OCD-DOD regional offices that their amateurs were on the job. All this, plus additional miscellaneous traffic flying around, created a semblance of the kind of load we might expect in a real emergency.

Statistics

We'll present a detailed analysis of the statistics of this test at the end of the report, but in case readers are prone to skip over this aspect, we want to point out that all figures are up over 1962 and all previous years, and that this year's SET set new highs in nearly all departments. In addition, we can report with pride that nearly every net of the National Traffic System was on deck for at least part of the test, and most of them conducted special sessions. This type of operation cannot be reported statistically (not this year, anyway), but we'll arrange some kind of rundown on it in future tests. There is no doubt that this year's SET was the biggest and best to date and is a statistician's nightmare if there ever was one.

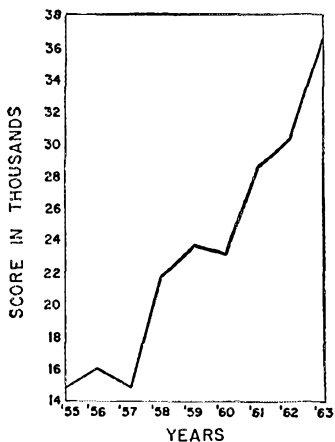
* National Emergency Coordinator, ARRL. Statistics by Pete Chamalian, K2UTV.

But statistics don't tell everything in any case. They deal only with the hard, cold facts that you can get your teeth into, not with the many *imponderables* that are very much a part of an exercise of this nature, such as spirit, enthusiasm (or the lack of them), hardships, difficulties, obstacles and *special circumstances* contributing to success or otherwise. Such things are reported to us also, and we'll try to cover some of them in the comments at the end of the statistical analysis.

Local Aspects

Most of our ECs found it possible to conduct their tests during the specified week end, thus enhancing the national flavor. A few used other week ends or other dates more convenient for them or for the agencies they were serving. Most of the traffic generated was given a precedence of "test priority" in order more closely to simulate the kind of traffic we would be handling in a real emergency situation; this in accordance with ARRL's new traffic precedence designations discussed in January *QST*. Reports were filed by mail on a form provided, which gives a point score which is non-competitive but cumulative. The total national score is compared with the same score for the previous year, providing a basis for assessing our performance. Some ECs reported by radio only, others did not report at all, but we know from information received that certain groups mentioned were active. Several others, we suspect, were active that we did not even hear about.

Local exercises are based on an imaginary situation existing at the local level, simulated incidents then being imposed by the EC and/or his assistants to add realism and significance to the activity. Sometimes these are based on a simulated sectionwide situation given by the SEC or, as in Florida, by a statewide situation set down by two or more SECs in collaboration. Others simulate isolated local emergencies, such as fires, storms, explosions, riots or, in some cases, non-emergency situations such as parades



The sky's the limit! While the scoring system remains the same, our point total each year continues to soar. This graph shows our progress in the SET since the low years of 1955-57.

or police or traffic patrols. Just what sort of situation is to be simulated is a matter of the EC's judgment and decision. Our pre-test bulletin suggested several possibilities, and some of these were, in fact, used. We have a pretty ingenious crop of ECs, however, and most of them simulated situations coinciding with the probabilities in their areas.

Long-Haul Traffic

This year the long-haul aspect took on a more prominent look, with the National Traffic System under surveillance as the principal handler. All in all, we can say that the NTS performed admirably and proved itself capable of handling traffic in a real emergency with efficiency and dispatch. Some improvements are indeed indicated. About the time you read this, or before, we are hoping to have in the hands of all ECs, SECs and NTS officials a full critique of the SET which pulls no punches, culls spades, and sets down definite recommendations to improve our future performance.

From Monroe Co., Mich. we have standing (l. to r.) W8TZZ (Asst. EC), K8LYY, W8NDM (EC), WN8HGX, K8HFZ, and W8HGD. Kneeling (l. to r.) W8EFK (Asst. EC), W88HGE, K8AVG, and WN8GDU.





(left) KN3s YUR and YUS man two-meter stations in the Prince George's County, Maryland SET. (right) Some of the operators in the Brigham City, Utah, SET (l. to r.): KN7YLT, K7TQE (EC), W5JPR/7 KN7UGK, and W7ONA.

In order to check NTS performance, this office prior to the SET mailed twelve messages addressed to the National Emergency Coordinator, ARRL, to as many ARRL officials, mostly SECs, located throughout the nation, with instructions to give them numbers, a precedence of "test emergency," a check, a filing time and date, and to originate them on a local emergency net without comment, just to see what would happen. What happened was a little surprising, and was the subject of ARPSC *Field Bulletin No. 1*, directed to all ARPSC leadership officials. Without naming names or mentioning calls, *Bulletin No. 1* traces, step by agonizing step, each relay of each of the eleven messages known to have been originated, and points out the errors made in each case, why they were apparently made, how they could have been avoided, and draws general conclusions regarding some of our operating habits in handling traffic. One message got here from the midwest in 47 minutes; one took two and a half days. One never made it at all. All ten delivered were altered at least in some minor fashion from the originals, and a couple were miserably garbled. It was an interesting experiment, but oh, so much work to dig up the facts (!) that we shall probably never again attempt such a test.

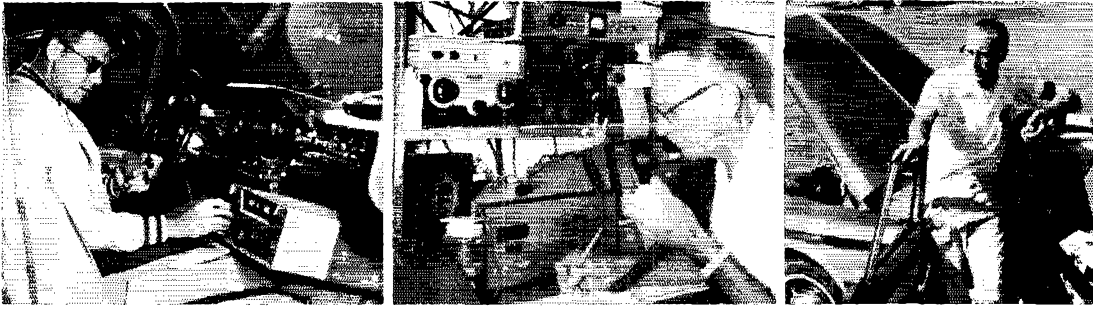
The Office of Civil Defense, Department of Defense, responded this year, to our inquiries relative to the SET, in only three instances, each involving personal acquaintances. W6CIS advises that he handled 8 messages for the California Disaster Office and one for OCD Region 7. W4POI advises that his OCD Regional Office (Reg. 3) received approximately 15 messages concerning the exercise, all with apparent excellent accuracy. W8LBM reported from Region 4 that three messages were received there from city and county c.d. directors.

The Red Cross picture is a little more encouraging. K4IAG, ANRC chief of communications, reports that a total of 965 messages was recorded by the national headquarters and its four area offices in Atlanta, St. Louis, Alexandria (Va.) and San Francisco. This includes traffic both sent

and received by each office from and to Red Cross chapters throughout the nation. Chapters were instructed to handle their traffic via stations reporting into NTS nets, but it is not possible to ascertain how many actually did this. At the national office in Washington, however, most of the received traffic came through MDD Net and most of the originated traffic went out via VN. Of the 1000 Red Cross chapters that have amateur affiliation, about 50% participated in the exercise, which beats the approximately 20% of our ECs who took part. A special report from W6JWF, trustee for W6CXO, the Red Cross club station in San Francisco, tells of the detailed groundwork laid by that office for the test, resulting in 307 messages sent and 111 replies received by W6CXO, which was operated by a staff of 21 operators. W6JWF especially mentions the work of the Golden Bear Net, the Mission Trail Net, San Jose Red Cross Station W6UW, and W6PMK, the station of the North Peninsula Electronics Club.

At ARRL headquarters a total of 284 messages were received, constituting EC reports and other miscellaneous messages, some in the usual VIP category. As usual, W1AW delivered the greatest number of these (104) while ARRL staff members and local stations delivered as follows: W1NJM, 71; W1BDI, 51; W1LWQ, 22; K1LFW, 19; W1MPW, 5; W1YBH and K1YZP, 2 each; and several others, one each. A little over half the traffic received was from ECs, constituting their radio reports. The rest was from ARFC members and non-amateur officials of various kinds, including the mayor and chief of police of Miami Springs, Fla., c.d. director of New York City, Bristol, Va., Broward and Volusia Counties, Fla., and the communications chief of Bristol, Va. We wish also to acknowledge radio reports from the following SECs: W1YNE, K2OVN, W3CVE, W4s 1YT NML, W5AIR, W3s HNP LOX, W9SNQ, W6SIN, VE3s 3AML and 70M; from SCMs W3ZRQ and VE6TG; and from Director W5QKF.

A special word about NTS performance is in order. In fairness to our hardworking NTS net

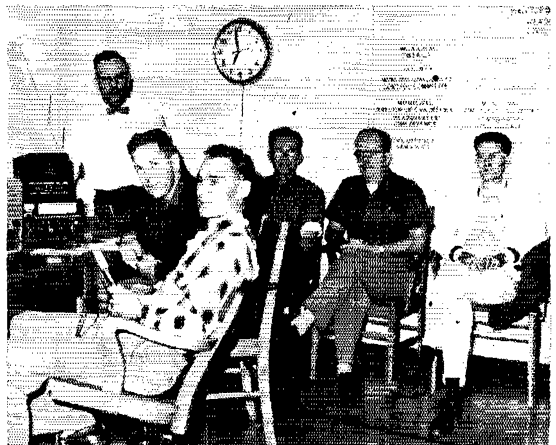


(left) WA4LPH/mobile operating in the Rutherford County, Tenn., SET (center) WA4DED, EC of Jackson, Co. Fla., copies a message. (right) Representing Kansas City Amateur Radio Club in the Jackson, Clay, Platte and Cass Counties, Mo., SET is KØGRC, operating mobile.

managers, whose jobs are routine and hard enough during normal times, we should point out that it was the *intention* not to operate NTS nets for the full 24 hours of the two days of the Oct. 5-6 week end. However, prior to the SET instructions were sent out to region and area net managers and TCC directors (a couple apparently did not receive them) to operate their nets on a specific schedule allowing for a number of extra sessions to take care of the big load of "test priority" traffic which was expected. Nearly all of them complied with these instructions to the letter, and although there was some criticism of NTS performance during the test (not to mention some criticism of the test by NTS managers), generally speaking we are proud of the effort expended by this hard-core group of traffic men and women to maintain their tradition of efficiency and general excellence. Says WB6BBO, manager of the NTS Sixth Region Net (Calif.), "From the way you grumble I gather you are very pleased with SET 1963. Remember, even a tailored suit needs a few alterations." NTS's over-all performance was something to be proud of, its shortcomings something to be grumbled about and corrected *soon*, before we are caught with our nets down in an emergency.

Enough material was collected from the SET to write volumes about. The above is a mere skimming of the surface, and omits many amateurs and activities and events we would like to cover. It's just too big an activity and too much happens. What's more, it is getting bigger and better every year. Perhaps in our bulletin critique we shall be able to cover some of the points we were forced to omit herewith.

Headquarters staff of the Calgary County, Alberta, S.E.T. are (l. to r.) VE6s FK, AGF, SH, AB, WA, and AP.



Statistical Summary

Scoring was on exactly the same basis as in 1962 and therefore scores are comparable. ECs are given a point for each AREC member signed up, two points for each amateur SET participant, five points per mobile or self-powered portable in action, five points for each fixed station on emergency power, five points for a message or messages originated on behalf of a served agency, one point for each message from an AREC member to his SEC, a point for the EC's radio report (plus making this a factor in the section's competitive standing) and ten points each for served-agency contact, submission of a press release and submission of a local AREC plan. The total for each group is its contribution to the section's total for competitive standing with other sections, and to the national total to show the performance for the year compared to previous years.

Four factors are considered in the competitive standing by sections: (1) total number of reports received; (2) total mail reports received; (3) total radio reports received; (4) total point score compiled. Thus it can be seen that if an EC sends in a mail report with point score computed, he contributes to his section's standing in three of the four factors. If he also reports by radio, he adds a fourth factor. If by radio only,

without a score, two factors are contributed. Reporting is essential to this standing. Because sections with large amateur population have the greatest potential to stand high, your section's standing should be considered on the basis of where it *should* stand rather than be considered in competition with other sections of vastly different amateur population. Note that Iowa,

Eastern Florida, and Tennessee, not by any means the most populous sections, are nevertheless the national leaders while some of the more populous sections lag considerably behind. This is no accident.

Reports in the summary below are alphabetical within each section, with sections in order of their competitive standing.

Figures in parentheses are 1962 scores for comparison:
Total Reports Received: 326 (294)
By Mail: 275 (247)
By Radio: 136 (132)
By Hearsay: 14 (14)
Total Reported AREC Members: 3014 (7849)
Total Known Participation: 4559 (3997)
Mobiles & Portable: 1483 (1109)
Fixed Stations on Emergency Power: 260 (215)
AREC Messages sent to SEC: 2698 (1771)
EC Radio Reports to ARRL: 177 (167)
Per Cent Received By Radio: 59.44 (57.8)
Total Points Compiled: 36449 (30200)
AREC Groups also heard from in 1962: 135 (142)
AREC Groups bettering 1962 score: 71 (42)

Area of Jurisdiction	Reported by	Points
1. IOWA (30 reports)		2359
Buchanan Co. 1,3	KØTQI	12
Buena Vista Co. 1,2,2,2,7	KØEVC	66
Cherokee Co. 1,2,2	KØTBO	72
Clay Co. 1,2,7	KØHGH	47
Clinton Co. 1,3	KØSCW	106
Crawford Co. 1,16	WØDUK	28
Decatur Co. 1,2	KØDYS	41
Des Moines Co. 1,2,8	WØUTG	87
Payette Co. 6	WØFEK	...
Moyd Co. 3	KØYVU	...
Franklin Co. 1	WØAASM	72
Humbolt Co. 1	WØPDM	25
Hamilton Co. 1	WØFSO	71
Ia Co. 1,2,3	KØLXL	70
Jackson Co. 2	WØJAJ	...
Jasper Co. 1,2,10	WØNWX	151
Jefferson & Van Buren Cos. 1,16	KØIQV	14
Kossuth Co. 1,2,3	WØDDQD	32
Linn Co. 1,16	KØQER	122
Lyon Co. 1,2,4	WØNLF	11
Muscatine Co. 1,3	WØPDL	37
Osceola Co. 2	KØWKT	...
Pocahontas Co. 3	KØZKU	...
Sac Co. 1,3	WØYOZ	81
Scott Co. 1,3	KØMST	159
Union Co. 1,21	KØHCX	98
Wapello-Davis Co. 1,3	KØYCP	79
Webster Co. 1,2,7	KØARA	94
Woodbury-Plymouth-Monona Cos. 1,2,16	KØMMS	784
Wright Co. 3	WØVRA	...
2. EASTERN FLORIDA (21 Reports)		3769
Alachua 1,2	W44BMM	278
Brevard Co. 1,2	W4CWD	72
Broward Co. 1,2,3	K48JH	259
Clay Co. 1,3	W4WHK	24

Collier Co. 1	W4ACT	43
Highlands Co. 1	K4JJZ	25
Hillsboro Co. 1	W4GDS	162
Lake Co. 1	W4SXJ	114
Lee Co. 1,3,28	W4KOB	715
Manatee Co. 1,3	K4HJB	95
Martin Co. 1,3	K4KGB	119
North Dade Co. 1,2	W4OLV	656
Orange Co. 1,2,3	W4NKD	621
Osceola Co. 6	W4DDW	...
Palm Beach Co. 4	W44BOR	...
Pasco Co. 6	K4MTP	...
Pinellas Co. 1	W44BGW	196
Polk Co. 1	W4CCC	133
Sarasota Co. 1	W4NIR	42
South Dade Co. 1	W4RQP	147
St. Lucie Co. 1	K4JZU	98

3. TENNESSEE (17 reports)	Points
Blount Co.	K4DJV
Bristol 1,3	K4ILW
Coffee 1,3	K4WUH
Davidson Co. 1,3	W4KAT
Gibson Co. 1,2,3	W4JGW
Hamilton Co. 1	K4HCH
Haywood Co. 1,2	K4VIR
Hawkins Co. 1	K4NIR
Henry Co. 1,2,3,29	W4NGO
Marshall Co. 1,3	W4DWT
Memphis (Shelby Co.) 1,2,3	K4FZJ
Montgomery Co. 1,2,3	W4NGL
Oak Ridge & Anderson Co. 1,2,3	K4VOP
Roane Co. 1,2,3	W4VNU
Rutherford Co. 1,2	W4SZE
Sullivan Co. 1 (less Bristol)	W4TYV
Weakley Co. 1	W4FLW

4. NEW YORK CITY — LONG ISLAND (11 reports)	Points
Bronx & Yonkers 1,2,3	WA2QAO
Huntington 2	K2HTX
Kings Co. 1,3	W20KU
Nassau Co. 1,2,3,10	W2FI
Area 21,17	W2ELK
Area 61,3,12	W2UAL
Area 71,12	W2AZA
Malverne 3,12	W2ZAI
West Central 1,12	W2IAG
Queens Co. 1,2	W2TAQ
2 Meters 6,12	
5. ALABAMA (13 reports)	1251
Alabama Gulf Coast 1,3	K4THT
Blount Co. 1	W4TSY
Calhoun & Cleburne Cos. 1,7	K4HJM

Elmore Co. 1,9	WA4CWI	18
Franklin 4,7		
Jefferson Co. 1,8	W4EOH	214
Lauderdale & Colbert Cos. 1	WA4HFE	95
Limestone Co. 1,3	K4YKA	37
Macon Co. 1,2,10	K4HJX	86
Madison Co. 1,2	W4YFN	198
Morgan Co. 1,2,11	K4WHW	127
St. Clair 1	K4NTUW	...
Walker Co. 1,5	W4CTU	...
6. INDIANA (12 reports)	1012	
Cass Co. 1,3,6	K9WET	96
Crawford Co. 1	W9BGI	62
Dearborn Co. 1,2	K9ZIV	75
Jay Co. 1	K9ULW	79
Lake Co. 1	W9GUX	50
Madison Co. 1,2	W9FWH	139
Morgan Co. 1,2,3	W9ZSK	125
Muncie, Delaware Co. 1,2,3	W9FYC	203
Orange Co. 3	W9QYQ	...
Ripley Co. 1,2	K9PYM	27
Shelby Co. 1,3	W9RSL	70
Wayne Co. 1	K9QAN	156

7. NORTHERN NEW JERSEY (12 reports)	Points
Bergen Co. 1,2,19	WA2CCF
Clifton 2	W2UOM
Essex Co. 1,3	W2BNF
Fanwood 1,23	W2HXP
Maplewood 3	W2COT
Morris & Sussex Cos. 1,2	K2ZTF
Old Bridge 3	W2ALF
Red Bank 3	W2BCS
Sayreville & Keyport 1	K2OEI
Somerset Co. 1,3	WA2ZKT
South Amboy 1,3,26	K2BVE
South Bergen & Woodridge Cos. 1,2,3,26	W2DMJ
8. MICHIGAN (9 reports)	1449
Calhoun Co. 1,2	K8AEM
Hillsdale Co. 1,3	K8GEX
Ingham Co. 1,28	W8CKK
Kalamazoo Co. 1,2	K8JZP
Lapeer Co. 1,3,21	W8EST
Lenawee Co. 1	W8ETQ
Monroe Co. 1,3	W8NJM
Oakland Co. 1,2,3	K8YRV
St. Clair Co. 1,14	W8QFQ
9. NORTH CAROLINA (14 reports)	797
Cabarrus 4	W4CXV
Carteret & Craven & Pamlico Cos.	W4BAW
Dare Co. 1	WA4CXO
Durham 1	W4LEN



Ozaukee County, Wis., portable station W9RYA/9 (center) with mobiles from left to right are: K9EOY, K9VNM, WA9CPN W9RXJ, W9RYA, WA9CPE, K9MAU and WA9DOT. Others pictured are K9DJT, WA9DMX, WA9CNO, W9VLL and WA9BMA.



W4SZE, EC of Rutherford County, Tenn. before . . . and . . . after the SET at W4ZAC, the Veterans Hospital club station.

Forsyth Co. ¹	WA4CJV	158	Pasadena Area ^{1,2}	W6ORG	131	Steuben Co. ^{1,2}	W2YTY	209
Gaston Co. ⁴	W4CXV	...	Redlands & Vicinity ^{1,2,3}	K6GGS	152	Wayne Co. ^{1,3,8}	W2OMV	62
Guilford Co. ¹	W4AJT	157	West Covina Area ^{1,3}	W1KUX/6	251	26. COLORADO (5 reports)		341
Hertford Co. ^{1,3}	W4VSI	66	Whittier ^{1,2,19}	W6LVQ	96	El Paso Co. ²	K0YGH	...
Orange Co. ³	K4CWZ	...	17. ONTARIO (6 reports)			Louan Co. ⁷	W0NUU	6
Raleigh ¹	WA4DOA	...	Peel Co. ^{1,2,3,27}	VE3CWA	39	Montrose Co. ^{1,2,3}	K0EDK	117
Rockingham ⁴	K4YEC	...	Sudbury ¹	VE3BLZ/SRS	59	Pueblo Co. ¹	.....	187
Kowan Co. ^{1,3}	K4YJY	92	Toronto ^{1,3}	VE3LI	158	Weld Co. ¹	K0UYF	31
Stanley Co. ⁴	K4EO	...	(Metropolitan area)			27. KANSAS (5 reports)		706
Wake Co. ^{1,3}	K4FMW	74	Toronto ^{1,2,3}	VE3DRF	148	Butler Co. ¹	K0ZTC	61
10. OHIO (9 reports)			Whitby ^{1,3}	VE3ATI	52	Sedwick Co. ¹	W0BMW	234
Ashtabula Co. ¹	K8LXA	103	Windsor ¹	VE3ETM	64	Zone 31 ^{1,9}	K0LHF	163
Butler Co. ^{1,3}	K8KXS	107	18. EASTERN PENNSYLVANIA (5 reports)			Zone 5 (Wyandotte & Johnson Cos.) ^{1,14}	W0ZGK	105
Clermont Co. ¹	W8ZRL	74	Bucks Co. ³	W3BUR	1315	Zone 141 ^{2,19}	K0YBR	143
Cuyahoga & Lake Cos. ^{1,3}	W8SIX	611	Lackawanna Co. ¹	W3QDW	94	28. MARYLAND-D.C.-DELAWARE (6 reports)		234
Licking Co. ^{1,2,3}	K8RXD	184	Montgomery Co. ^{1,14}	W3AHZ	613	Calvert Co. ^{1,2,3}	W3ZNV	62
Lorain Co. ^{1,2}	K8DNS	243	Northumberland Co. ^{1,2,3}	W3LXN	211	Carroll Co. ^{1,32}	...	32
Muskingum Co. ²	W1QJB	...	Philadelphia Co. ^{1,3}	W3ELI	397	New Castle (Del.) ³	K3AZH	...
Richland Co. ³	W8TAT	...	OKLAHOMA (5 reports)	...	876	Prince George's Co. ⁴	K3BYD	...
Ross Co. ^{1,28}	K8SBU	126	Comanche Co. ^{1,3}	K5BYF	264	St. Mary's Co. ¹	K4SRA/3	93
11. SOUTH TEXAS (7 reports)			Garfield Co. ^{1,3}	W5MFV	76	Washington, D.C. ¹	W3CJT	47
Corpus Christi ³	W5AQK	1511	Muskogee Co. ^{1,37}	K5WPP	89	29. MONTANA (4 reports)		302
Harris Co. ^{1,2}	K5RDP	694	Oklahoma Co. ¹	W5FUL	353	Deer Lodge Co. ¹	W7TYN	68
Maverick Co. ^{1,3}	K5OPR	46	Stephens Co. ^{1,3}	W5IBZ	94	Havre ⁶	W7EWR	...
Nueces Co. ^{1,2}	W5AQK	121	20. ARKANSAS (6 reports)		391	Laurel ^{1,2,3}	W7LBK	31
Presidio, Jeff Davis & Brewster Cos. ¹	K5QPW	39	Baxter, Marion Cos. ¹	WA5CAG	8	Missoula ^{1,2,3}	W7COH	153
San Antonio ^{1,3}	K5HZR	281	Faulkner Co. ¹	K5GKQ	31	30. VIRGINIA (4 reports)		438
San Patricio ^{1,2}	W8BRZ	30	Poinsett Co. ^{1,3}	K5TKC	22	Alexandria Co. ^{1,2,3}	W4JXD	146
12. EASTERN MASSACHUSETTS (8 reports)			Pulaski Co. ^{1,3}	W5DTR	82	Bristol ¹	...	...
Hoston ¹	W1FON	76	Sebastian Co. ¹	W5HPL	184	Old Princes Anna Co. ¹	K4JDK	75
Groveland ¹	W1MRQ	97	Washington Co. ^{1,3}	W5HPL	184	Fairfax Co. ^{1,2}	W4RHO	217
Needham ¹	W1STX	77	21. WESTERN MASSACHUSETTS (6 reports)		64	Chicago & N.E.	W8SPB	240
Norwood ^{1,32}	K1QLG	38	Fitchburg & Area ¹	W1BYH	443	Fulton Co. ¹	W9MUL	68
Pepperell ^{1,3}	K1TSD	38	Gardner ^{1,2,3}	K1LNC	238	Greene, Jersey, Calhoun Cos. ¹	W9IFA	56
Sharon ^{1,2,3,14}	K1HCJ	120	Pittsfield ¹	W1BKG	118	Monroe Co. ¹	W9ICF	33
Townsend ^{1,2}	K1PNB	74	Springfield ³	W1NLE	...	32. MISSOURI (3 reports)		766
Winthrop ^{1,32}	W1BB	183	Westfield ³	W1LRA	...	Jackson, Clay, Platte, & Cass Cos. ¹	K0TCB	375
13. RHODE ISLAND (7 reports)			Worcester ³	K1SSH	...	Springfield (City) & Greene Co. ¹	K0JJP	118
East Providence ^{1,3,22}	K1PAM	563	22. SOUTH DAKOTA (6 reports)		257	St. Louis, St. Charles Cos. ¹	W0ANT	273
Johnston ³	W1POP	100	Butte & Harding Cos. ^{1,2,3,7}	K0ZMA	22	Alberta (3 reports)	W0ANT	273
Middletown ¹	W1LUO	45	Deuel Co. ^{1,3,16}	K0TAM	40	Calgary ^{1,2,3}	VE6FK	361
Newport ¹	W1JFF	50	Fall River & Shannon Cos. ¹	W0HOJ	45	Edmonton ³	VE6AJY	...
Portsmouth ^{1,3}	K1PLH	64	Lawrence Co. ^{1,2,3,7}	W0DVB	77	Southern Alberta ^{3,18}	VE6ABS	...
Providence ¹	K1LPL	175	Union Co. ^{1,20}	W0WJU	77	34. BRITISH COLUMBIA (3 reports)		249
Warwick, Greenwich & N. Kingston ^{1,3}	W1NTU	129	Yankton Co. ¹	K0YJF	69	Delta ^{1,3}	VE7BJV	171
14. SANTA CLARA VALLEY (8 reports)			23. EASTERN NEW YORK (4 reports)		771	Richmond ³	VE7AKE	...
Burlingame ¹	W6VZE	49	Dutchess Co. ^{1,3}	W2HZH	147	Vancouver ^{1,3}	VE7AMW	78
Half Moon Bay Area ¹	W6PLS	83	Eastern Putnam Co. ¹	W2DQW	65	35. WEST VIRGINIA (3 reports)		220
Monterey Co. ^{1,3}	K0TEH	109	Schenectady Co. ^{1,2,3}	K2HNW	403	Fayette Co. ^{1,16}	K8CFT	35
Redwood City, Atherton & Menlo Park ^{1,2}	W6DEP	485	Westchester Co. (Less Yonkers and Peekskill)	K2SUN	156	Kanawha Co. ^{1,4,14,21}	W81RN	123
San Jose (Red Cross) ¹	W6A6V	115	24. WISCONSIN (5 reports)		846	Tucker Co. ^{1,3}	K8CHW	62
San Mateo ^{1,3}	K6PJW	77	Brown Co. ^{1,2,3}	W9HDV	124	Dixon ¹	W6LKE	...
Santa Cruz Co. ¹	K6BDK	12	Esau Claire Co. ¹	W9BEW	64	Metropolitan Contra Costa Co. ^{1,3}	W6NFF	199
South San Francisco ^{1,24}	W6QIE	590	Marathon Co. ¹	W9VHA	84	West Contra Costa Co. ^{1,3,28}	W6FFF	125
15. CONNECTICUT (6 reports)			Milwaukee Co. ^{1,2,3}	K9KJT	393	37. GEORGIA (3 reports)		385
Bloomfield ^{1,3,40}	W1PRT	547	Ozaukee Co. ^{1,2}	W9RYA	181	Floyd, Barton & Chattanooga Cos. ¹	K4YRL	122
Canaan, Salisbury, Sharon, Norfolk & Grohept ^{1,24}	K1BEN	61	Westchester Co. (Less Yonkers and Peekskill)	K2SUN	156	Fulton-DeKalb Cos. ¹	K4MDC	263
Danbury ^{1,3}	W1ADW	33	25. WESTERN NEW YORK (5 reports)		529	Gordon Co. ³	.....	...
Fairfield ^{1,2}	W1WX	87	Brown Co. ^{1,2,3}	W9HDV	124			
Hamden ^{1,2,41}	W1WY	315	Esau Claire Co. ¹	W9BEW	64			
Meriden ^{1,2}	W1FYG	65	Marathon Co. ¹	W9VHA	84			
15. LOS ANGELES (6 reports)			Milwaukee Co. ^{1,2,3}	K9KJT	393			
Alhambra ^{2,14}	K6SUT	865	Ozaukee Co. ^{1,2}	W9RYA	181			
Central Los Angeles ^{1,2,3}	W6OI	130	Westchester Co. (Less Yonkers and Peekskill)	K2SUN	156			
			Chemung Co. ³	K2DUN	...			
			Delaware Co. ^{1,3}	W2TFL	108			
			Orleans Co. ^{1,2,26}	K2QKM	150			

38. WASHINGTON (3 reports)	213	Boulder City ^{1,29}	W7TGK	85	Area, New Orleans ^{1,3}	W5BUK	60
Adams Co. ¹	W7CTS	Greater Las Vegas ¹	K7RKH	72	49. SOUTHERN NEW JERSEY (1 report)		100
Benton Co. ^{1,2,33}	W7YFO	Reno, Sparks & Washoe Co. ^{1,19}	W7PC	54	Gloucester Co. ¹³⁵	K2JKA	100
Puyallup & Sumner ^{1,32}	K7DQV	61	43. MINNESOTA	102	50. NEW HAMPSHIRE	W1TNO	69
39. OREGON (3 reports)	262	(3 reports)		53	Section ^{1,22}		67
Benton Co. ^{1,2,19}	K7LZL	Freeborn Co. ^{1,16}	W0FIT	49	51. ARIZONA (1 report)		67
Josephine Co. ¹	W7DEM	Lake Co. ¹	K0HKA	49	Maricopa Co. ¹	K7RUR	67
Linn Co. ¹	W7SO	64	K6JFJ	...	52. UTAH (1 report)		66
40. WESTERN FLORIDA (5 reports)	206	44. SAN DIEGO (1 report)	457	457	Brigham City ¹	K7TQE	66
Escambia Co. ⁴	WAHLM	Two Meters, S.D. ¹	K6TFT	457	53. SACRAMENTO		65
Jackson Co. ¹	WA4DED	45. WESTERN PENN- SYLVANIA (2 reports)	340	340	VALLEY (1 report)		65
Leon Co. ⁴	K4ARK	Blair Co. ¹	W3ISZ	253	54. IDAHO (1 report)	W6LSW	35
(Okaloosa Co. ¹	W4MTD	Cambria Co. (North Half) ¹	K3JCZ	87	Minidoka Co. ¹	K7OAB	35
Port St. Joe ¹	K4RFD	46. KENTUCKY (1 report)	262	262	55. NEBRASKA (1 report)	W0ZWG	32
40. MAINE (4 reports)	161	Louisville & Jefferson Co. ^{1,2,30}	W4NOA	262	Seward ^{1,7}		29
Hancock Co. ¹	K1DYG	40	47. NEW MEXICO (2 reports)	95	56. SAN FRANCISCO (1 report)		29
Northern Aroostook Co. ¹	K1CYJ	37	Bernalillo Co. ³	K5CXN	57. SOUTH CAROLINA (1 report)	W6SLX	29
Sagadahoc Co. ³	K1SZC	...	Los Alamos ¹	K5QIN	95		00
Southern Aroostook Co. ^{1,3}	K1CLF	84	48. LOUISIANA (1 report)	60	Rock Hill ³	W4UMW	...
42. NEVADA (3 reports)	211	Algers & Westside			58. All Others		Rien

¹ Mail report received. ² Bettered last year's score. ³ Radio report received. ⁴ Hearsay report. ⁵ Mail report without point summary. ⁶ Mail report received, no test held. ⁷ October 13. ⁸ September 21. ⁹ October 9. ¹⁰ November 5. ¹¹ October 6. ¹² Report included in report from W2FT. ¹³ Report from Assistant EC. ¹⁴ October 12. ¹⁵ October 12. ¹⁶ Data includes reports from: W2s AZA, ELK, HSB, JKK, JU, KRP, UAL, VLQ, ZAL. ¹⁷ October 20. ¹⁸ October 11. ¹⁹ October 25. ²⁰ October 31. ²¹ October 14. ²² October 27. ²³ Reported by KINKR acting EC. ²⁴ Composite reports of ECs K2IWC, WA2GAB, WA2DUD, K2LOB. ²⁵ October 15-16. ²⁶ October 2. ²⁷ September 30, October 6. ²⁸ October 12-13. ²⁹ October 3, 5-6. ³⁰ October 30. ³¹ October 26. ³² October 15. ³³ October 7. ³⁴ October 10. ³⁵ October 18. ³⁶ October 4. ³⁷ October 22. ³⁸ October 1. ³⁹ October 16. ⁴⁰ October 3. ⁴¹ October 21. ⁴² Report included in report from W2IAG.

Miscellany

Detailed reports describing the activity during the SET were submitted by many emergency coordinators, section emergency coordinators and NTS net managers. They will remain in our SET file for one year, until after the 1964 SET. Meanwhile, here are some notes and comments worth passing along.

A word about preparations. We were greatly impressed with the quantity and detail of SET preparations worked out by all concerned for the 1963 SET. Some set a specific date and time for the simulated emergency, others merely bracketed the times between which a test drill might be called. Lengthy bulletins went out to the local field, outlining emergency plans and procedures, setting up alerting processes and check-in sequences, and instructing all concerned how to conduct themselves in the event of emergency, real or simulated. It is a most impressive folder of documents, illustrating as nothing else can the interest in public service activities among the hard core of our ARPSC leadership.

National Traffic System nets at all levels conducted extra sessions to take care of the traffic load. In the pre-test SET bulletin, six extra cycles of the system's daily traffic-handling cycle were called for at specified times, to assist in expediting routine and priority traffic. (Emergency traffic was to be handled like a hot potato — taken immediately by any station receiving it across-channels as near as possible to the destination net.) Bottlenecks developed because the system was not made operative on a 24-hour basis, and traffic piled up at local net level until NTS nets went into operation. The system was operative from 2300 GMT Oct. 5 to 0800 GMT Oct. 6, completing three bi-hourly cycles, and again from 1800 GMT Oct. 6 until 0700 GMT Oct. 7 for another five complete cycles. Many section nets, most region and area nets and all TCC jurisdictional areas observed this schedule, and many NTS nets conducted additional sessions on their own initiative when the need for them seemed apparent. Some complained of a famine in traffic, others that they were snowed under. In any case, it was a most interesting test of the system's capability for emergency operation, and will bear close analysis. Was it successful? The answer to this depends on what we were trying to prove. If we were interested in showing that NTS is unqualifiedly competent for handling all emergency communications, the test certainly did not prove that, because there were many "bugs" uncovered. But this test was made for the purpose of uncovering these bugs and taking steps to correct them, and in this the SET was eminently successful.

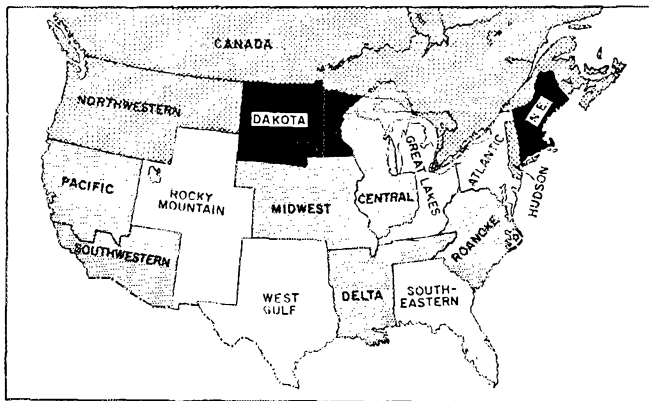
The Florida test in 1963 gave NTS in the southeastern area of the U. S. all the traffic it could handle, and at times a lot more. While this was going on, a real hurricane named

Flora was pounding the stuffings out of Cuba and apparently bidding her time to do the same to Florida, so while the Florida and southeastern ARPSC were playing games, the boys were keeping an apprehensive eye on Flora, who fortunately did not include the U.S. mainland in her itinerary, as it turned out. The Florida "twins," SECs W4LYT and W4MLE, put out joint communiques, both before and after the test, totaling 26 legal-size pages, and activity was at its usual high pitch. The final statewide report made a number of educated recommendations based on observations and comments during and after the test.

Here are some samples of comments dropped along with reports and score summaries (wish we could include more): Many of our operators are new in the game and of high school age and are doing very well. — *K2HTX, EC Huntington Twp., N.Y.* We had the best SET in the section yet, even without an SEC. — *W6ZRJ, SCM SCV.* In a number of cases, as expected, messages were of a higher priority than their content warranted. Suggest the CD prepare an operating aid at an early date. — *W4MPK, SEC N.C.* All civic leaders, civil defense and Red Cross people were most cooperative. — *W6QIE, EC South San Francisco, Calif.* Many stations checked into nets from communities without ECs, so we have hopes of increased activity. — *W4NVL, SEC Ala.* The ARRL incentive licensing proposal acted as a deterrent throughout the operation. — *K5DLP, SEC Okla.* The number participating did not represent the percentage that we had last year, but still quite good for a surprise drill. — *W3ISZ, EC Blair County, Pa.* The 160-meter frequency used was clear almost the entire time, which ran in excess of 4 hours. — *K8DNS, EC Lorain County, Ohio.* In a word, I'm disappointed. — *W0SCT, SEC So. Dak.* A highly successful SET. — *K4MDC, EC Fulton-DeKalb Counties, Ga.* Considering the fact that this group has been functioning for only a short time, we felt that the personnel handled the problem very well. — *W1POP, EC/RO Johnston, R. I.* Mayors of 52 incorporated communities in Jefferson County, Ky., were personally visited by mobiles and asked to originate messages to the Red Cross or c.d. — *W4NOA, EC.* Generally, the SET was very well attended, with more traffic than ever before. — *W6DEF, new SEC SCV.* Nine counties responded to letter to all ECs. This is a very poor showing. — *W8LOX, SEC Mich.* Since there were no reports of any kind from 20 ECs in 9 areas, the section's participation cannot be considered as more than token, although 8 ECs were known to have been active. — *W4SHJ, SEC Va.* The integration of AREC and NTS is progressing and will probably be accomplished without too much difficulty. — *W1VNE, SEC R. I.* I feel very proud of my team and the way they work. — *V67FB, SCM R.C.*

General consensus: Better and better, but still not good enough.

QST



THE building fund continues its upward progress, although not at a sufficient speed to put the fund into orbit. Here's how the various divisions stand in the matter of achieving their individual quotas at the end of January:

New England	112.9%	Roanoke	74.2
Dakota	110.6	Pacific	67.8
Hudson	88.2	Delta	64.3
Northwestern	85.8	Atlantic	59.2
Canada	82.8	Rocky Mountain	58.8
Southwestern	79.9	West Gulf	56.1
Central	79.4	Great Lakes	48.4
Midwest	74.5	Southeastern	45.5

On the accompanying map is charted the progress of the divisions. Those blocked out in solid

black are solidly in the black—they have achieved 100% of quota. Those divisions which are double crosshatched have achieved between 80 and 100%, those with single-line shading are between 60 and 80% of quota, while those without any shading are still below the 60% mark. As you can see from the figures above, there are several divisions that can, with only a modest amount of drive, advance themselves across the threshold into another bracket. Southwestern and Central, for example, can move over into the 80-100% range, while Rocky Mountain and Atlantic should soon be listed in the 60-80% bracket.

Help put your division in the black!

Members Are Saying . . .

Enclosed is our check . . . Your building is one that the amateurs can be very proud of. — *Meriden (Conn.) Amateur Radio Club*

. . . Wish I could contribute more, but this is at least a token of interest in the project. — *K7P01*

Enclosed is our contribution to the Building Fund. We would like to see our division top its quota. — *West Virginia State Radio Convention*

I take pleasure in attaching my personal contribution for the erection of the new building. — *XE1CE*

Enclosed is my contribution to the ARRL Headquarters Building Fund. I personally back your proposals for incentive licensing, but seriously doubt the chances of selling the idea either to the FCC or the amateur membership as a whole. — *K6U2B*

Enclosed please find check for Building Fund. Hope I'm not too late. — *WA2ACQ*

It is indeed a pleasure to see the Headquarters looking so fine these days. — *W2TUK*

I am happy at this time to make my contribution to the ARRL Building Fund. I have been a member of this League since 1929 and certainly cannot understand why anyone will pass up this opportunity to further the advancement of our League. From what I have seen and read, the fact still remains that without the support and hard work of the ARRL, there would be no use for amateur radio as a hobby or otherwise. — *W1ERG*

Keep up the good work. We may fuss and gripe, but do appreciate the work ARRL is doing. — *Mineral Wells (Texas) Amateur Radio Club*

Here is my small contribution toward your new building. I am proud to be a member of the League. I am only 11 years old and have been a ham for less than a year. — *K7WQ0*

What can I say that hasn't already been said concerning the ARRL and the building fund? I am thankful that there is an amateur's organization I can support. Keep up the good work. — *W8QXQ*

I should have done my bit to push that graph higher long before this, but better late than never. — *W2CCP*

This is my second donation, and I am prepared to make another next year if the fund is not then fully subscribed. — *W4NEP*

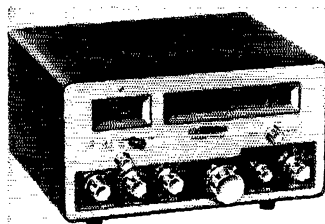
Here is my donation. At first I did not intend to contribute, but as I sat in front of my SX-101A planning the Yagi beam that would be used in the Novice Roundup, I realized that some gift or other would be in order. — *W1HGFHN*

I have been meaning to send this in for a long time, but being fourteen it isn't the easiest thing trying to pay for a new transmitter and keyer, and still have enough left over to send in to you for the Building Fund. — *W10GNQ*

(Continued on page 150)

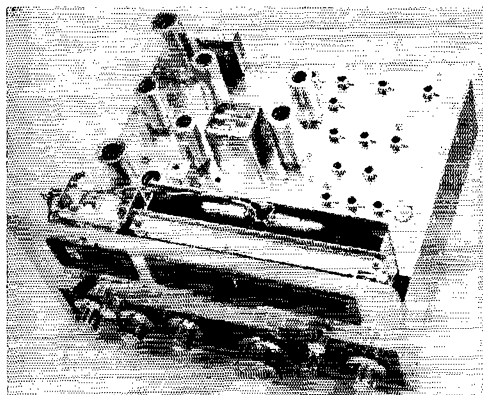
• Recent Equipment —

Heathkit HR-20 Mobile Receiver



THE Heathkit HR-20 Mobile Receiver covers the 80- through 10-meter amateur bands, a.m., s.s.b., or c.w., and may be also used as a home receiver if the appropriate a.c. power supply is connected. It is an 8-tube receiver which obtains its selectivity and image-rejection characteristics by means of a crystal-lattice filter at the 3-Mc. i.f. In addition, temperature compensation is employed throughout.

Referring to the block diagram of Fig. 1, the r.f. amplifier V_1 is a 6BZ6. The r.f. gain control



Top view of the HR-20 Mobile Receiver. Just to the left of center is the 3-Mc. lattice filter, while to the right are the various slug-tuned coils in the r.f., mixer, and h.f. oscillator stages. The dial mechanism, with its 30-to-1 tuning ratio, is a spring-loaded affair with quite a slew of gears, and takes up an appreciable percentage of the space behind the panel.

also controls the gain in the first and second i.f. amplifiers. V_{2A} , the mixer, is half of a 6EA8, and the other half functions as the high-frequency oscillator, V_{2B} . The h.f. oscillator and mixer are gang-tuned while the r.f. stage can be peaked up with a front-panel control. The $5\frac{1}{2}$ -inch slide-rule dial has a 30-to-1 tuning ratio.

The mixer output is fed through a 3-Mc. lattice filter to the first i.f. amplifier, V_3 . The manufacturer states that the bandpass characteristics of this filter are 3 kc. at 6 db. down and 10 kc. at 60 db. down.

The second i.f. amplifier, V_{4A} , is half of a 6EA8 and its output is capacity-coupled either to the a.m. detector or to the product detector. V_{4B} , the other half of the 6EA8, is the S-meter amplifier.

V_5 is a triple diode (6BJ7) which functions as an a.m. detector, a.v.c. amplifier, and series-type noise limiter. The output of the a.m. detector is capacity-coupled to the first audio amplifier.

The product detector is V_6 , a 6BE6, which also acts as b.f.o. The b.f.o. is crystal-controlled, for stable performance. The product detector mixes the i.f. and oscillator signals so that their resulting difference appears in the output as an audio frequency. For s.s.b. reception, the b.f.o. replaces the missing carrier frequency. If the two frequencies are separated by a frequency in the audio range, this results in the generation of an audible beat note for c.w. reception. This output is fed to the first audio amplifier.

V_7 is a 6EB8. The triode portion of it serves as the first audio amplifier, and its gain is controlled by the AF GAIN. The pentode section of the 6EB8

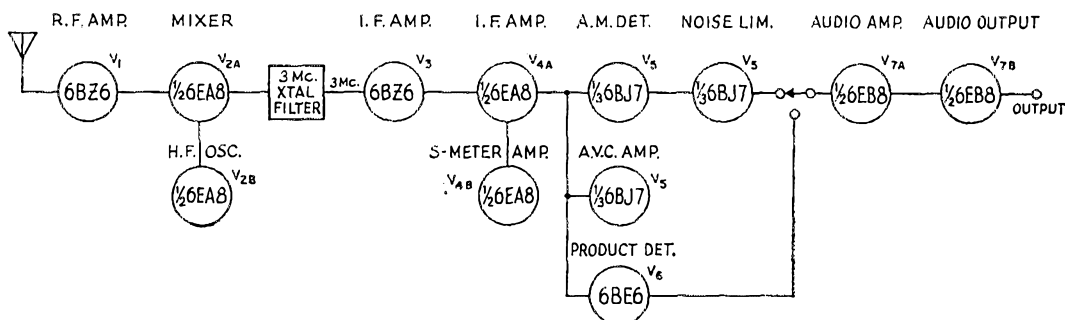
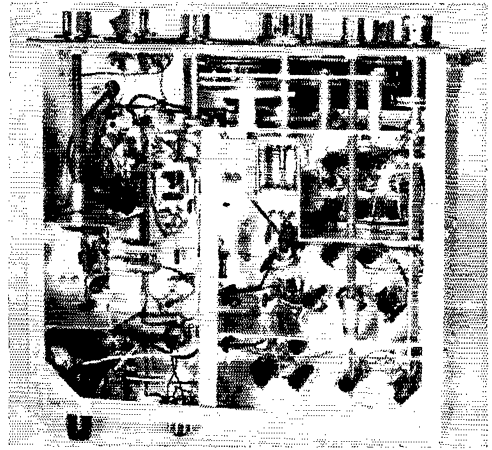


Fig. 1 — Block diagram of the HR-20 Receiver.

Heathkit HR-20 Mobile Receiver

Height: 6 $\frac{1}{8}$ inches.
 Width: 12 $\frac{1}{8}$ inches.
 Depth: 9 $\frac{3}{16}$ inches.
 Weight: 16 pounds.
 Power Requirements: 12 v. a.c. or d.c.,
 2.5 amp.; 275-350 v.d.c. 85-127 ma.
 Price Class: \$135.
 Manufacturer: Heath Company, Benton
 Harbor, Michigan.



is the power output amplifier, feeding either phones or a loudspeaker.

Plate voltage in this receiver is regulated by means of an OA2, while filament voltage for the r.f. amplifier and mixer-oscillator is regulated with a transistor-Zener diode combination. Because of this transistor, the receiver can be used only on negative-ground power supply systems.

The rear panel of the receiver provides connectors for a 50-ohm antenna, operating and control voltages, antenna relay, 8-ohm speaker, and headphones.

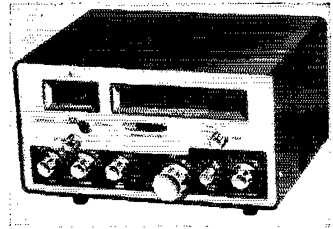
This receiver was received at ARRL already wired, and so we can't say how long the wiring takes. However, although it uses no printed

Have you ever wired up a Heathkit? If so, does yours look like this? Anyway, this is how it looks when the factory does it. On the edge of the chassis at the left is the compartment housing the crystal-controlled b.f.o. The r.f. stage and associated components are at the right rear, with mixer and h.f. oscillator between there and the dial mechanism.

circuits, which means that you have to do it all yourself, it shouldn't be too time-consuming a job. Accessibility is pretty good in most areas.

Heathkit HX-20

Mobile S.S.B. Transmitter



THE Heathkit HX-20 Mobile Single-Sideband Transmitter is a companion unit to the HR-20 Receiver described above. It provides for s.s.b. or c.w. operation on the entire 80-, 40-, 20-, and 15-meter bands, and on three 500-ke. segments

of the 10-meter band (using the crystals supplied).

Referring to the block diagram in Fig. 2, V_1 is a 6EA8 which serves as speech amplifier and cathode follower, delivering audio to a pair of germanium diodes in a balanced modulator cir-

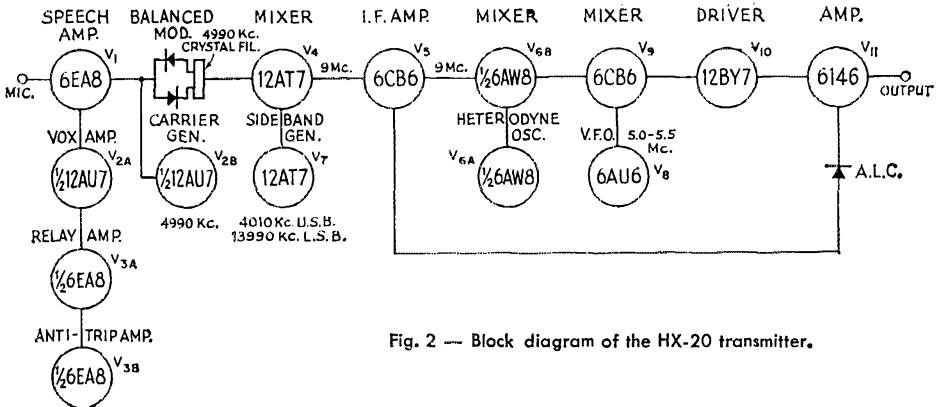
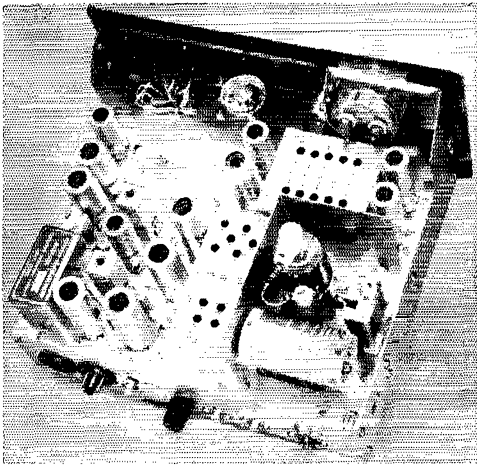


Fig. 2 — Block diagram of the HX-20 transmitter.



Above the chassis are most of the major components. At the right is the final amplifier compartment, while the exciter portion of the transmitter is lined up along the left-hand side of this photo. Controls and terminals along the rear side aprons include a receiver accessory socket, power input, **SIDEBAND BALANCE** control, fuse, receiver antenna connector, r.f. output, key jack, external relay connector, anti-trip control, **VOX** sensitivity, and microphone jack.

cuit. The 180° phase difference results in suppression of the unmodulated carrier. V_{2B} , half of a 12AU7, serves as a crystal-controlled carrier generator on 4990 kc. A variable capacitor across the crystal allows it to be adjusted to place the frequency at the optimum point on the slope of the crystal filter for proper audio response and unwanted sideband suppression.

The filter is a crystal-lattice type which passes only those frequencies which contain one sideband of the modulated carrier frequency of 4990 kc. This sideband energy is fed to one triode section of V_4 , the first mixer.

V_7 uses both sections of a 12AT7 as Colpitts crystal oscillators. One oscillator operates on 4010 for upper sideband, while the other is on 13990 for lower sideband. The sideband balance control provides for equal output from both sideband oscillators. The mode switch on the front panel selects either sideband.

A 12AT7 is used as the first mixer, V_4 . The 4900-kc. s.s.b. signal from the crystal filter, FL_1 , goes to one grid, while either the 4010-kc. signal or the 13,990-kc. signal goes to the other grid. The beat between 4990 and 4010 or 4990 and

13990 produces the upper or lower sideband respectively at 9 Mc. This 9-Mc. signal goes through a tuned transformer to the i.f. amplifier, V_6 , a 6CB6. The bias of this amplifier is controlled from the front panel by the **DRIVE LEVEL** control, which varies the bias voltage on the grid when the transmitter is operating on c.w. On s.s.b. the bias is controlled by the a.l.c. circuit.

The transmitter is keyed by changing the bias applied to the driver and third mixer grids.

A crystal-controlled heterodyne oscillator, V_{6A} , generates signals at 25.5, 25.0, 24.5, 17.5, 10.5 and 3.5 Mc. which, when mixed with the 9.0-Mc. signal in V_{6B} , provide signals at 9.0, 12.5, 19.5, 26.5, 33.5, 34.0, and 34.5 Mc. These signals are in turn mixed in V_9 with the output of the v.f.o., V_8 , which operates from 5.0 to 5.5

Heathkit HX-20 Single-Sideband Mobile Transmitter

Height: 6 $\frac{1}{8}$ inches.

Width: 12 $\frac{1}{8}$ inches.

Depth: 9 $\frac{5}{16}$ inches.

Weight: 17 pounds.

Power Requirements: 12 v. a.c. or d.c., 2.7 amp.; 350 v.d.c., 120 ma.; 600 v. d.c., 125 ma.; -130 v.d.c., 20 ma.

Price Class: \$200.

Manufacturer: Heath Company, Benton Harbor, Michigan.

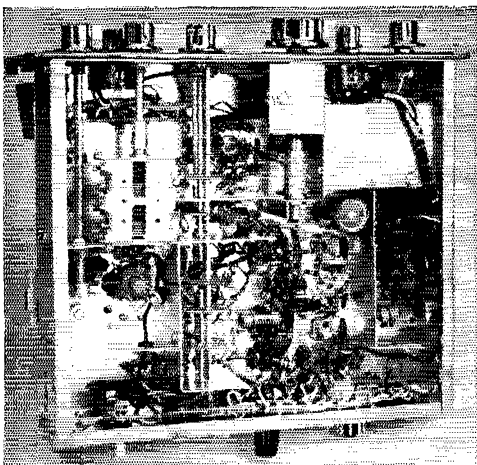
Mc., to produce output on the various bands 80 through 15 meters and on three 500-kc. segments of 10 meters.

V_{10} is a 12BY7 driver which boosts the output of V_9 to a level sufficient to drive the final amplifier, V_{11} , a 6146. The final amplifier operates in Class AB₁. The loading on the final is fixed, being designed to work into a 50-ohm load. For s.s.b. the a.l.c. circuit is switched in and the peak driving voltage is controlled by the **AUDIO GAIN** control on the front panel. The a.l.c. functions by sampling a voltage developed across a resistor in the 6146 grid and using it to change the bias on i.f. amplifier V_5 .

Associated with the speech amplifier at V_1 are a **VOX** amplifier, V_{2A} , and a relay and anti-trip amplifier, V_3 , and there are controls on the rear apron for adjusting these circuits.

Front panel controls include an **OPERATE-SPOT-STANDBY** switch, **MODE** switch, **FINAL TUNE**, **DRIVER TUNE**, **BAND** switch, **VFO TUNING**, **METER**

Here's that professional wiring again, underneath the chassis. The v.f.o. tuning control is quite a combination of mechanical linkages, but it has a smooth and comfortable feel.

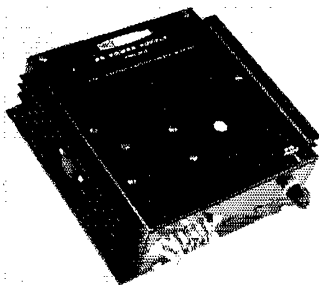


ADJUST, AUDIO GAIN, and DRIVE LEVEL. The meter is a relative power output indicator, sampling the r.f. output through a diode, and all tune-up is done by means of this meter.

This unit was, like the receiver described

above, assembled by the Heath Co., and so we can't tell you how long a job it is. However, it is somewhat more complicated than the receiver (there are 71 pages of assembly instructions for the transmitter, only 38 pages for the receiver).

Heathkit Transistorized D.C. Power Supply



The Heathkit HP-13 d.c. power supply provides the following output voltages: 750 v.d.c. at 250 ma. load; 300 v.d.c. at 150 ma. or 250 v.d.c. at 100 ma.; adjustable -40 to -130 v.d.c. It also switches d.c. filament voltage for the equipment for which it is to be used. There is relay control of all primary power, and individual circuit breaker protection of the d.c. input to the power supply and of the d.c. filament voltage line to the equipment being used with the power supply. The circuit breakers are of the automatic reset, load delay type.

Two heavy-duty transistors act as switches to convert the d.c. to a.c., which is then stepped up through the toroid power transformer. A total of seven silicon rectifiers take care of high voltage, low voltage, and bias supply rectification.

Assembly time for this unit was roughly three hours, and it went together with no hitch. In fact, the only problem we had was with the cables supplied. They were obviously designed for a front-engine car, and in our Corvair were about three feet short of reaching from the engine compart-

Heathkit HP-13 Transistorized D.C. Power Supply

Height: 2 $\frac{3}{8}$ inches

Width: 7 $\frac{3}{4}$ inches.

Depth: 7 $\frac{5}{16}$ inches.

Weight: 5 $\frac{1}{4}$ pounds.

Power Input: 12 to 11.5 v.d.c. (negative ground)

Power Output: 750 v. at 250 ma.; 250 v. at 100 ma. or 300 v. at 150 ma.; -40 to -130 v.d.c. at 20 ma.

Price Class: \$60.

Manufacturer: Heath Company, Benton Harbor, Michigan.

ment of the car to the location of the transmitter and receiver under the dash.

This is a versatile power supply unit, with its available voltage outputs and its price making it an attractive package for anyone considering some type of mobile operations. — R.L.B.



California—The Camellia Capitol Chirps will be hostesses for the West Coast Fun Fest March 6-7 at the Mansion House Inn in Sacramento. YL luncheon, YL-OM dinner, and many fun features planned. Contact K6HHD.

Delaware—The Kent County Amateur Radio Club annual auction is scheduled for March 10 at 8 p.m. in Dover. Nearby clubs are invited; details from K3RUJ.

Florida—The Orlando ARC hamfest will be held the week end after Easter, April 3-4, at the Cherry Plaza Hotel in Orlando. Something of interest for everyone, sez K4NTB, who's the man to write for reservations.

Georgia—The annual hamfest of the Columbus ARC will be held March 22 at the Columbus Fairgrounds. More information from K4VGI.

New Jersey—The sixth annual dinner and hamfest of the East Coast V.H.F. Society will be held at the Chalet in Rochelle Park, N.J., March 21. Tickets by advance sale (before March 8) only. Contact any member or K2HHS.

New Jersey, New York—The first annual W2-DX

banquet will be held March 21 at Schraff's County Restaurant, Scarsdale, New York. Cocktails after 4:00 p.m. dinner at 7. Register with Bob Stankus, W2CVZ.

New York—SSBARA presents the annual sideband dinner and hamfest at the Statler-Hilton during the IEEE Show in NYC March 24. Reservations from W2JKN. See display advertisement, page 167, Feb. QST for more details.

New York—The Southern Tier radio clubs of Broome County are holding their annual dinner at Johnson City, on April 4. Reservations before April 1 only, from Harry Spencer, 1165 Vestal Avenue, Binghamton, New York.

New York—The RTTY gang will meet during the IEEE Show in N. Y. C. Dinner, cocktails, and ragchewing at the Patricia Murphy Restaurant, 260 Madison Avenue, March 23 at 5:30 p.m. Reservations \$6.50 from W2PEE.

Pennsylvania—The South Philadelphia Amateur Radio Klub will hold a swap shop and auction March 15 at the Childs School, 17th and Tasker Streets, Philadelphia. More information from K3LKB.

Happenings of the Month

A.R.R.L. RTTY PROPOSAL BECOMES DOCKET

In accordance with ARRL request (RM-358; page 53, October 1962 *QST*), FCC has issued a Notice of Proposed Rulemaking, Docket 15,267, which would change the dual identification requirement so that only the call of the transmitting station would have to be sent by A1 or A3 when other forms of emission are in use. The FCC also requests suggestions on superimposition of this call upon the other means of communication in progress. Any individual or group may comment by March 16, 1964; reply comments will be accepted until April 1, 1964. An original and 14 copies are required, as usual. The text follows:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of
Amendment of Section 97.87
(a) (2) of the Commission's
Rules governing the Ama-
teur Radio Service to delete
a "dual identification" re-
quirement. } DOCKET NO. 15267
RM-358
RM-435

NOTICE OF PROPOSED RULEMAKING

By the Commission:

1) The Commission has before it for consideration petitions from the American Radio Relay League (ARRL), Newington, Connecticut (RM-358), and from Edwin B. Bruening, Ann Arbor, Michigan (RM-435), both proposing to amend Section 97.87(a)(2) [formerly Section 12.82(a)(2)] of the Commission's Rules governing the Amateur Radio Service. The ARRL petition proposes to delete the requirement for the identification by telegraphy or telephony of the call sign(s) of the station(s) to which an amateur radio teleprinter station is transmitting.

2) Mr. Bruening submits the same proposal but only as an alternative to his primary recommendation. Primarily, Mr. Bruening proposes that all telegraphic or telephonic identification requirements for amateur radio teleprinter stations be deleted and that, as a substitute therefor, licensees be required to file prior written notice of their proposed radio teleprinter operations with appropriate Commission Field Offices.

3) Section 97.87 of the rules sets forth station identification requirements in the Amateur Radio Service. Section 97.87(a)(1) provides that identification shall include transmission of the call sign of the station being called followed by the call sign of the transmitting station. Section 97.87(a)(2) provides that this identification shall be by either telegraphy or telephony, as appropriate, and, in addition, when a method of communication other than telegraphy or telephony is being used, such as radio teleprinter, the identification shall also be transmitted by that method. The requirement for telegraphic or telephonic station identification, in addition to radio teleprinter station identification, is commonly referred to as the "dual identification" requirement.

4) Deletion of the "dual identification" requirement was considered by the Commission in connection with an earlier petition (RM-277), filed by the

ARRL. In denying that petition by its Memorandum Opinion and Order released February 26, 1962 (FCC 62-214:22 RR 1573), the Commission stated that:

"The dual identification requirement is necessary for the Commission properly to perform its duties. Amateur stations are not assigned specific frequencies, and as a consequence, the interference resulting from the overlapping of signals makes identification difficult at best. Infraction notices are issued only upon positive identification. Without the dual identification requirement, positive identification would be very difficult for the monitoring stations, and practically impossible for the Commission's mobile units which are not equipped to receive radioteletype transmissions. It appears to the Commission that the advantage to the Amateur service as a whole in having proper and prompt enforcement of the Amateur Rules and Regulations outweighs any possible advantage to be gained from the relaxation of the present identification requirements."

5) Petitioner Bruening takes note of the Commission's comment in RM-277, but he maintains that by requiring licensees to file prior written notice of their proposed radio teleprinter operations, elimination of "dual identification" could be accomplished without detracting from monitoring efficiency. He contends that since radio teleprinter operations are conducted by very few amateurs, "Such an amendment should not, therefore, place any administrative burden upon the district offices of the Commission, and will indeed help their monitoring efforts through such special registrations. In the case of suspected interference by an amateur using a mode of operation other than telephony or telegraphy, the district Engineer-in-Charge would have immediate access to a list of amateur stations participating in special forms of transmission and communications."

We cannot agree with this contention. A filing of a notice of proposed operation would not provide the means of rapid and positive identification which is so necessary to investigative and enforcement activities.

6) The Commission does, however, feel that, notwithstanding its view with regard to deletion of the entire "dual identification" requirement, a partial relaxation of Section 97.87(a)(2) is appropriate as proposed primarily by the ARRL and alternatively by Mr. Bruening. In support of its petition, the League notes that:

"... the Commission's identification needs will be fully met by modifying the present dual identification requirement for teletype operation only to the extent of making it unnecessary for telegraphic transmission of the call sign or signs of the station or stations being called or communicated with by a station conducting teletype transmissions. The Commission's monitoring stations and mobile units, as well as the League's Official Observers, still will be able to identify the transmitting station by the telegraphic transmission of its own call sign. Should the Commission desire to learn the identity of the station or stations called or communicated with, it need only ask the transmitting station to supply the desired information from the logs it is required to maintain."

7) For the reasons set forth by the ARRL, the Commission concludes that it does not appear that the omission of the telegraphic or telephonic transmission of the call sign of the station being called during teleprinter operations will unduly detract from the Commission's monitoring efficiency. Therefore, the Commission proposes to delete this require-

ment by amending Section 97.87(a)(2) as set forth in the attached Appendix.

8) As a corollary to its basic proposal, the ARRL notes: "... that telegraphic identification of the transmitting station might be superimposed upon the carrier without interrupting the teletype transmission. It is suggested that any notice of proposed rule making based upon this petition invite comments and suggestions on such a method of telegraphic identification." With regard to this suggestion, the rules do not now specifically preclude the use of such a method of identification, provided that the type of emission used therefor is in accordance with those specified in Section 97.61 (formerly Section 12.111). However, satisfaction of the purpose of Section 97.87(a)(2) requires that the International Morse identification be easily discernible by ear using a conventional communications receiver. To date, the experience in other radio services with such superimposed identification indicates that a method which provides clearly unmistakable identification and which is also simple and inexpensive has not yet been developed. Therefore, until a suitable method has been developed and demonstrated, amateur licensees experimenting with superimposed identification may not omit making the required identification by proven conventional methods. However, in addition to comments on the proposed amendment to Section 97.87(a)(2), the Commission invites the submission of comments and suggestions on methods of superimposed identification, including methods using (superimposed) emissions not now permitted by Section 97.61.

9) Authority for this proposed amendment is contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended.

10) Pursuant to applicable procedures set forth in Section 1.415 of the Commission's Rules, interested persons may file comments on or before March 16, 1964, and reply comments on or before April 1, 1964. All relevant and timely comments and reply comments will be considered by the Commission before final action is taken in this proceeding. In reaching its decision in this proceeding, the Commission may also take into account other relevant information before it in addition to specific comments invited by this Notice.

11) In accordance with the provisions of Section 1.419(b) of the Commission's Rules, an original and fourteen copies of all statements, briefs, and comments filed shall be furnished the Commission.

FEDERAL COMMUNICATIONS COMMISSION
REN F. WAPLE
Secretary

Adopted: January 8, 1964

APPENDIX

Part 97 of the Commission's Rules is proposed to be amended as follows:

§ 97.87(a)(2) is amended to read as follows:
§ 97.87 Transmission of Call Signs.

* * *

(2) The required identification shall be transmitted on the frequency or frequencies being employed at the time and, in accordance with the type of emission authorized thereon, shall be by either telephony using the International Morse Code, or telephony, except that, when a method of communication other than telephony or telegraphy using the International Morse Code is being used or attempted, the required identification shall be transmitted by that method and only the call sign of the

transmitting station need be transmitted by either telephony or telegraphy using the International Morse Code.

THIRD-PARTY TRAFFIC

Colombia and the United States have signed an agreement permitting amateurs of the two countries to exchange messages or other communications on behalf of third parties. As with earlier agreements, messages must be of a personal or technical character, not important enough to warrant transmission by the public telecommunications system. The operators may not have any pecuniary interest in the messages, of course.

Another temporary agreement between the U.S. and the International Telecommunications Union permits third-party traffic between W/K amateurs and 4U1TU only, from January 27 through July 31, 1964.

The full list of countries with which the U.S. has similar agreements is: Bolivia, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Haiti, Honduras, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, and Venezuela.

The Canadian List comprises Bolivia, Chile, Costa Rica, El Salvador, Honduras, Mexico, Venezuela and the United States.

BANNED COUNTRIES LISTS

Roumania has been removed from the list of countries with which Canadian amateurs are forbidden to communicate. Countries remaining on the list are Cambodia, Indonesia, Laos, Thailand, Viet Nam and Jordan.

Amateurs in the U.S. may not work amateurs in Cambodia, Indonesia, Thailand and Viet Nam.

The two lists both result from communications by the countries concerned to the International Telecommunication Union objecting to QSOs between amateurs in their countries and amateurs elsewhere. Differences in the list come from differing interpretations on what a notification says.

MOBILE RULES PETITION DENIED

FCC, in a Memorandum Opinion and Order released December 16, denied RM-371, a petition filed by Jack W. Bazhaw, W5CXJ, for amendment of rules to provide that no log need be kept for amateur mobile work above 50 Mc. Petitioner had cited the lack of logging requirements in other mobile services, the dangers inherent in attempting to keep a log while driving, and the fact that above 50 Mc., the work is largely local and would be recorded by fixed amateur stations, located in the same general area as the mobile station. The FCC disagreed with W5CXJ's presentation, saying that amateurs have wide latitude in choice of frequencies, mode and range of transmissions; therefore, log entries are necessary for the enforcement and regulation of amateur activities; that the safety hazard had been eliminated by the logging rules adopted March 21, 1963 in Docket 14,853 as proposed by ARRL (allowing a mobile amateur to log the stations he has worked during a period of continuous mobile operation at the first convenient stopping point); the FCC didn't feel that its engineers should have to go around gathering information on a mobile amateur, and in any case, there would be under petitioner's proposal no logging at all for permissible one-way communications or for mobile-to-mobile work.

(Continued on page 150)



Hints and Kinks

For the Experimenter



MARS FREQUENCIES WITH THE HT-37

THE HT-37 transmitter has very little overlap at the ham-band edges and thus presents a problem to those interested in working some of the MARS frequencies.

A study of the v.f.o. circuit revealed a feed-through terminal, designated "TP2" or "FSK," originally included for the addition of an RTTY circuit. By adding a fixed silver-mica capacitor,

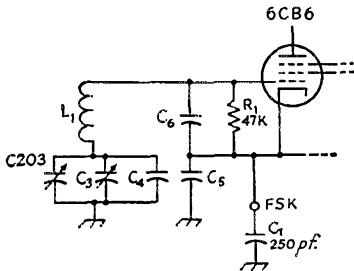


Fig. 1—A 250-pf. capacitor at the FSK terminal will shift the HT-37's output frequency about 30 kc.

C_1 in Fig. 1, at this point, the v.f.o. frequency will shift down, which results in an increase in the output frequency on 80 and 40 meters because of the heterodyning process in the HT-37. With a value of 250 pf. for C_1 , the output frequency is shifted up about 30 kc. On 20, 15, and 10 meters, the output frequency is lowered by about the same amount.

When trade-in time rolls around, a soldering gun easily restores the transmitter to its original condition.

— Robert L. Schaffer, W8EWP/K3BWI

SIMPLE CRYSTAL FILTER

THE circuit in Fig. 2 is an ultrasimple crystal-filter i.f. amplifier for any receiver that has an

i.f. of 440 to 470 kc. Crystals Y_1 and Y_2 are FT-241A surplus types matched to 5 cycles at the i.f. With the i.f. of 460 kc., and a crystal-controlled b.f.o. at 461 kc., capacitors C_1 and C_2 were adjusted to reject the other side of zero beat which was down at least 60 db. after adjustment. A bandwidth of about 250 cycles, at 10-db. points, was obtained with the system. A complete i.f. strip, using only one i.f. transformer, can be made by adding an amplifier at point "X" and feeding the output to a product detector.

This circuit is a modification of the one by W6YBR, "An Inexpensive Crystal-Filter I.F. Amplifier", *QST*, February 1958. With an i.f. this low, only two crystals are needed instead of three used by W6YBR. — Chet Opal, K3CUW

FLUSH-MOUNTING TRANSFORMERS

IF YOU didn't read KITVF's article in this issue, here is a helpful hint borrowed from it. In mounting flush-mounting power transformers, it is often difficult to spot the four mounting holes accurately. If the chassis has been covered with paper in the manner customary for layout marking, the mounting holes can be spotted accurately after the rectangular core hole has been cut by using a ball-point refill which will pass through the core-bolt holes of most transformers. — W1TS

VF-1 STABILIZER

A SLIGHT INSTABILITY in my VF-1 v.f.o. was traced to the 2200-ohm grid resistor, the one between the 40-meter positions on the v.f.o. band switch. Replacing the resistor with the same value but a 2-watt unit eliminated the trouble. It is also a good idea to periodically clean the contacts on the band switch with contact cleaner.

— Bob Richardson, W6WHM

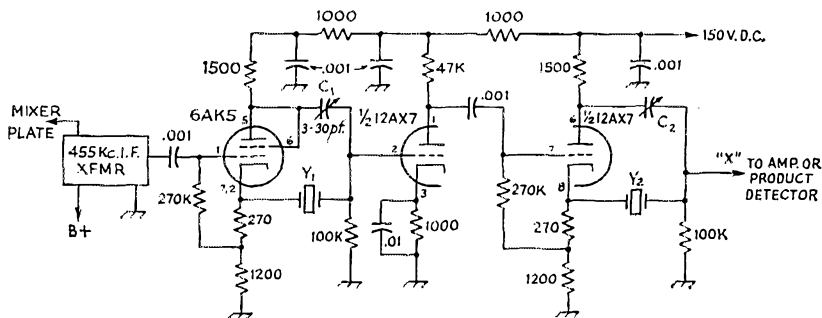


Fig. 2—K3CUW's crystal-filter i.f. amplifier circuit. Unless otherwise indicated, capacitances are in μ f., resistances are in ohms, resistors are 1/2-watt.

UPDATING THE 420-MC. PREAMPLIFIER

NUVISTORS have been on the scene now for several years and many v.h.f. and u.h.f. radio amateurs have used them for converters and other equipment. I used one, a 6CW4, to update the 420-Mc. preamplifier that appeared for many years in the "V.H.F. Receivers" chapter of *The Radio Amateur's Handbook*.

The *Handbook* gives most of the mechanical details for the inductors and the construction of the preamplifier, but several changes are necessary when using the 6CW4 Nuvistor. The Nuvistor socket is positioned $2\frac{3}{16}$ inches in from the end of the trough and is oriented so that its plate connection, Pin 2, is in the proper position to connect to the end of the plate line, L_1 . Ground Pin 4 directly to the side of the trough. A shielding plate between the input and output of the stage may be necessary in some cases but wasn't in our modification. The r.f. chokes are made with 8 inches of No. 28 enamel wire wound on 10,000-ohm or higher $\frac{1}{2}$ -watt resistors.

The power supply for the amplifier needs only to supply about 75 volts. Alignment and adjustment procedures outlined in the *Handbook* should be followed for the Nuvistor version.

— Ralph Steinberg, K6GKX

NO-CHIRP KEYING

MY TRANSMITTER, which consists of a DX-35 and VF-1 v.f.o., had a bad chirp on 20 meters when operating c.w. By applying an old principle, which may be new to some, I completely cleaned up the signal. The solution was to power the v.f.o. from an independent source (other than the transmitter), such as from the receiver power supply, and to let the v.f.o. run continuously. Now, keying just the DX-35 results in a clean keyed signal.

— B. H. Carveth, VE8BC

READING OLD TUBE LABELS

OLD TUBE type numbers are sometimes unreadable due to an accumulation of dirt and grease. Removal of the dirt often obliterates the type number, too. A good way to clean the tubes without erasing the label is to spray the tube envelope with hi-fi record cleaner, then wipe off the dirt with a soft, clean cloth. The type number will stay put and should be readable.

— Terry Welch, K8ZBI

ROSIN SOLVENT

AERO GLOSS dope thinner makes a perfect solvent for cleaning rosin from soldered connections. The thinner comes in 4 oz., pint, and quart sizes at moderate prices and may be obtained from most any hobby supply store. Simply brush on the solvent with a small brush. The compound makes a good cleaner, too, and it doesn't seem to harm the finish on components, tube sockets, etc.

— George T. Walczyk, WA2FCC

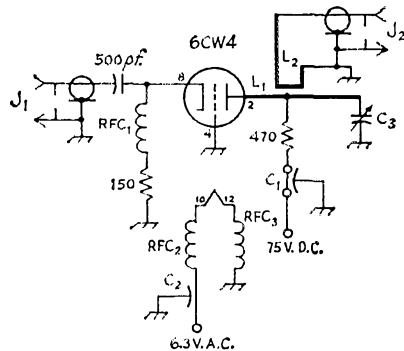


Fig. 3—Diagram of the 6CW4 420-Mc. preamplifier
Resistors are $\frac{1}{2}$ -watt.

C_1, C_2 —0.001- μ f. ceramic feedthrough capacitors]

C_3 —Copper tabs, $\frac{7}{8}$ inch diameter.

J_1, J_2 —BNC chassis connectors.

L_1 — $\frac{1}{4}$ -inch tubing $7\frac{3}{8}$ inches long.

L_2 —Loop of insulated wire adjacent to L_1 for $\frac{3}{4}$ inch.

RFC1-3—See text.

TAPPING HOMEMADE COILS

ONE neat and simple method of providing taps on hand-wound coils is to twist a small loop in the wire. After the loop has been cleaned and tinned, the winding may be continued.

— Harold Morris, W4VUO

MAKING FARADAY SHIELDS

THE construction of Faraday shields can be simplified by using materials included in etched-circuit kits. The desired shield is drawn on a piece of copper-clad phenolic using the special etch-resistant ink. Etching solution is then used to remove the unprotected copper, leaving the shield ready for easy mounting.

Incidentally, most mail-order houses list the kits under the *printed circuit* heading of their catalogues. — E. L. C.

CAR-BATTERY REMINDERS

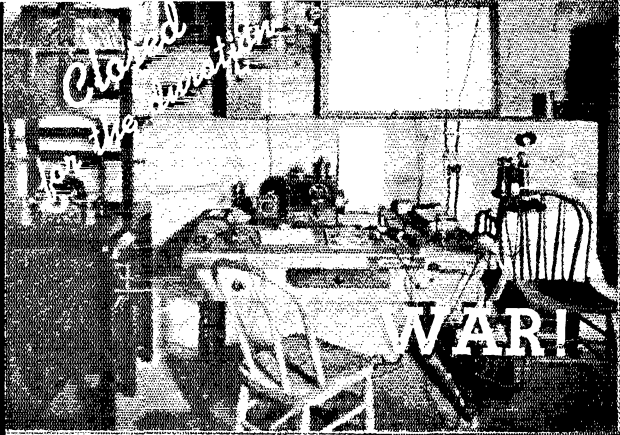
ALWAYS keep battery terminals clean and tight, because corrosion reduces the charging current supplied to the battery by the charging system.

Periodically check system voltage with a voltmeter to make sure the generator is developing sufficient voltage. Look for excessive voltage drops caused by loose or high-resistance cable.

Check specific gravity with a hydrometer once a month and recharge the battery if necessary. Add distilled water to the battery as required.

Measure the charging voltage after the regulator has come up to operating temperature. Too high a setting of the voltage regulator is damaging to the radio, light bulbs, ignition contacts and transistor power supplies. Too low a setting will allow the battery to become discharged. Consult your garage for the proper charging voltage.

— WITS



ARRL

Amateurs Serve Their Country

WHEN the United States went into the War, the military forces were faced with an absolute lack of the great corps of radio officers, instructors, and operators that was needed. That need was great, and it was urgent. There was no time to train men. Probably no more fortuitous circumstance has ever occurred in history than the fact that at the time these thousands of trained radio men were so badly needed, there were over six thousand amateurs in this country who had been training themselves for periods as long as fifteen years in just the sort of activity for which they were required.

Washington contacted New York. A naval officer at the New York Navy Yard called H. P. Maxim in Hartford and asked him to call at his earliest convenience. Together with General Manager Hebert, he went to the Navy Yard the next day. The officer, Lieutenant McCandlish, explained the situation. Five hundred operators were needed, at once, desperately. Could the League supply them? More than that, there was not sufficient radio equipment available. Could the apparatus of the better amateur stations be converted to military use?

Ten days were allowed. A last broadcast went out over those stations which had not yet been dismantled under the executive order. There was just time; in the next day or two, federal officials placed a government seal on all amateur apparatus. But Destiny again played its part, and within the allotted ten days the Navy had its operators.

The second call was for two thousand volunteers. These were recruited with almost equal dispatch. It is estimated that before the war was over more than a thousand additional amateurs followed in the footsteps of those first volunteers. While the records have never been fully tabulated, it is generally believed that between 3500 and 4000 amateurs saw military service during the period of the war.

This portion of the story is excerpted from *Two Hundred Meters and Down*, by Clinton B. DeSoto.

The Importance of Amateurs

There can be no question of the importance of the part the radio amateur played in the winning of the war. The superiority of Allied, and particularly American, communications was the deciding factor in many moments of close struggle during the fighting on all fronts. The reason for this superiority is well described by Lieutenant Clarence D. Tuska, then secretary of the ARRL, who discontinued publication of QST with the September, 1917, issue, and volunteered. His standing as an amateur caused the military authorities to place him in charge of the organization of radio training in the Air Service with an officer's commission, without an hour's preliminary instruction. Concerning his experiences in training wartime radio operators at Camp McClellan, he has said:

The amateurs have come across in the case of the Army. . . . I have turned out a whole lot of operators for the Air Service and have become pretty well acquainted with the type of human it takes to make a first-class radio operator. . . . The very first sort of a student we looked for is an amateur. He seems to have had all the experience and all we have to do is acquaint him with a few special facts and he is ready for his Army job. If we can't get an amateur or a commercial radio operator, then we try to convert a Morse (wire) operator, but it's a pretty hard job. After the Morse man, we take electrical engineers, and from them on, but a man without previous experience is almost hopeless as far as my experience has shown. Of course we can make an operator of him in fifteen or sixteen weeks; whereas, the other way an amateur is fitted in as few as one hundred hours. They've surely done their bit and I am mighty proud I was one.

At the conclusion of the war, the Secretary of Commerce said:

The officers in charge of the wireless operations of our armies in France commend highly the skill, ingenuity and versatility of the licensed amateur radio operators who volunteered in large numbers for military service and served in dangerous and responsible positions.

The experience of Tuska was not unique. Dozens of the more competent amateurs were taken directly from private life and given commissions on the strength of their amateur proficiency.

Captain (later Major) Edwin H. Armstrong, famous inventor of the Armstrong regenerative circuit which was used by every belligerent in the war, president of the Radio Club of America, was placed in charge of the Signal Corps' Radio Laboratory at Paris, France. There he invented the superheterodyne receiver, now the almost-universal circuit for radio reception.

Altogether, the records show at least fifty amateurs who were placed in positions of responsibility directly as a result of their amateur experience. They formed the nucleus of and largely developed the most efficient wireless signal corps possessed by any of the combatant nations. Self-trained and self-organized, they played a heroically important part in the winning of the war.

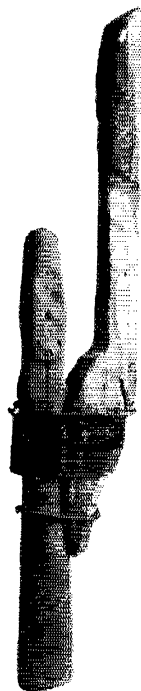
Eventually, after one year and seven months, it was all over. November 11, 1918 — Armistice . . . peace. But not for amateur radio.

THE IMPORTANCE OF OUR ARRL

. . . There is no such thing as organization if each one of us starts out to be thoroughly selfish. If all our efforts are to be directed solely for the benefit of self, we are purely individual and able to take about as much form as the individual sands of the sea. We are an incoherent, uncontrolled crowd. On the other hand, if just a little of our efforts is devoted to the common cause, we automatically establish organization and efficiency and protection, and everything else that is elevating, improving and worth the having. . . . When an amateur asks that old-time question, "What do I get out of joining the ARRL?" the answer should be, "Protection." He cannot have it unless somebody joins an organization and does the work. Unless he joins and does his bit, he must not complain when his fellows place him in the list of unenviables who are not willing to do any work themselves. . . .

— HIRAM PERCY MAXIM,

in *QST* for November, 1919.



The Wouff Hong,¹ one of three instruments of torture mentioned by The Old Man in January, 1917, finally showed up in physical form at Headquarters, in time to appear in the first postwar issue of *QST*, June, 1919. Around it sprang up the Royal Order of the Wouff Hong, honorary "inner circle" of the League, which still conducts its mystical initiations, during League conventions, when the clock strikes midnight.

Regulatory Problems

Concurrently with the signing of the Armistice, Representative Alexander of Missouri, author of numerous prewar radio bills, introduced what was the strongest attempt made up to that time to give the Secretary of the Navy control of all radio in the United States. Hearings were held by the House Committee on Merchant Marine and Fisheries. Amateur radio rushed into the fray. At a meeting at the Engineers' Club in New York City on November 30, 1918, the old Board of Direction of the ARRL authorized Hiram Percy Maxim to attend the hearing on these bills, H.R. 13159 and S.5038. This he did, presenting a detailed and highly effective brief in opposition. A number of local clubs had representatives in attendance as well — Charles H. Stewart, representing the Wireless Association of Pennsylvania and others; Francis Hamilton, of the Hoosier Radio Club; Mr. Densham, of the South Jersey Radio Association; the Baltimore Radio Association; and thirteen-year-old

¹ More complete explanations of the Wouff Hong may be found in the following issues of *QST*, on page 9 in each case: May, 1953; June, 1955; February, 1961.



The money to buy QST from "The QST Publishing Co., Inc." was raised by loans from members, secured by ARRL Bonds. The bonds were issued in any amount from \$1 to \$200, and were for a one-year period, renewable at ARRL option for another year, and interest was paid at 5%. One hundred seventy-six staunch Leaguemans laid out an average of \$17 each, raising \$3000. (Four of the bonds went to the Chapman Printing Company, presumably postponing the payment of QST printing costs; these four totaled \$1,000.) Incidentally, 10 of the bonds, worth \$110, never were redeemed; a couple of these were lost but the other holders apparently valued the bond higher as a memento than they valued it as a cash reserve.

Joseph Heinrich of Washington, who made a fervent plea for the defeat of the bill.

Meanwhile, inspired by a "blue card" appeal sent by the ARRL to "Any member of the family of:" every amateur licensed at the outset of the war, pleading for assistance in this time of emergency, thousands of letters of protest from voters reached congressional sanctums. Where amateurs themselves were still in the service, members of their families wrote letters in their behalf. Many a shaky plea came from mothers whose sons had been killed in the war, asking for other mothers' sons the preservation of that which theirs could never more enjoy. It was the most effective gesture amateur radio had ever undertaken, and a powerful example of the united strength that could be brought to bear by courageous, concerted leadership. Simultaneously, Representatives Greene and Edmonds lent their vocal support on the floor and in the locker rooms; their opposition to military control of radio was staunch. The net result of all this effort was that the bill was not even reported out of committee.

The Board Meets

In February, 1919, the ARRL Board met again and listened to a report by General Manager Hebert on the affairs of the League, which had been held in abeyance since the last prewar meeting, April 21, 1917. This report stated that all memberships had lapsed, and that there was but \$33 in the treasury. It ended by recommending that, if the League were reorganized, a paid secretary be employed, and that QST should be purchased and operated by the League.

On the first of March the Board again met, and voted to reorganize the League. It also voted to purchase QST from its owner, Clarence D. Tuska. Since the purchase price of QST, including several months' unpaid printing bills, was about \$4700, and the

League had only \$33 in the treasury, the actual method of purchase seemed a bit obscure. A committee was appointed to devise a financing plan, and the Board adjourned until March 29th. The first action taken at this meeting was to draw up a new constitution. A new slate of officers was then elected, including Hiram Percy Maxim, President; R. H. G. Mathews, Vice-President; C. R. Runyon, Jr., Treasurer; Clarence D. Tuska, Secretary; and J. O. Smith, Traffic Manager. The last-named office was a new one created under the new constitution.

It was immediately decided to advise as many former League members as could be reached of the reorganization plans. Orders were given to the Secretary to print up a miniature four-page issue of QST and send it out. To defray the cost of publication, approximately a hundred dollars, the eleven men present — Victor Camp, H. L. Stanley, J. O. Smith, W. F. Browne, A. A. Hebert, K. B. Warner, R. H. G. Mathews, C. D. Tuska, H. P. Maxim, A. F. Clough, and H. E. Nichols — dug down into their pockets and in a few minutes had made up the fund.

When they met again, on the 16th, applications were beginning to come in. It was voted to resume regular publication of QST, and Lieutenant Kenneth B. Warner, formerly 9JT of Cairo, Ill., was elected the paid Secretary of the League, replacing C. D. Tuska, who stated that he would be rendered ineligible by reason of commercial connections, since he was entering the radio manufacturing business.

Meanwhile the amateurs of the country, mostly now released from the service, were straining at the leash, fretting at the five months of enforced inactivity following the Armistice. On April 12, 1919, the Navy Department, in whose hands had been placed the control of all radio communication for the duration of the war emergency, announced

that, effective that day, the ban on amateur receiving would be lifted; but that the restrictions on transmitting would continue in force until the President officially announced that a state of peace existed.

The instant this announcement was made public, thousands of amateurs throughout the nation rushed frantically up to long-deserted attics or down to musty basements where the old apparatus lay, intact under its seals, in cobwebby, dust-covered decay. Hastily it was brushed off; tenderly idolatrous fingers carried the individual units to old resting places; tremblingly, bell wire was stripped of its insulation and connections wired in place. The towering antenna of old, dismantled in 1917, was mourned for a bit, in silence; and then work started on a new network of wiring, to be strung gingerly aloft from tree or roof or mast. Hungering, codesick ears, sad in the nostalgia of two long weary silent years, absorbed in ecstatic reunion the roaring threnody of the commercial and government stations.

ARRL Bonds

There was still other work to be done, however. In early May the ARRL Board again met to consider the plan proposed by the finance committee. Briefly, this plan was to borrow \$7500 from former League members, issuing in return certificates of indebtedness payable in two years with interest at 5 per cent per annum. The proposal was approved. The purchase of QST was consummated. Secretary Warner was instructed to lay plans immediately for the first issue of the magazine.

Before the month ended, the first postwar issue of QST — dated June, 1919 — was out, printed with money loaned for the purpose by the printer himself, and the ARRL bond issue was advertised to the members. It was stated that, if the League were to continue, \$7500 must be subscribed by the membership. No security could be offered; the League had no assets. Yet there was hardly a man of all the old members of the League who did not do his bit, some with five dollars, some with five hundred, but all in the same true amateur spirit. The bond issue was almost completely subscribed, and the League went on.

Amateur radio without the right to transmit was a sorry body at best. Amateurs fumed, swore, and turned to the building of long-wave receivers for diversion. The Great Lakes Naval Station started the transmission of drill messages, in both coded and plain language, for reception by amateurs. But waiting grew increasingly irksome. The pages of QST were filled with discussions of the fascinating new possibility of vacuum-tube, or continuous-wave, transmission, an outgrowth of war experience. The Thor-

darson Company was offering a prize to the first ARRL member to transmit 1500 miles on spark.

It was patently the ARRL's first and most important job to get the ban on transmitting lifted. Months had passed since the termination of hostilities but transmitting was still prohibited. The League sent protests, appeals and entreaties to Washington, but month dragged after weary month with no results.

Instead, on July 24th, there appeared another threat. Secretary of the Navy Daniels wrote a long letter to the President of the Senate urging legislation which would give the Department a monopoly of all oceanic and international radio. The Navy still had not given up. As a result the Poindexter Bill, S.4038, was introduced. Concurrently, the Navy attempted to secure the adoption by the United States government of the 1919 Radio Protocol, an attempted revision of the 1912 London Radiotelegraphic Convention. Neither of these matters referred directly to amateur radio, of course; yet their intent was, to say the least, frankly dangerous. They were eventually frustrated by the combined American radio interests.

On August 1st the reopening of amateur transmitting stations was again postponed.

Supplement to QST for October 1919 (Vol. III, No. 3)

BAN OFF!

THE JOB IS DONE, AND THE A.R.R.L. DID IT

See next QST for details

23700-49

NAVY DEPARTMENT
NAVAL COMMUNICATIONS SERVICE
Office of the Director

Washington, Sept. 29, 1919.

Sir:

The Secretary of the Navy authorizes the announcement that, effective October 1, 1919, all restrictions on amateur and amateur radio stations are removed. This applies to amateur stations, technical and experimental stations of schools and colleges, and to all other stations except those used for the purpose of transmitting or receiving commercial traffic of any character, including the business of the

owners of the stations. The restrictions on stations handling commercial traffic, will remain in effect until the President announces that a state of peace exists.

Attention is invited to the fact that all licenses for transmitting stations have expired and that it will be necessary for the owners to apply to the Commissioner of Navigation, Department of Commerce, for new licenses. In so far as amateurs are concerned, radio resumes its pre-war status under the Department of Commerce.

Very respectfully,
(Signed) E. B. Woodworth,
Commander, U. S. Navy,
Assistant Director Naval Communications

COMING!

The Biggest Boom in Amateur Radio History.

AMATEURS: Order your apparatus and get your licenses!
MANUFACTURERS & DEALERS: Tell us what you have!
NON-SUBSCRIBERS: Get in your QST subscription
At Once - Immediately - To-day - Now!

WE'RE OFF!

The circular above is far from modest, but the ban on amateur transmitting was not lifted until Congress, at League request, ordered the Navy to remove the restrictions on the use and operation of amateur radio stations.

Secretary of the Navy Daniels was in Hawaii at the time; the pronouncement was made by Assistant Secretary Franklin D. Roosevelt. Interrogated by League officials and a member of Congress, Mr. Roosevelt stated that he did not know why the reopening had been postponed, but that the ban would be removed as soon as Mr. Daniels permitted, probably coincident with the proclamation of peace by the President.

It was obvious that, if there was to be action, it would have to be forced action. The Hon. Wm. S. Greene introduced a resolution, No. 291, which was referred to the House Committee on Merchant Marine and Fisheries, asking the Navy Department to explain why the transmitting ban had not been lifted. A month passed without result. Representative Greene then introduced H. J. Res. No. 217, which read,

"Joint Resolution, to direct the Secretary of the Navy to remove the restrictions on the use and operation of amateur radio stations throughout the United States. Resolved by the Senate and the House of Representatives of the United States of America in Congress assembled, that the Secretary of the Navy be, and he is hereby, directed to remove the restrictions now existing on the use and operation of amateur radio stations throughout the United States."

On Sept. 26th the Director of the Naval Communication Service announced the removal of all restrictions on radio amateurs and the resumption of authority by the Bureau of Navigation of the Department of Commerce.

Ban Off!

The ban was off! A wave of wild enthusiasm swept the country! A boom such as had never before been experienced in the radio game was under way. Manufacturers were hard put to supply apparatus fast enough. The assembly and reassembly of thousands of stations in all parts of the country was begun.

Even so, the resumption of amateur transmitting was not immediate. Two and one half years had elapsed since the Navy took over control. All amateur licenses had expired. First it was necessary to secure new licenses from the Bureau of Navigation. The Department being short of clerical help, still further delays seemed inevitable. With characteristic cooperation, however, temporary authorizations were provided, on which applicants were supplied with tentative calls in rotation, that permitted temporary operation; the actual licenses followed later when the clerical work could be completed.

Before November, 1919, was over, amateur radio was back on the air.

Sidelights, 1919

K. B. Warner made a strong plea for tube transmitters in amateur radio. "Radio Utopia . . . would be if all of us used c.w. as I can imagine no more feasible way of minimizing QRM than by having everyone's decrement approach zero." — *QST*, June, 1919 . . . The first clubs were affiliated with ARRL on December 5, 1919; these included the Milwaukee Radio Amateurs Club and the Houston Amateur Radio Club, both very much in business today — *January, 1920* . . . Navy began nightly transmission of weather, late news and a coded message from Great Lakes NAJ at 25 w.p.m. — *August, 1919* . . . An Honor Roll of amateurs who died during the war was proposed by the Editor; a list of eleven names was later run in the magazine — *QST*, August and December, 1919 . . . A member proposed that the "government appoint a capable operator in each small district to look after complaints and to see that no willful QRM exists in his locality." — *August, 1919* . . . In an editorial entitled, "Reforming the Squeak Box," *QST* asks for designs of "really scientific" spark coil sets which would meet the legal decrement and wavelength regulations — *September, 1919* . . . Canadians, off the air since August 1914, returned to the air on May 1, 1919. Any amateur within five miles of a government or commercial station or waterway was limited to a wavelength of 50 meters; within 25 miles, 100 meters; and within 75 miles, 150 meters. Power input at the transformer terminals was limited to $\frac{1}{2}$ kw. — *September, 1919* . . . A *QST* reader suggested that amateurs in the small towns could operate "an amateur press service," posting the news in a store, and forwarding the town's news, such as basketball scores, to the city papers. — *October, 1919* . . . Delays in actual issuance of station licenses were expected upon reopening; Radio Inspectors were therefore authorized to advise applicants what call letters they would eventually receive and permit them to operate using that call. Operators had to hold unexpired commercial license, or take either first- or second-class amateur examinations; 10 w.p.m. was required and the test questions had to be answered in full ("What you fail to say, you don't know.") The second class was available by mail only if you lived at least 50 miles away from the R.I. — *November, 1919* . . . A *QST* subscription contest was started, the winners to get their choice of gear from the *QST* advertisers. — *November, 1919*.

The Coming of C.W.

IN retrospect, it seems almost incredible that the methods of communication we employ today are based on a few concepts that were established fifty years ago, during those hectic first five years of ARRL's existence — the period from the League's beginning in 1914, through the World War I close-down, and ending with the reopening in 1919.

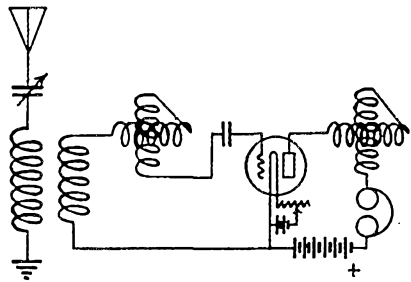
In the intervening years there have been many advances in technology; nevertheless, our receivers use the superheterodyne principle developed by Armstrong and his associates in France during the war; our phone transmitters operate on modulation principles clearly understood before the 1920s; and single sideband, the most spectacular post-World War II development in amateur communication, not only had been described publicly in 1915 but had been the subject of considerable experimentation by the time of the 1919 reopening. Even short waves had been used by the armies during the war, although mostly in an attempt to circumvent enemy interception. But there was a long road to be traveled before all these things could become a part of everyday amateur radio.

In 1919, amateur radio — and commercial radio, too — was starting from scratch in these new fields. In the main, suitable equipment not only was unavailable, it had not yet been invented. The war had stimulated development of vacuum tubes and, in the four-prong bayonet base, had even introduced an element of standardization. By now the importance of having a good vacuum in amplifier tubes was appreciated; some of the problems of operating amplifier stages in cascade had been overcome, at least partially, and the desirability of amplification at radio frequencies, before detection, was much talked about although nobody knew how to do it effectively. Progressive amateurs were itching to get going, instinct telling them there were great things ahead. But for a while nothing much happened; amateur radio started out, after the reopening, by picking up where it had left off at the close-down.

Little else could have been done at the time. Everything hinged on the vacuum tube, and there were only a couple of types of small receiving tubes to be had. The tube picture was much confused by patent fights and replete with warnings that only this or that manufacturer's type was legally usable by amateurs. Although continuous-wave transmission was urged by all forward-looking amateurs as the solution to DX and QRM problems, there were no power tubes. Nevertheless, there were some c.w. signals on the air very shortly after the reopening, thanks to a few fortunate ones who had their "channels". Mostly these were i.e.w. (interrupted continuous wave) transmitters — what we today call tone-modulated or A2 — because

the amateur of that day universally operated his regenerative receiver *below* the oscillating point, where it was most sensitive to spark signals.

But with these few exceptions, transmission immediately after the reopening was by spark. The DX records and the kind of everyday relay work that went on gives the present generation nothing to sniff at, considering the wavelength — 200 to 250 meters — and the power. Rather, it seems hard to believe, now, that such good work could be done with a method of transmission that spread its energy over so wide a spectrum. Nor can today's amateur appreciate what it meant to have one nearby station blot out *all* the spectrum available. Those, indeed, were the good old days!

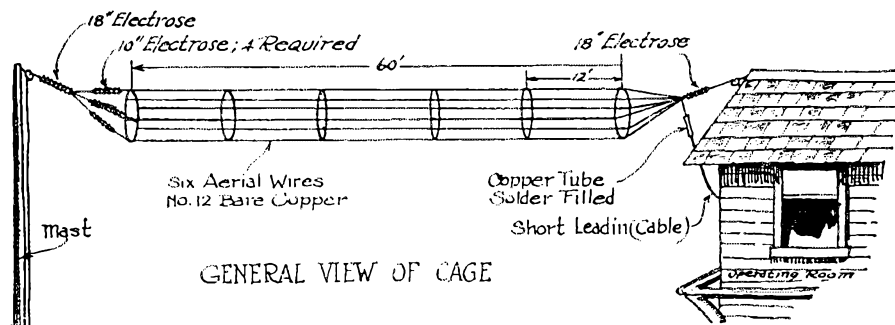


The top receiving circuit of the era immediately following World War I was the "two variometers and variocoupler" shown here. Most versions did not use the antenna series condenser but had a tapped primary on the coupler. Tuning range was approximately 150 to 600 meters. (From January 1920 QST)

C.W. on the Way

As much as anything, the QRM situation spurred interest in tube transmission. Of course, the fact that time and again a 50-watt c.w. set showed that it could do everything that a one-kilowatt spark set could do didn't hurt, either. Nevertheless, c.w. was approached with caution. Aside from the lack of tubes, other problems were visualized. It was seriously doubted that transmitters and receivers ever could be made stable enough at wavelengths as short as 200 meters to permit two-way working with "pure" c.w. Today this may seem funny, but consider the state of the art in 1919:

There were only triode tubes — not very good ones by modern standards, and short-lived at that. Neutralization had not yet been invented, and oscillator-amplifier transmitters were unheard of. Almost nothing was known about stabilizing the frequency of oscillators; the main problem was to keep them oscillating and to get them operating efficiently enough to put some power into the antenna. The principal tank circuit was the antenna system itself — a direct



The cage antenna attained prominence in the post-WW I period. This drawing is from an article on the cage by IAE in the October 1920 issue.

carry-over from spark transmission, where the antenna was the actual oscillating circuit.

Conditions were much the same in the c.w. receiver, which was invariably an oscillating regenerative detector tightly coupled to the antenna. In both the transmitter and receiver, the oscillating frequency was at the mercy of variations in antenna constants. The receiver, too, suffered from "body capacity" effects; having tuned in a pure c.w. signal, one had to become absolutely immobile and cease breathing in order to hold it. Long extensions on the tuning shafts were not uncommon on this account. Operators who didn't have them became adept at detuning the signal in such a way that when the hand was moved away from the receiver the beat note swooped down to audibility.

It was over a year — in December, 1920 — before the first transmitting tube was advertised in *QST*, and that merely a slightly overgrown receiving tube rated at up to 500 volts on the plate and a "capacity" of 12.5 watts. Yet there had been an appreciable swing to c.w. during that year, using such tubes as either were regularly available or could somehow be procured. Other c.w. equipment, such as inductances and power transformers, had made its appear-

ance. Attempts were being made at telephony, accompanied by the inevitable phonograph-record concert. Tube transmission was getting into position to give spark a good run for the money.

A Scientific Experiment

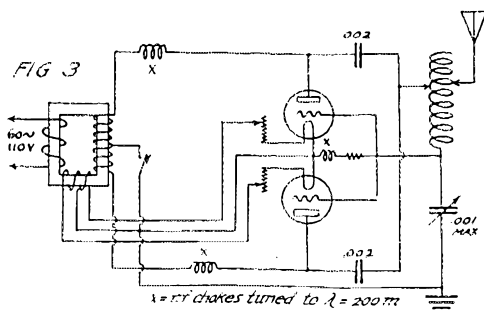
It was in this year, 1920, that the first concerted amateur effort along scientific lines was made — the famous fading tests conducted in a cooperative venture by ARRL and the Bureau of Standards. Sparked by a prominent prewar amateur, R. S. Kruse, at that time at the Bureau and later *QST*'s first technical editor, these tests were announced in June 1920 *QST* as a means, it was hoped, for uncovering some of the reasons for the variations in the signal strength of distant stations. Since the basis of the tests was scheduled transmissions by a few of the better stations while others kept logs of signal strength vagaries, cooperation on the part of the whole amateur body was imperative if the test signals were to be heard at a distance, without destructive QRM.

The fading tests were the forerunner of many such efforts by amateurs of later days, even to the present.

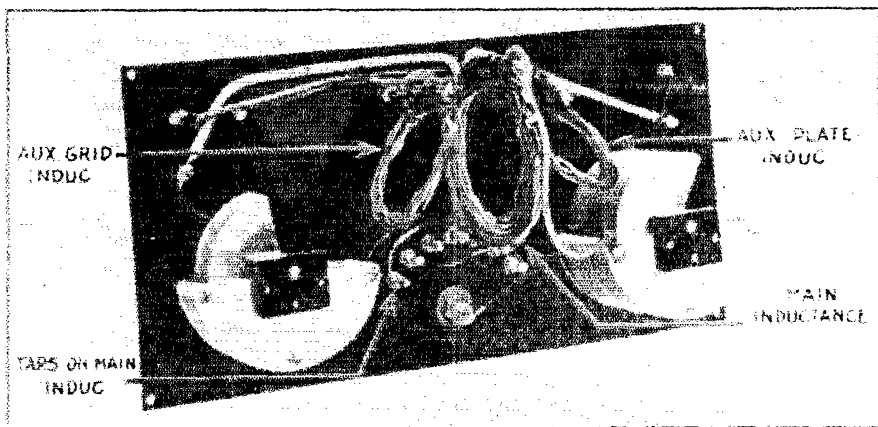
Power Supply

One of the problems of the era was power supply for the vacuum tubes. The indirectly-heated cathode was years away. There were attempts at using a.c. on receiving-tube filaments by connecting an adjustable center-tapped resistance across them, but these were not successful on sensitive detector tubes. Since most receiving tubes took about an ampere of filament current at around 5 volts, the standard heating source was a 6-volt storage battery. The plate supply was invariably a "B" battery, frequently home-assembled by soldering connections between a number of flashlight cells.

The transmitting power supply question was even worse, although here, at least, a.c. could be and was used on the filaments. The motor-generator was acknowledged to be the best for plate supply, but admittedly too expensive for most amateurs. There were a few center-tapped plate transformers, intended for full-wave tube



Back-to-back self-rectification in the c.w. transmitter. This was developed in a day when plate power supplies were expensive and components hard to get. Tubes oscillated alternately, one on each half of the supply cycle. Recognize the Colpitts circuit? (From December 1920 *QST*)



The inside of the original Reinartz tuner, introduced in June 1921 *QST*. This was probably the first receiver design made specifically for reception of amateur 200-meter c.w. signals.

rectification, giving voltages up to 350 or 400 per side. But if transmitting tubes were practically non-existent, where were tube rectifiers to come from?

The first solution was to put the raw a.c. on the plate. The 60-cycle modulation could be copied with a non-oscillating detector, which was at least a talking point, but as c.w. the signal didn't have the piercing quality of a real d.c. supply. It soon occurred to someone that *two* oscillator tubes could rectify and oscillate on alternate halves of the cycle, thus doubling the modulating frequency, and with the help of a filter choke the result would have some resemblance to a d.c.-generated signal. These back-to-back or self-rectifying sets were reasonably popular, but still, when phone was attempted, the hum over-rode the voice modulation that could be attained with the crude modulation methods then in use.

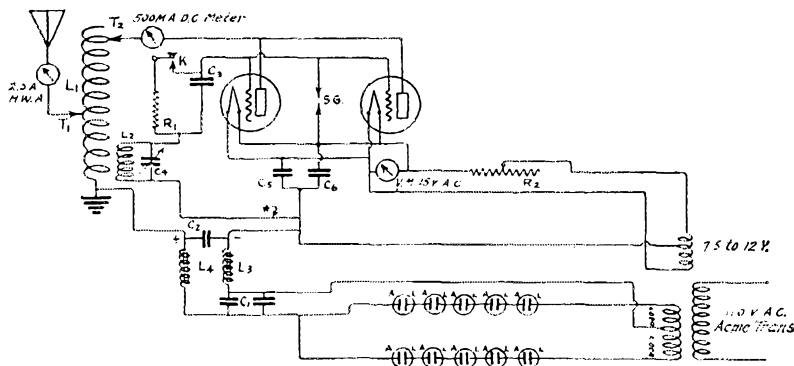
It was a happy day when Furlong, 1FF, reported in *QST* successful experiments with electrolytic rectifiers. Simply constructed with lead and aluminum strips in a borax or ammonium solution, the "slop-jar" rectifier almost

overnight became the standard method for getting d.c. for the plate supply. The characteristic messiness was taken in stride by a generation used to burning holes in rugs with the acid spray from storage batteries, and the chemical rectifier held a firm place in the amateur transmitting world for several years to come.

Transmitting Tubes at Last

The month of March, 1921, saw the first real power tubes put on the market. The UV-202 and UV-203, and a month or so later the UV-204, were greeted with open arms. Now c.w. was *really* on its way. Endless circuit variations for oscillators were tried, promoted, and often discarded. One described in *QST* by Whittier, 1DH, was among the most successful. Old timers will have no difficulty in recalling the "sure-fire c.w. circuit" — the reversed-feedback or reversed-tickler circuit, so called because the plate circuit was tuned and the tickler coil was connected to the grid, the reverse of the ordinary receiving arrangement.

By the end of 1921 only the most obtuse — or the most stubborn — could fail to see that the



The "sure-fire c.w. circuit," described by 1DH in July 1921 *QST*, gave impetus to tube transmission in the early Twenties. Strongly recommended by the Editor, tried and liked by numberless amateurs, QSL cards of the day frequently mentioned the "1DH circuit" as the transmitting arrangement in use. Power supply shown here makes use of lead/aluminum rectifiers.

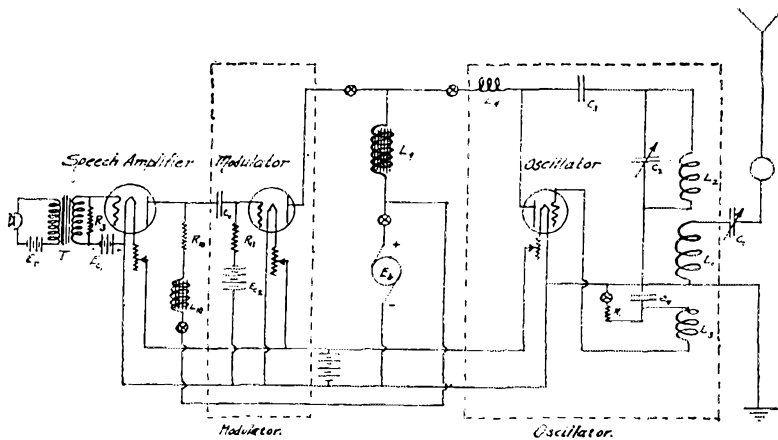


FIG. 14 - 200 Meter Constant Current Transmitter.

This constant-current phone circuit for 200-meter work was shown by the inventor of the modulation system, R.A. Heising, in a paper published in August 1921 *QST*. The oscillator circuit, a modification of the Meissner, is unusual for its time, inductive coupling to the antenna being a rarity in early amateur c.w. transmitters.

days of spark were limited. But spark was far from dead; indeed, this was its heyday. Its supreme achievement was yet to come.

In December of 1921 Paul Godley left for Ardrossan, Scotland where he was to set up a receiving station for the transatlantic test scheduled for the next year. The U. S. had already been spanned; amateur signals were being heard over long distances at sea by ship operators who were also amateurs when on shore. Why shouldn't we get all the way across?—especially if the

receiving were done by an American amateur used to our equipment and ways of working.

Although this part of our story ends here, history records that the first American signal Godley heard was a spark. It was not the only one. But the superiority of c.w. showed so overwhelmingly in the tests that spark's greatest moment was also the beginning of its descent to oblivion. The transition period was nearing its end. A new kind of amateur radio was on the verge of taking over.

King Spark: Crescendo and Diminuendo

GENERAL Sherman's well known description of war is tragically accurate. Yet, during the Hell of World War I developments in radio were greatly accelerated. This was to be reflected later in the advertising pages of *QST*, when tube transmitters began to come into their own, although commencing in June 1919, the Reopening Number, the ads were much like those in 1916 and 1917. "We're Off Again" "Open for Business." "All Amateurs will Celebrate Opening Night. Will Your Station be Ready?" were advertising headlines obviously written with the idea of doing business as before.

Through the October issue advertising was for receiving apparatus, but with the announcement in the Liberty Number, November 1919, that the transmitting ban was off, ads on transmitting equipment began to build up slowly. Spark was King and it's doubtful that even the most prophetic foresaw the inevitable abdication. How-

ever, a few signs were there. The Marconi Wireless ad on the Marconi V. T. "the only vacuum tube which Amateurs can use" mentioned continuous wave transmission. De Forest's November advertisement featured a Wireless Telephone, probably the first complete tube transmitter advertised for amateur use.

One piece of copy that is intriguing is on the Western Electric VT-1, "sold only for uses other than transmission or reception of messages!" Sounds like "Do not connect wire A to Point B or you may make the tube oscillate" patent-dodging idea of later days.

An indication of the many patent fights to come was advertising copy by RCA/Marconi and Audiotron Sales Co. "A Warning," shouts the former, "The Audiotron . . . not licensed under the Fleming patent. Do not take chances . . ." while Audiotron declares, "The Audio Tron is . . . licensed under De Forest patents."

Immediately after the war not many *QST* advertisers said anything about tube transmission. The handful of amateurs experimenting with c.w. used an a.c. motor-d.c. generator combination for supplying plate voltage to the tube, but a small ad in *QST* for April 1920 announced a new device that was to supplant the m.g. and remain in widespread use to the present day — the high voltage vacuum tube rectifier. This early one was called the Electrodyne.

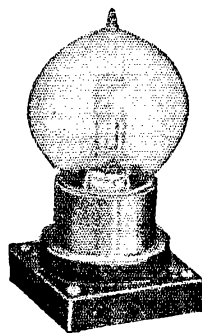
In 1920 a few companies began to cater to the small group of amateurs struggling with the newer method of transmitting. Tuska inductances were advertised in October. In the same month Chicago Radio predicted that "c.w. transmitters would be adopted by all progressive amateurs during the coming season" and offered an instruction sheet and blue print for a c.w. circuit. Acme boasted in October that the company name was becoming synonymous with c.w. The-A-P Transmitting Tube was announced in December. Two manufacturers, Radioland and de Forest, advertised complete Radiophones, de Forest's portable unit being shown in September.

Perhaps the most influential ad in putting amateurs on c.w. was the RCA announcement in December 1920 of the UV 201, which "... may be used for Detection and for Radio and Audio Amplification." It didn't take the boys long to find that the UV 201 was a good low power transmitting tube.

Two pieces of equipment that are still with us came out in 1920. The Cootie Key made its entry in June. Under the generic name of Sideswiper it is still popular, especially with French hams, and its sophisticated successor controls many an electronic keyer. Baldy phones appeared in December. John Firth and Company had started to advertise the famous mica diaphragm phones before the war, but the name Baldwin or Baldy had not been used.

There was a "Tremendous Demand for Wire-

NEW ELECTRODYNE



RECTIFIER TUBE

These tubes are used, generally in pairs, for rectifying commercial alternating current for supplying the plate circuits of Radio Telephone and C.W. Telegraph radio power tubes. They make

Motor Generator Unnecessary

These tubes will rectify up to 500 volts and carry 30 milliamperes each, normally, sufficient for most purposes.

Price, \$7.00 each.

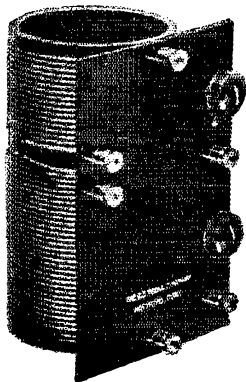
Good delivery from stock.

Send at once for illustrated circular No. 14.

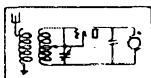
WIRELESS EQUIPMENT CO., Inc.
188-190 Greenwich St., New York, N. Y.

less Operators" as one radio school put it. Many a good ham-to-be served on shipboard. Eastern Radio Institute, Dodge's Institute and Massachusetts Radio and Telegraph School were among the first to use the advertising pages of *QST*. "Positions Guaranteed" declared one. "Wireless Telegraphy Pays Big Money" screamed another school.

TUSKA "C.W." INDUCTANCES



TUSKA C.W. INDUCTANCE—Type 182. This

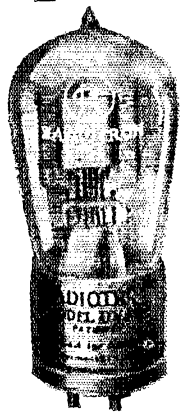


inductance is designed for the electromagnetic circuit shown. The aerial and filament connections are variable by means of a positive contact switch lever. The winding is threaded in Bakelite tube $3\frac{3}{4}$ " in diameter by $7\frac{1}{4}$ " high. Bakelite panel $4\frac{3}{4}$ " x $7\frac{1}{4}$ ". Wave length range 200 to 325 meters. Shipping weight 2 lbs.

Price - - \$10.00

RADIOTRONS VACUUM TUBES *for* Amateur or Experimental Use

THE facilities and resources of the world-famous RESEARCH LABORATORIES of the General Electric Company have been concentrated upon the development and design of a new series of VACUUM TUBES for Radio Detection and Amplification. The RADIO CORPORATION OF AMERICA now offers to the Wireless Experimenter two distinct types, each adapted to a particular field of usage.



List Price \$5.00

RADIOTRON U. V. 200, The first of the series, is a Detector and Audio Frequency Amplifier of unusual capabilities, which operates from a single standard plate battery. Best detector action occurs at plate voltages between 18 and 22½ volts, with a filament current of approximately 1 ampere, and with a grid condenser and grid leak. U. V. 200 is particularly adapted to amateur regenerative circuits. A trial in such circuits will be the most convincing.

At the end of 1920 advertising of Thordarson and Acme spark transformers; Dubilier condensers; Wireless Mfg., Benwood, Bell, Signal, Franklin and Mesco gaps was still going strong. A new decimeter (What was a decimeter, Dad?), the Doolittle, was announced for "Amateur Wavelengths" in September.

Other new manufacturers' names like Burgess, Amrad, Conn. Tel and Electric, Rawson, Jewell and Continental Fibre entered the advertising columns of *QST*. A few of the stores were Atlantic Radio, Tresco Sales, Patent, Atlantic & Pacific

Radio Supplies.

Spark advertising reached its peak in 1921 with names like Benwood, Karlowa, Ray-Di-Co, Wilcox, Radio Supply, Saginaw, Chicago Radio Lab in *QST*. But the vacuum tube had struck the fatal blow to the music of spark. The treble of the 500-cycle rotary synes, the middle and bass of the 60-cycle rotaries — crescendo, diminuendo, death.

At the end of 1921 Benwood was advertising a complete wireless telephone and Karlowa listed a page of c.w. components and said, "From coast to coast a chain of c.w. stations will ultimately carry the relay work." An early ad, March 1921, by Federal Tel and Tel talked about a "really good microphone." RCA brought out the UV 202, the UV 203 and the UV 204 in April; in May the RCA Kenotron rectifiers UV 216 and UV 217 appeared. A-P's rectifier tube came out in May.

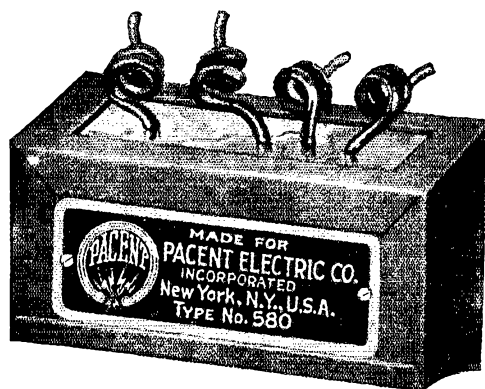
The change to c.w. was now accelerating. Thordarson advised, significantly, in November: "Change over your (Thordarson) spark transformers to high voltage c.w. transformers" and offered to furnish replacement secondary coils.

Amateur receiver and component advertising continued strong. Westinghouse and RCA came out with amateur receivers. Winkler, Standard Assembly and Tuska were among the first kit manufacturers. In September of 1921 Grobe's "Gentlemen, Meet Doctor Mu!" started one of *QST*'s best known receiver advertising campaigns.

Postwar circulation of *QST* was increasing. A page of advertising in 1921 cost \$60. QST

DUBILIER C W CONDENSER

Type No. 580





25 Years Ago

this month

March 1939

The editorial and the lead article of March 1939 *QST* both accented the ARRL Safety Campaign. The League was also offering \$25 for the best safety slogan submitted by a reader. The result of this contest was, of course, the now-familiar "Switch to Safety."

... W9PLM wrote about his modern band-switching superhet, which featured such ahead-of-the-times items as an acorn-tube preselector, and a clock (for \$85?).

... W1HRX described a 100-watt amplifier about as big as the palm of his hand, W1LJI a two-tube transmitter which used odd harmonics as well as even (result: five bands), W7DTJ wrote about his portable transmitter-receiver, W5EOW about a bidirectional beam built from bamboo fish poles and a barn door hinge, and W2IDV featured a five-meter transmitter with stability which satisfied 1939's rigid new regulations.

... Other technical articles were about an electrostatic deflection kinescope unit for television receivers, new ideas in v.t. voltmeter design, and checking frequency accuracy.

... And "Ohmite News" was credited with a valuable tip for DXers: "If you want to hear better, get your head X-rayed. X-ray operators have noted that persons whose heads were X-rayed often showed a temporary improvement in hearing." QST

Irving Vermilya, W1ZE

It is with deep regret that we record the passing of Irving Vermilya, W1ZE, who took his own life at the age of 73 on January 30. Considered by many to be Amateur Number One, his interest in wireless was sparked in 1901 by the acquisition of a coherer from Marconi through the auspices of a mutual friend, a priest. He followed wireless all his life, and was at one time manager of the famous spark station WCC at South Wellfleet, Cape Cod, whose signals were used for code practice by many an oldtimer. He believed in the use of plenty of power and large antennas, and his crashing spark at HIAA will be remembered by many. He kept up his operation to the last in spite of rapidly failing eyesight and poor health. His passing severs a link with the earliest days of amateur radio.

MEMBERSHIP CHANGES OF ADDRESS

Four weeks' notice is required to effect change of address. When notifying, please give old as well as new address. Advise promptly so that you will receive every issue of *QST* without interruption.

Silent Keys

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

- W1BBB, Albert M. Harmon, Westbrook, Me.
- W1BIC, Ernest E. McAviney, East Haven, Conn.
- W1HL, Francis A. Bourse, Chatham, Mass.
- W1JPM, Henry A. White, Westfield, Mass.
- W1JS, Walter J. Furlong, Newton, Mass.
- K1NHE, Harold Davidson, Milton, Mass.
- W1QJD, Walter C. Foster, Lynn, Mass.
- W1ZE, Irving Vermilya, Mattapoisett, Mass.
- W2BRX, Charles J. Yopp, Wanamassa, N.J.
- WA2CNY, Edward F. Bergman, Plainfield, N.J.
- K2IG, E. Dillon Smith, Levittown, N.J.
- W2LGR, Marvin C. Lane, Avenel, N.J.
- W2OEM, James L. Fluck, Pitman, N.J.
- W2PTN, Carl D. Hubbard, Tully, N.Y.
- W2YY, Lucius O. Adams, Horseheads, N.Y.
- W3BH, Donald E. Riggs, Canton, Pa.
- W3BLL, Hubert E. Warner, Towson, Md.
- W3HAD, Emil J. Berger, Sr., Lansdale, Pa.
- W3KPP, Robert H. McEague, Sewickley, Pa.
- K4GCK, Ina A. Settle, Atlanta, Ga.
- W4G4, David C. Woods, Richmond, Va.
- W4GLN, George D. Tomberlin, Montgomery, Ala.
- W4PLZ, Earl E. Cline, Sr., Chattanooga, Tenn.
- W4SKT, Andrew J. Baker, Hermitage, Tenn.
- W4SZL, Gordon D. Cheek, Jackson, Tenn.
- W4TLW, John E. Hamilton, Portsmouth, Va.
- W4UWF, Flavius L. Warford, Sr., High Point, N.C.
- W5EGE, Ely Primeaux, Alexandria, La.
- W5GKG, Menford R. Sims, Seminole, Okla.
- WA6AMZ, William R. Barnes, Los Angeles, Calif.
- ex-W6ENM, Allison L. Smith, San Francisco, Calif.
- WB6FLV, Kenneth E. Nevens, Santa Monica, Calif.

- Calif.
- W6GQY, Timothy V. Conroy, Fortuna, Calif.
- W6HFS, Harry E. Christenson, Ventura, Calif.
- K6HZN, Robert M. Roberson, Oakland, Calif.
- W6JZJ, Frank J. Czenkus, Inverness, Calif.
- W6KTZ, Ray W. Williamson, Rosemead, Calif.
- W6LFZ, Edwin C. Fichtner, Burlingame, Calif.
- WA6LHY, Dorothy M. Van Arman, Herlong, Calif.
- WA6OTE, Irving S. Best, San Francisco, Calif.
- WA6UEN, Tom H. Van Dyne, Bakerfield, Calif.
- W6YI/W6OCH, Larry J. Barton, San Leandro, Calif.
- W7HFC, Thomas P. Carson, Seattle, Wash.
- W7NAW, Frank Miller, Billings, Mont.
- W8ARF, Joseph L. Romstadt, Sr., Toledo, Ohio
- W8AZF, Harry L. Harter, Akron, Ohio
- K8CEL, Hugh L. Wehrly, Dayton, Ohio
- K8DEI, Sherwood F. Anderson, Cincinnati, Ohio
- W8EGV, Roy E. Pate, Ashland, Ohio
- ex-W8GIC, Paul H. Hilt, Miamisburg, Ohio
- W8JNF, William B. Davis, Cleveland, Ohio
- WN8KGB, Denis H. Vingo, Cuyahoga Falls, Ohio
- W8ONT, Claude E. Bodey, Sr., Bellevue, Ohio
- W8ZZC, Max H. Watkins, Cleveland, Ohio
- W9ICJ, John S. Kral, Chicago, Ill.
- W9LLP, Errol A. Gifford, Champaign, Ill.
- W9PYE, Quentin N. Mitchell, Madison, Wis.
- W9SFF, George E. Wernett, Cicero, Ill.
- W9VNV, Charles E. Mitten, Indianapolis, Ind.
- W9YUC, Frank W. McDonnell, Park Ridge, Ill.
- W0AZC, Henry H. Beaver, Fremont, Nebr.
- W0CC, Urban L. Lynch, Grand Island, Nebr.
- W0DSB, Samuel L. Maynard, Englewood, Colo.
- WA0GIO, Ralph L. Armstrong, Bowling Green, Mo.
- W0LZY, Elmer O. Hamilton, Colorado Springs, Colo.
- K0PVL, Norman N. Kahler, Sioux Falls, S.Dak.
- K1H6PD, Ray H. Westfall, Kailua, Oahu, Hawaii
- PA0HG, W. Van Heeren, Gouda, The Netherlands
- VE1WV, W. R. Christoffersen, Guysborough, N.S., Canada
- VE3AMU, Charles F. Venn, Sault Ste. Marie, Ont., Canada
- VE3MIN, A. J. O'Donnell, Toronto, Ont., Canada
- VE7ABJ, Alfred K. Mathier, Victoria, B.C., Canada



Correspondence From Members -

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

MINUS 75 METERS

☐ I would like to report herein the results of my recent experiments in a heretofore unexplored region of electronics. The germ of the idea struck me as I was staring morosely at one of the i.f. cans in my recently retired receiver kit. The facts concerning frequency conversion in a superhet are well-known to all of us. But it occurred to me that perhaps we had ignored one facet of the theory. As an example, consider tuning a BCB receiver to 1000 kc. In the superhet circuit, the local oscillator would be automatically tuned to 1455 kc. in order to produce an i.f. frequency of 455 kc.

Idly I put down all combinations of these two mixing frequencies, 1000 and 1455. (1000 kc. plus 1455, 1455-1000, and 1000-1455). This last seemed to present some puzzles. What was -455 kc.? By further study I succeeded in winding an i.f. transformer for -455 kc. and put it in my BCB receiver. Eureka! There was no output except hum and occasional bursts of static!! I had discovered a new band with no QRM!

I am now in the process of building a kw. s.s.b transmitter for the 75-meter band. I hope that readers will begin construction on their own negative-band transmitters, so I will be able to make contacts. So far the band has been dead.

To wind transformers for negative frequencies, just wind one coil in the normal manner, then wind the other on the same coil form but in the opposite direction. — *Dave Bartley, WNSKOY, Muskegon, Michigan*

GOOD NEIGHBORS

☐ For about six or seven years I have been writing and contacting a fellow ham in Ireland and finally had the great pleasure of meeting him in person for a few days last summer when I went over. We really got to know one another and I have, as it were, adopted him. I send him whatever I think he can use and whatever may be of value.

I would like to see a national movement of this type where every U.S. ham seriously adopts one overseas ham and gets to know him as much as humanly possible through QSOs and letters, and help him as much as he can. The degrees will vary of course.

Wouldn't this truly bring about more brotherhood than this 599 cul QSO such as I went thru getting 280 pasteboards that mean absolutely nothing when you come right down to it? — *Ted E. Dames, W2KWW, Arlington, New Jersey*

AGE LIMIT LICENSES?

☐ I feel that it is a vast mistake to encourage children to aim for a license, and I define a child as one under at least 18 years of age. As a college instructor who works day-in and day-out with 18-year-olds, I can state that they are on the bare threshold of maturity. I see no reason why children should be allowed to clutter the frequencies with childish chatter.

We have an age limit for voting, why not for ham radio? — *Jerome S. Miller, W8IDP, Grand Rapids, Michigan*

WE NOT THEY

☐ I have never before noticed that the ARRL is the kind of organization that I like to belong to. This may be because I was never as active as I am at this time. Yes, it took a League appointment to show me the kind of organization I have helped to support throughout the years. I support it, I am proud of it and I will continue to support it.

The ARRL has undergone a change; I sense it in *QST* and in the *CD* Bulletins. It is my opinion that the change is for the better. I see a new and forceful approach to OUR problems and gentlemen, my hat goes off to you. For once we are shaking up some of our fraternity. This is good for us all. I hope to see this procedure continue (not through a feeling of sadism but rather, one of reincarnation). Our hobby needs good leadership and (at this time) some strong incentive. Even if OUR proposal does not go through, some brows have been raised and some commotion made. There will soon be a smooth and non-crippling change. Incentive Licensing is "preventive medicine." — *James S. Mortellaro, K2SPG, Bronx, New York*

ENLIGHTENED DX CODE

☐ It seems, all of a sudden, that you and the rest of the staff at headquarters are way off base in your DX operating code. I hope you get up to date on the latest way of operating DX. We're in the twentieth century now and so your code is obsolete.

The new code is:

- 1) Call DX whenever you hear him, disregard his present situation, because you're all important to him.
- 2) a. Get on his frequency and call, call, and call.
b. *KV*, *AE*, and *CL* are just things made up by obsolete ARRL so if a DX station sends them, just disregard it and call, call, call.
c. Always call on his exact frequency even if it's out of band; the FCC and the DX station appreciate that type of operation.
d. Disregard his directional CQ if you are out of the limits. They are not as important as you anyway.
- 3) Disregard his instructions to you; he is nuts and doesn't know what he is talking about.
- 4) Don't give him an honest report; make it good or he won't send you a QSL.
- 5) Keep the signal and procedures sloppy. They sound so good to him it never fails to make a good impression.
- 6) Always call CQ DX over and over again, never listen, because you just might hear one calling CQ too.
- 7) Always ask him to listen for your friends. He likes to do this for you because you are such a good operator and person to talk with.

(Continued on page 156)

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* WINJMJ

A BASIC rule of thumb in public service operating organization is "keep it simple." If this rule is not followed, too many amateurs will throw up their hands, say it is too complicated, and turn to other operating interests. Recently we received a letter (a gross understatement: we receive thousands of letters!) criticizing us (in a nice way, of course) for complicating our operating procedures with new prosigns and detailed instructions regarding their use.

It is true that anything can be simplified, but over-simplification of complicated things often leaves only a misleading hint of the real considerations involved. Take Einstein's theory, for example. In its simplest form, $E = MC^2$, it can be stated in simple words that nearly anyone can understand. But any such statement leaves out the many complex ramifications of its significance and applications which are understood only by physicists and mathematicians.

In a broadly analogous way, the same can be said of public service operating organization; it is basically a simple matter of getting organized to perform a communications service in emergencies and handle written messages on a regular basis, and in general this is done by copying what is sent to you accurately and passing it along exactly as received to another station or to the addressee. Nothing to it.

In actual fact, however, it is just not practical to make the operation of all public service nets simple enough so that any amateur can break into any net any time.

The National Traffic System, traffic division of ARPS, has nets at four levels, known as local, section, region and area. These are described in detail in a publication known as CD-24, available for the asking from the ARRL Communications Department. Most of the local nets are phone nets, many of them on v.h.f. At section level, still pretty basic, you have about an equal number of phone and c.w. nets. When you get to region level, operation is all c.w. and begins to get pretty educated; it *has* to, if all the traffic is to be cleared. There are only three area nets, and operation at this level is swift, snappy, curt; these are the real "pros" of the amateur service. For a beginner in record traffic handling to try to work in an area net would be sheer folly. Not only would he be completely snowed under, but he would disrupt the net to such an extent that its efficiency would suffer irreparable damage for that session. It would be like throwing a grade school pupil into a college class and expecting the entire class to sit by while the new pupil is brought up to their

level before further progress can be made.

This is not a matter of snobbery, but of consideration for practical training levels and proficiencies which are common practice in the pursuit of any art or science. It is not unusual for an amateur who doesn't know the ropes to break into a region or area net session, and then have one of two things always happen: either he gets a fast QNX from the net control (a very harrassed individual), or net operation slows down to a crawl while he is nursed along and his traffic cleared.

Participation in nets at the proper proficiency level is a necessary part of each public service operator's training. But you cannot acquire proficiency by reading books, or even by listening; you have to *participate*, get in their and *try*, and soon you will find yourself enjoying the greatest self-satisfaction (call it fun, if you prefer that term) of all — knowing that you are doing something that is at once both useful and skillful, and that you are contributing to the public service record of the amateur fraternity.

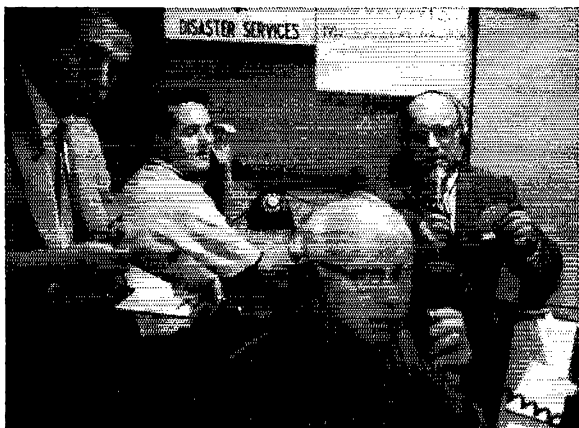
Diary of the AREC

This is late being reported, but on Mar. 5, 1963, a tornado touched down at Bessemer and at Lipscomb, Ala., and W4s EOH and DFE were called by authorities of the Red Cross and civil defense. At 1530 local time the emergency net on 2 meters was called into emergency session. From then until late that evening the net stayed in session handling command traffic for the Red Cross. The e.d. bus got to Bessemer from Birmingham at 1600 and acted as a coordinating center for emergency traffic. Mobiles were provided by W4s ATE ORX DEO GET, K4s NST AAU; they also helped man the bus. K4DSO was net control for the mobiles, passing command traffic into the Red Cross



When it comes to handling traffic in large gobs, Lloyd Peek, W7BA, has few peers. First licensed in 1913, Lloyd has been in the BPL column 145 consecutive times, usually near the top of the list. He is ORS and OPS and has three Public Service Edison Award citations. You might run into Lloyd any time, on any band, doing what he loves best — providing a swift, efficient point-to-point circuit for amateur traffic.

* National Emergency Coordinator.



On Dec. 15, the San Diego Red Cross Emergency Communications Center was operated for the benefit of the county medical society "Eye Bank" drive. Mobile operations on 75 and 10 meters were coordinated from club station W6VMS, operated by (l. to r.) K6SCK, K6KTP, W6LTF and W6FOP.

trouble. Fortunately, W9LJY was still monitoring the frequency, but by now W0VZL's battery was so low that W9LJY could hear only his carrier; thus, it became necessary to switch to c.w., using the push-to-talk button as a key. All further communications were conducted by this mode with no difficulty, and within an hour everyone was safely back in Madison. Moral: know the code, put a key jack in your mobile rig and carry a key. — W9VZL.

— * * * —

Chapter in Birmingham requesting supplies, personnel, etc. The Birmingham Red Cross station was operated by W4LEM, K4s PZH IQF and KDE. Many other fixed stations were alerted and stood by in case of need. K4s AOZ and APF acted as liaison stations to the National Traffic System. K4s HAL and TKC manned the Birmingham Amateur Radio Club station. Most of the welfare traffic was handled on six meters. K4HAG acted as liaison between six and two, assisted by K4DSO for relay work back to Birmingham. Alabama Emergency Net "O" was called into session and stood by in a support role. There was no loss of life but considerable damage to property and communications. — W4EOH, EC J. Berson County, Ala.

During a pre-Christmas snowstorm in the Baltimore, Md., area on Dec. 23, the Baltimore Area AREC was alerted at 1500Z and started issuing reports to a number of agencies, such as the State Roads Commission, the Police Dept. and broadcast stations, including such information as power failures, traffic tie-ups, road conditions and changing weather conditions. At 1900Z the emergency net was put on full operation as snow accumulated. Four stations were mobile, giving on-the-scene reports from main arteries and secondary roads throughout the city and county. A total of 28 stations participated, with five different stations acting as net control during the 10½ period of operation. The net closed at 0130Z officially, but stations stood by for many hours afterward. The AREC had an exclusive hook-up to the WCAO news room during this operation. Amateurs participating: K3s EVI LBJ OGS OWX QOK RGB RGD RKU RNM RQH SCD SVC TAZ TKI TQN TZK UBN UQU VBD VJY VGX VPZ VVM YLG, W3s DTM NAE, RKK, K2KFF/3. — K3SGD, EC Baltimore Area, Md.

— * * * —

At midnight local time, Nov. 9, EC VE3ECA was notified by the Ontario provincial police of a man lost in a very dense section of forest not far from Port Arthur, Ont. By daylight, c.d. station VE3ZCD from Port William was on the air, operated by VE3EEN. In Port Arthur, 75 meters was monitored by VE3ANP. At the base camp 18 miles from Port Arthur, VE3AYZ mobile was on the air, with VE3ECU mobile stationed at the half way point to relay, if needed; this operator also helped operate VE3ZCD later. VE3AVS mobile developed dynamotor trouble and also returned to help operate VE3ZCD. By 1820 EST, the group was prepared to operate the following day, but at 1830 a report came in that the lost man had been found. Amateurs of this AREC group are trained in this type of work with the local Search and Rescue Unit. — VE3ECA, EC Port Arthur-Port William, Ont.

Near noon on Dec. 26, melting snow caused the lead shield on an underground telephone cable near Memphis, Tenn., to break, allowing water to enter and disrupt telephone service to an area encompassing four important hospitals. The AREC was alerted at 1300 local time, and emergency portables and mobiles were sent to the hospitals. EC K4FZJ and SEC W4WBK operated from the Red Cross radio room, later assisted by Assistant EC W4OQI and K4JZS. Starting out on two meters, the operation was shifted to six with W44RX in charge from Red Cross amateur station W48EU. Also participating "in the front lines" were K4s PZJ PPN ENA CPM, W4s DLV ZNV, W44s KOG PWV PNQ ISC RPP HBY LSV. Assisting with relays were K4KZF, W44s DPJ IQC FSR LSX and PTD. — K4FZJ, EC Shelby County, Tenn.

On Nov. 29 a commercial jet airplane crashed in St. Therese, Que. Upon hearing of the disaster, EC VE2AUU and a neighbor immediately drove to investigate any possible needs for communications, meanwhile establishing contact with VE2s PY and WY on 75 meters. Upon arrival, the Montreal c.d. director, via VE2QC, requested that VE2AUU remain on the scene to supply communications between the disaster area and other points. Seven hand-carried units were also obtained from a local electronics dealer and delivered to the disaster scene with police escort. Amateurs operating these units included VE2s OC ANQ AKK BMK SC and K1DNX. VE2AZF operated a fixed station in Montreal, 20 miles distant, and was able to maintain contact with the hand-carried units and provide direct contact. The net thus set up was most valuable in view of the swamp area conditions aggravated by heavy rain. Air line and c.d. officials expressed their appreciation for the efforts of the amateurs, and the entire operation was considered a great success. — VE2AUU, EC Montreal and Ile Jesus, Que.

NATIONAL CALLING AND EMERGENCY FREQUENCIES (KC.)

3550	3875	7100	7250
14,050	14,225	21,050	21,400
28,100	29,640	50,550	145,350

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

The following are the National Calling and Emergency Frequencies for Canada: c.w. — 3535, 7050, 14,060; phone — 3765, 14,160, 28,250 kc.

While driving to Milwaukee on Dec. 14, with the temperature hovering around 0°, engine trouble forced W0VZL mobile to leave the road just east of Madison. He called for help on 29,620 and was immediately answered by W9LJY in Madison, who made all the necessary towing arrangements. While the disabled car was being towed back to town, however, the tow truck itself developed engine

Houston amateurs responded quickly to a call for a rare type of blood to save the life of a 15-year-old boy suffering from leukemia. The boy's mother appealed to K5KZQ to assist and a call went out on the air. Within 20 minutes, donors were at the hospital, and 17 pints of blood were donated while twenty additional donors stood by in case more was needed. This apparently saved the life of the unfortunate victim.

On Jan. 13, the Baltimore Area AREC was again activated for a snowstorm emergency, at 1200Z. Minutes after the net was activated several accident reports were relayed to the Maryland State Police and the Baltimore County Police Department. By 1400Z the BAAREC was issuing regular reports on road conditions and traffic tie-ups to broadcast stations; these reports were taped over the landline and played on the air. By 1700Z the condition had become serious. Three mobiles were on frequency giving road condition and accident reports from main roads throughout the area, and four stations acted as net controls during the 13-hour period of operation. A total of 32 stations participated, including K3s IYJ IZK MJI, OGS QWX QCE QOK RGB RKU RNM SGD SOZ TAZ TKI TQN UBN UOD VBD VBE VJY VVM VPZ WIT WKY YLG, W3s CDI DTN PKC YZL, WA9ENO/3, K2KFF, 3. The net was closed at 0105Z, but stations stood by until midnight. — K3SGD, EC Baltimore Area, Md.

At 0700 EST Nov. 30, KITPK, deputy SEC and operations officer of the R.I. AREC received a request for mobiles from Portsmouth Red Cross. Three mobiles proceeded to the Island Park section of Portsmouth to stand by and patrol the shore line as heavy rains caused flooding and raised the possibility of evacuation proceedings. KITPK mobile proceeded to Portsmouth Police Headquarters and maintained contact with the mobiles. The water receded and no evacuation was necessary and operation was secured at 0900. The group was alerted again at high tide in the evening, but no emergency situation developed. — W1YNE, Rhode Island.

On Dec. 24 at 0214Z, W1YNE interrupted casual operation of the R.I. AREC Net on 51 Mc. to notify Deputy SEC KITPK of heavy snow warnings issued by the U.S. Weather Bureau at Warwick. The frequency was cleared and a communications watch was established, consisting of stations from the north, east and west areas of the state. Storm conditions were reported to the SEC at various intervals. No losses of power or landline facilities were reported, and operations were suspended at 1200Z. — W1YNE, SEC Rhode Island.

We received thirty-eight SEC reports for November, representing 18,800 AREC members, the same number of reports as last year but more than a 2000 increase in AREC members represented. From a terrific start this year, SEC reporting has tapered slightly, when it ought to be going up. Sections reporting: Del., E. Mass., S. Texas, Ark., Alberta, Ohio, Ind., Ariz., Va., E. Fla., N.C., Mich., N. Texas, N. Dak., Nev., Okla., Maine, E. Bay, W. Fla., Mo., Ore., Colo., Wash., Ala., Utah, Minn., Tenn., S. Dak., N.N.J., Iowa, NYC-LI, SCV, Kans., W. Pa., Ont., E. Pa., Sac. V., R.I.

RACES News

The Pettis County (Mo.) RACES Network is presently participating in a series of drills which are designed to develop maximum capabilities of each station and operator.



The operator receives instructions by sealed mail and is given a particular type of job. He may be told to establish a "duplex" operation with another station even though he normally works in another net. He may act as NCS in a net, handle traffic from local to state, handle traffic as a station working in a field hospital, etc. This RACES net was the first in Missouri to be approved after the new revisions were made effective. Presently a ten-meter and a six-meter net are established, and a two-meter net is nearly ready to be activated. The RACES personnel consists of 8 operators. Jack Kraus, Sedalia-Pettis County C.D. Director, who sent us this information so we would have something for the RACES column, says, "Surely, I am not the only civil defense director blessed with a group such as this."

National Traffic System

The Second Region Net (2RN) was the statistical champ of NTS region nets in 1963. The Third Region Net, last year's champ, dropped to third place, while RN5 climbed up to second, all the way from 7th a year ago. This is only the second time 2RN has won the championship; the first time was in 1960. Other regions which have come out on top are 1RN ('54), 3RN ('62), 4RN ('51), RN5 ('55), RN6 ('52 and '59), 9RN ('56, '57, '58 & '61) and TEN ('53). So you see, the statistical championship has been spread around among the regions quite a bit. Here's the table showing how each region stood in each of the five basic categories:

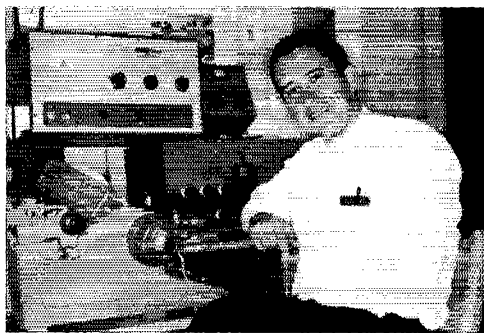
Net	Sessions	Traffic	Rate	Average	Rep.	Final Standing
2RN	2	2	1	3	1	1
RN5	3	1	3	1	3	2
3RN	1	4	5	5	2	3
4RN	6	3	6	4	4	4
9RN	10	6	2	2	6	5
1RN	8	5	7	6	9	6
TEN	7	7	4	7	11	7
8RN	4	9	10	10	5	8
RN6	9	8	8	8	7	9
RN7	5	10	11	9	10	10
TWN	11	11	9	11	12	11
6CN	12	11	12	12	8	12

Congratulations to 2RN and its manager, WA2GQZ, on a fine performance during 1963. This net has been on its way up for some time, and has developed some of our very best NTS operators. We predict it will be a contender for highest honors again this year, but there will be some stiff competition from other region nets who don't like being on the bottom.

Note that although 2RN was top only in two of the five categories, it rated quite high in others as well, no lower than third. RN5 also placed no lower than third, beat 2RN in traffic and average but placed behind them in

Members of the Catamount Radio Club (Bennington, Vt.) set up this station in the show window of a local utility company and offered to send yuletide greetings anywhere in the U.S. A total of 95 messages were originated. The photo shows WIADY (right) accepting a message for origination, while in the background W1UXK and K1NLD operate. (Bennington, Vt., Banner photo.)





Here is a personable young ORS who is beginning to make himself heard in West Coast traffic circles. He is Jim Gilbreath, WA6BRG. Note that he is equipped for handling traffic in quantities.

sessions, rate and representation. These categories have a tendency to balance each other out. For example, a net that places high in number of sessions is going to have a tough time maintaining a high average and high representation, but may place pretty high in total traffic. The net that wins is the net which reports all its sessions, handles a lot of traffic very efficiently in each one and has a representative from every section in each session. The sad part of it is that even though your performance is *good*, you are going to place behind any net whose performance is *better*. The general level of proficiency and efficiency is coming up, so nets that remain the same are going to lose ground in the standings. It becomes a test not of who is improving, but of who is improving the most.

December reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
1RN	37	756	387	13.3	66.9
2RN	60	1020	323	27.3	99.6
3RN	62	913	504	14.7	94.6
1RN	60	1362	575	22.7	94.8
RN5	62	1870	837	30.2	96.0
RN6	62	1763	512	28.1	92.2
RN7	59	615	310	10.4	70.1
SRN	60	618	354	10.3	91.3
9RN	31	1068	348	34.1	91.1
TEN	61	1109	626	18.1	56.8
PCN	28	106	153	3.8	82.2 ¹
TWN	31	541	629	17.5	66.9 ¹
Sections ²	1071	10880		10.7	
EAN	31	2497	1318	80.6	99.4
CAN	31	2432	1421	78.4	100.0
PAN	31	2245	1135	72.4	98.9
TCC Eastern	124 ³	1052			
TCC Central	113 ³	2122			
TCC Pacific	124 ³	1755			
Summary	1797	34724	CAN	16.6	CAN
Record	2015	14109	1387	23.5	100.0

¹ Region net representation based on one session per day or less. Others are based on two or more sessions per day.

² Section nets reporting: AENB, AENH, AENJ, AENO, AENP, AEM, AENP Eve, AENS, AENT, AENAI (Ala.); BUN (Utah); BN (Ohio); CPA6 & EPA (Pa.); GBN (Ont.); GEM (Idaho); ILN (Ill.); MDD & MDDS (Md.-Del.-D.C.); MSN (Alim.); NCN Early, NCN Late, NCSN (N.C.); NJPN, NJG-2 (N.J.); OQN (Ont.-Que.); QFN (Fla.); RISP (R.I.); SCN, SC'S, SCVSN (Calif.); TPN, TN, Tenn SSB, E, Tenn Phone; VSN (Va.); W. Fla. Phone; Wis. SSB & Wis. Training.

³ TCC functions reported, not counted as net sessions.

Years like we broke another record. A new record "rate" was established by CAN during December, which means that traffic was handled by this net at an average rate of 1.421 messages per minute during the month. That's going some! EAN and PAN weren't far behind, both averaging better than a message per minute. There is no fooling around on these area nets. Nice going, gang. Most of the records remain unbroken from previous years, when sun spots were keeping the skip down and giving us some decent traffic-handling conditions.

WA2GQZ says 2RN almost got through the year with some perfect figures, but missed out at the last minute. W3UE vows that 3RN will be a net to be reckoned with in 1964. K4EOP has been awarded a 4RN certificate. K4WOP wins high RN5 NCS honors for the month, Alabama high section honors with Tennessee just a shade behind. W6BBO says December was no month to sit and gloat and holler "See what we did!", but it does show that RN6 is improving. K7EWZ keeps up Montana representation in RN7. K7IWD holds forth for Oregon, and Idaho has shown a substantial increase. Did you know that RN7 covers a total area of two and a quarter million square miles? W8CHT says he no sooner gets a new 8RN roster made out and it's obsolete. The 8RN bulletin is keeping up interest, however. TEN is experiencing difficulty with late skip, sez W8LGG, but the response from a November form letter was encouraging. W8HXB notes that rate and representation are up on TWN, and that K8FDH has earned a TWN certificate. W2EZB says EAN stations are getting tired of battling long skip, but he has heard of no one quitting yet. W9DYG is enthusiastic in his praise of the CAN gang, who broke December rate and total traffic records and total traffic for the year during the worst possible conditions. K4AKP/6 says the December report is "more like it," after a substandard showing in November. John intends heling out one of his famous bulletins soon.

Transcontinental Corps. All three TCC areas are having difficulties with erratic conditions, necessitating several alternative frequencies and times to most schedules. W3EML reports that TCC-Eastern would have had 100% in reports except for one unreliable station. K9ZLA has received a TCC certificate from Central Director W4ZJY; TCC-Central conducted a number of special schedules during December to take care of the holiday overload. PAN also conducted some extra schedules during the holidays; most of those unsuccessful were the long hop from Pacific to Eastern and vice versa.

December reports:

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	124	72.6	3091	1052
Central	113	97.3	3637	2122
Pacific	103	75.8	3510	1755
Summary	340	81.4	10238	4929

The TCC roster: Eastern Area (W3EML, Dir.) — W1s EMG NJM, W2s GVB MTA, W3s BLV KQG VLK, W3EML, K3s FHR MVO, W4s DLA DVT, K4POA, WA4EUL, W5s CHT ELW QFO, Central Area (W4ZJY, Dir.) — W4ZJY, WA4AVM, K5IBZ, W5s PPE QMJ, K6s DHN ZLA, W7s AKV CXY DYG JOZ PTZ QLW VAY, WA9AUM, W9BDR, K6FPC, Pacific Area (W7DZX, Dir.) — K4AKP/6, K6s DYN GHD, W6s EOT HC, W4s BRG ROF, W7s DZX WST/6, K6s EDH EDK, VE7AGF.

Net Reports. February QST is not yet in distribution, as this is written, but we expect that as soon as it is we'll start receiving anguished cries about the omission of miscellaneous net reports from the ARPSC column therein. This is not exercise of a new policy; it was an oversight, so go ahead and shoot. In the confusion of planning new ARPSC procedures it was overlooked, and will appear herein faithfully henceforth.

November reports:

Net	Sessions	Check-ins	Traffic
8 Ball Traffic	38	360	222
Early Bird Transcon	30	...	37
75 Meter Interstate SSB	30	1459	614
7290	39	1553	673
Northeast Area Barnyard	24	754	19
North American SSB	26	816	1334
20 Mtr. S.S.B.	25	610	1464

December reports:

Net	Sessions	Check-ins	Traffic
6 Meter 8 Ball Traffic	42	383	588
Early Bird Transcon	31	...	186
75 Meter Interstate SSB	31	1312	1167
7290	42	1492	883
Northeast Area Barnyard	26	875	24
American SSB	24	678	1769
20 Mtr. Interstate Side Band	22	502	2235

QST

YL news and views

CONDUCTED BY JEAN PEACOR,* K1JIV

YLS Make News

"SPARKLES of Happiness Club to Local Couple" recently headlined a Leamington, Ontario, Canada newspaper. "Ham Radios Cut Way in Road Jams" appeared in *The Washington Post*. "Code Taught Via Radio" was another Washington, D. C. headline in the *Sunday Star*. From the Portland, Maine *Sunday Telegram*, "Happy Voice of Barnyard Network is no Newcomer to Airwaves." Another Canadian news item was captioned "Her Ham Radio Set Acts as Calling Card." All of these headlines have one thing in common as the stories that followed all portrayed experiences in the lives of YL amateur radio operators. They also spread much good will on behalf of all of amateur radio.

Dell and Loris Daykin, VE3AJR, and VE3DNV, were the subjects of the Leamington, Ontario headline, having been named international president and vice-president, respectively, of the Sparkles of Happiness Club. Dell and Loris have been active members of SOHC for the past ten years. This world-wide organization, known to many radio amateurs, is devoted to helping the handicapped, the blind, and shut-ins.

As net control station of approximately 25 mobile amateur radio stations in the Washington,

D. C. area, Claire Barton, W4TVT, and President of Waylars, prompted the headline regarding how radio can help in traffic jams. Through this net, drivers are forewarned of congested routes or poor road conditions and have been saved many a half-hour.

Another Waylare, Betty Aylor, W3SLS, was pictured with her OM, W3DVO, checking tapes for code practice sessions which are sent from their station every Saturday on 7035 kc. at 1 P.M. "Code Taught Via Radio" explained how this is done and about the many people who have taken advantage of this opportunity to increase their copying abilities.

Eunice Thompson, W1MPP, is well known to many radio amateurs as an active member of the Barnyard Net on 75 meters. On the air since 1920, Eunice worked first with the American Radio and Communications Company's experimental station in Medford, Mass., later licensed as WGL. She first became a licensed amateur radio operator in 1921 using her own initials as her call letters. In 1934 she received her present call. One of the few women pioneers in radio, Eunice was paid a fine tribute in the write-up by the *Portland Sunday Telegram*.

Many fine radio experiences were related in the news item written about Doris Mendham, VE3DNW, of Georgetown, Ontario under the

* YL Editor, *QST*. Please send all news notes to K1JIV'S home address: 139 Cooley St., Springfield, Mass.



(left) Operating the Floridora station during the recent Miami Hamboree, January 18-19, are Marge, K4RNS, and Ellen, WA4FJF. Two very active Floridoras, Marge and Ellen also were 3rd- and 2nd-place high scorers, respectively, in the phone portion of the recent YLAP. They are both happy to have talked again with old friends in the contest and to have met many new ones. (right) Ivy, VE3EZI, is the first YL to receive the special V.H.F. Contest award being presented by Marty, VE3MR. (Courtesy of VE3CIL.)



24TH YL ANNIVERSARY PARTY RESULTS

COMBINED SCORES

K1UOR.....5845	K3PKI.....3443	K6POC.....4440	K7RAM.....4657	W8ARJ.....313
K1LCI.....2920	K3HZY.....2325	W6UHA.....3808	K7ADI.....1247	KØIKL.....10,785
W1YPH.....2076	WA4FJF.....9236	WA6AOE.....1747	K8ONV.....4646	KØEGC.....6435
K1NST.....2016	K4VDO.....990	W6DXI.....1459	K8LHF.....2310	KØEVG.....1232
WA1ANR.....1715	WA6OET.....9885	K7OFX.....5698	K8PXX.....2032	VE7ADR.....4565
			W8EFB.....1536	VE7BBB.....936

PHONE SCORES

K1UOR.....3700*	K3NVF.....1537	K6KCL.....6681	K7YGV.....3680	W8ARJ.....232
K1HIF.....2800	WA4FJF.....8000*	K6DLL.....4620*	K7IVK.....2887*	WA9ENB.....3760
K1LCI.....2080*	K4RNS.....7791	K6POC.....4180	W7GGV.....1987*	K9AXS.....3700*
K1HZT.....1687*	WA4FEY.....890*	K6HIT.....3677*	W7IHH.....1265	KØGR.....3610*
K1WZY.....1125*	K4VDO.....756	W6YZV.....3520	K7ADI.....1127*	K91LK.....3510*
W1YPH.....920*	W4TVT.....486	W6UHA.....2210	K7QGO.....319*	K9TRP.....1890
K1ADY.....725*	K4LSI.....234*	WA6LWE.....1813*	K8MZT.....3610	KØIKL.....8220*
WA1ANR.....665*	K5OPT.....6370	W6DXI.....1127*	W8VUB.....3354	KØEGC.....4905
K1NST.....266	K5SGJ.....5720*	K6VFE.....1050	K8ONV.....2844	KØEGC.....4730*
KIGSF.....30	K5OPS.....4830*	WA6AOE.....960*	K8TVX.....2790*	KØITP.....918*
W2OWL.....1150*	K5MIZ.....3906	K6UHI.....736*	W8HWX.....2437*	KØEVG.....320*
W3MDJ.....2175*	K9AMD/5.....3062*	W7RVM.....4945	K8LHF.....2175*	K7STT.....3002
K3HZY.....1925	K5BJU.....1822*	K7TNE.....4730*	K8ITF.....1982*	K4CØB VE6.....146
K3PKI.....1920	WA5ALX.....238	K7RAM.....4561*	W8ETT.....1755*	VE7ADR.....3046*
K3YBR.....1568	WA6OET.....7420	K7OFX.....3898*	K8PXX.....1552*	VE7NW.....1820*
			W8EFB.....720	VE7BBB.....891*

C.W.

K1UOR.....2145*	K3HZY.....100*	W6DXI.....332*	VE3EYN 8.....616*	KØIKL.....2565*
K1NST.....1780*	WA4FJF.....1236*	K6POC.....260	K8ITF.....506	KØEGC.....1705*
W1YPH.....1156*	K4RHU/4.....665*	K7OFX.....1800*	K8PXX.....480*	KØEVG.....912
WA1ANR.....1050*	WA4OZM.....280*	K7ADI.....120*	K8LHF.....135*	VE3BIL.....260*
K1LCI.....840*	K4VDO.....234	K7RAM.....96	W8ARJ.....81*	VE6ABV.....1800*
W2EFW.....336	WA6OET.....2165*	K8ONV.....1803	K8VTF.....19*	VE7ADR.....1510*
K3PKI.....1523*	W6UHA.....1598	W8WUT.....1093*	WØMLE.....1350*	VE7BBB.....45*
W3TSC.....1064	WA6AOE.....787*	W8EFB.....816	WA9CCP.....742*	JAYL.....99
				G2YL.....37*

* Low power multiplier.

CORCORAN AWARD

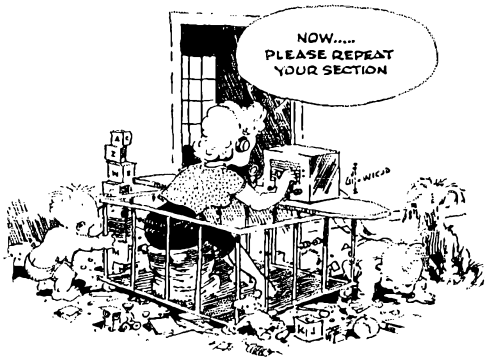
Joyce L. Polley, KØIKL 10,785

HIGH PHONE

Joyce L. Polley, KØIKL 8,220
Ellen Ackerman, WA4FJF 8,000
Marge Campbell, K4RNS 7,791

HIGH C.W.

Joyce L. Polley, KØIKL 2,565
Jessie Billon, WA6OET 2,465
Doris Young, K1UOR 2,145



caption "Her Ham Radio Set Acts as Calling Card." Her activities curtailed since 1947 because of multiple sclerosis, Doris told of the great enjoyment she has had since becoming licensed in 1960.

These are just a few of the headlines recently made by amateur radio operators. Such stories are but one way for the good will of amateur radio operators everywhere to spread. Somehow, they also increase the pride shown by us all when we say "Yes, I'm an amateur radio operator."

WRONE Week, March 9-13

Sponsored by the Women Radio Operators of New England.

Object: A contest for members of the Women Radio



Active in many contests, Doris Young, K1UOR, was the third high scorer in the c.w. portion of the YLAP. Doris shares the rig with her OM, K1NWE and son Rob, K1NWF.

Operators of New England (WRONE) to contact as many YLs in New England as possible. YLs everywhere may participate, but the method of scoring below should be noted. The primary purpose of this contest is to give the YLs of the six N. E. states a chance to get better acquainted.

Time: Contest begins at 1300 GMT Monday, March 9, 1964 and ends at 2300 GMT Friday, March 13, 1964.

Scoring: One contact with each station permitted (any band). Score 1 point if YL worked is YLRL member; 2 points if YL is WRONE member; 3 points if YL is both YLRL and WRONE member; ½ point if she is neither WRONE nor YLRL member.

Logs: Copy of regular log, with YLRL and WRONE member indication, must be received no later than March 25, 1964. Send logs to Ruth Barber, K1HF, 19 Bidwell Parkway, Bloomfield, Conn., 06002.

Prize: High-scoring WRONE member will receive 100 "Miss Wrone" QSLs.

YLs Only

What — Buckeye Belle—YL Party.

When — March 9 through March 13, 1964.

Where — All bands, any and all modes.

Why — To promote Buckeye Belle certificate achievement for YLs (other than Buckeye Belles). To promote YLRL Silver Anniversary and International Convention in 1964.

YL logs show — Station worked and handle, Buckeye Belle number, QSO number, date and time (GMT).

Score — 1 point per contact.

Award — To YL (other than Buckeye Belle) having greatest number of Belle contacts.

Send signed copy of logs to K8VMV, Jean Posey, 2864 Sherwood Drive, Aurora, Ohio, postmarked no later than March 31, 1964.

V.H.F. Award Winner

Following the June V.H.F. contest, Ontario amateurs present a low-power two-meter award to the high scorer on 2 meters. Marty Rosenthal, VE3MR, is the donor of the award, which was recently presented to Ivy Smythe, VE3EZI, for her record-breaking score on 2 meters only. This kept the record in the family, since the previous record had been set by Ivy's OM, Cliff, VE3EZC.

Since becoming licensed as an amateur radio operator three years ago, Ivy has been a very active YL. Able to copy code at 25 w.p.m. only two months after receiving her station license, she entered the YL/OM contest and placed second for all of Canada in the final results. A year after taking her first license exam, she passed the advanced test with 100%.

YLRL Appointment

Barbara Houston, K5YIB, has been appointed as Treasurer of the Young Ladies' Radio League succeeding K8MZT for 1964. Next year's membership dues, due March first, in the amount of \$2.50 (or \$3.00 for DX adoptees), may be sent to K5YIB, P. O. Box 652, Richardson, Texas.



Jessie, WA6OET, shown with her OM, Pete, WA6MWG, was the second place c.w. scorer in the YLAP. Two years ago Jessie listened for two hours before daring to join the contest, and now? She is an AI Op, has DXCC (130), and carefully reserves YLAP and YL/OM contest weekends.

Operating mostly c.w., Ivy holds ARRL appointments OES, OPS, and OO. Here is another fine credit to the fair sex!

Feedback

February's YL column erred when it stated that Minerva, WN2JNL, and Leennie's, WA2SVZ, children would soon number eleven. They became the proud parents of twins on Dec. 21 and 23.

YL Clubs

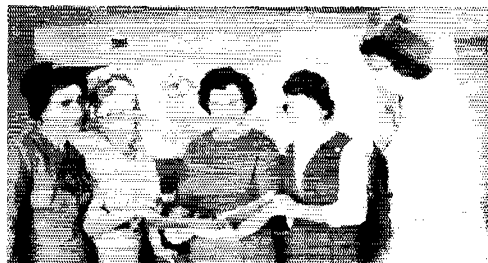
YL CHC Chapter 4 announces their new officers for 1964 as follows: K5BTM, Dot Dickinson, Pres.; W7GGV, Helen Maillet, V. Pres.; W1YPH, Leona Peacor, Secy.; and W5LGY, Helen Douglas, Treas.

Coming Events

YLRL 5th International Convention — June 19, 20, 21 at the Nationwide Inn, Columbus, Ohio. Buckeye Belles are the hostess club. For further convention and ticket information see Jan. QST YL column and Sept.-Oct. 1963 YL Harmonics. Migrate to the Buckeye State in 1964!

YL/OM Contest — sponsored by the Young Ladies Radio League. Phone, Feb. 29-March 1. C.W., March 14-15. See rules in February QST YL column.

QST



Surprises and fun for YLs who attend the YLRL 5th International Convention in June are being planned by this Buckeye Belle committee in the Committee Suite of Nationwide Inn, Columbus, Ohio. Left to right are K8UKM, K8MZT, W8LGY, K8CEN, and W8CJP.



CONDUCTED BY SAM HARRIS* W1FZJ

THE SUNSPOT MINIMUM makes the likelihood of transoceanic 50-Mc. DX look pretty slim. There is, however, no reason to believe that transequatorial scatter will not be in evidence. Experiments performed during the last Spring equinox indicated regular openings from the northern hemisphere to the southern hemisphere. These experiments were conducted using power levels commensurate with amateur power limits. It is true that the likelihood of openings is greatly increased if you live in the southern tier of states but it is possible that a combination of Sporadic *E* and *TEs* can occur, to allow us northerners to have a chance at it.

The biggest stumbling block is the lack of regular schedules with stations in the South American countries. Fifty-Mc. activity in this country is sufficiently high to provide the equivalent of continuous band monitors. What we need is a little letter writing to stations like LU9MA, HC1DC, PY7VBR, YV5ANS, PZ1AX, etc., asking for schedules.

During the past year VP7CX and XE10E have provided the bulk of our southern DX. HI8XHL and numerous KP4s have added spice to the scene. Latest information from FG7XT indicates that John transmits around noon (his time) each day on 50.100 Mc. looking for band openings. John is presently equipped for a.m., s.s.b. and f.s.k. RTTY. Beginning early in April he will transmit f.s.k. RTTY on 50.010 Mc. for the first five minutes of each hour at 1900, 2000, 2100 and 2200Z. He will listen for answers on any mode (c.w., A3, etc.) between 50.100 and 50.200. Despite keeping daily watch on 50 Mc., John's last contact was with a W4 on August 27, 1963. I am sure that a few words of encouragement would be appreciated by all of our DX friends.

WA2BWH and WA2GGB are undertaking a

* P.O. Box 334, Medfield, Mass.

DX tour through the Canal Zone to Tahiti and the Marquesas. Stops on several other small islands are anticipated. Operation will be s.s.b. on 50.090 and monitoring 50.110, from February 1 to April 1 this year. Low-frequency operation on 40, 20 and 15 can be used for liaison. Chuck and Tom are not sure of the call they will be issued, possibly FPSCG/FOS.

V.H.F. — Hawaii

It isn't often that we hear from Hawaii but when we do it seems as though an awful lot of information comes through, and once again it is time to quote directly from a letter. The following was received from Mac, KH6CMM: "Since arriving in the islands, I have been busy in a continuing attempt to recruit assistance in my v.h.f. work and have succeeded to a point. There are several persons interested and many are building for 50 and 144 Mc. It is my hope that some of the interested amateurs will go all the way once some experience has been gained. At the present time, I am working very closely with Bob Adams, KH6EEM/W6QMN. Our efforts thus far have been exclusively in constructing equipment rather than operating. This is being rewarded in that we both have elaborate stations completed for two of the v.h.f. bands, with additional equipment under construction. We have been designing our own equipment, striving for state-of-the-art performance, building identical equipment for both stations in the interest of saving time. Long before this appears in print KH6EEM and I, KH6CMM, will be observing the following schedule: Saturday/Sunday mornings, 1800 to 2200 GMT. 50.002 c.w., 50.105 s.s.b. (upper). KH6EEM will concentrate on s.s.b., conditions permitting, while I am primarily a c.w. man. We are also willing to conduct schedules with interested amateurs on 144 and 220 Mc., c.w. or s.s.b., and interested parties can write to me for details. We are especially interested in corresponding with VK/ZL amateurs who might be willing to try a 144-Mc. schedule during the spring and summer months.

"I might add that in addition to the fixed schedule observed, Bob and I will watch for Sporadic *E*, etc.,

International V.H.F. Convention

The ARRL National Convention, August 21-23, in New York City, should prove to be an outstanding experience for v.h.f. enthusiasts. As part of this affair there will be a complete International V.H.F. Convention, sponsored by the East Coast V.H.F. Society.

The importance and timeliness of such a convention is readily appreciated. Though all frequencies above 30 Mc. were thought of as mainly useful for local communications not too long ago, today we find v.h.f. and u.h.f. assignments becoming truly international in scope. Through exploitation of the possibilities of extended tropospheric propagation, moonbounce, and reflecting and relaying satellites, we may soon be seeing worldwide communications on all amateur frequencies.

Need for international liaison in v.h.f. matters is acute. Frequencies, techniques, equipment and even schedules

need to be discussed. The International V.H.F. Convention will provide an excellent opportunity for progress in this field. With the combined interest generated by the National Convention, the New York World's Fair, and the 50th Anniversary of ARRL, many amateurs from other countries are planning to visit the United States at this time. Every effort is being made by the East Coast V.H.F. Society and ARRL to encourage leading v.h.f. enthusiasts around the world to attend and participate.

An international conference will be held to lay the groundwork for communications experiments. A technical program will deal with problems and possibilities. Finally a period devoted to "V.H.F. Around the World" will present an opportunity for representatives of all countries to describe the state of the v.h.f. art in their parts of the world.

and be available any time there is a chance of working the mainland on 50 Mc.

"Recently I had a visitor from Midway Island, who expressed an interest in trying serious v.h.f. work from Midway. Commencing sometime this spring, K3LHJ/KM6, Nick Lambert, will be active and running a kilowatt on 50 and 144 Mc., s.s.b. and c.w., conducting tests between Midway and Hawaii. At the present time I do not know what frequency will be employed on either band. Antennas will be stacked 6-element Yagis on 50 Mc., and four 15-element Yagis on 144 Mc. To my knowledge this will be the first six- and two-meter activity from Midway. Anyone wishing further details on any of our skeds, can generally find either KH6EEM or myself on 7005 kc., plus or minus 2 kc. We would welcome any questions or schedules and can be found nightly from 0300 to 0800 GMT." (Glad to hear it, Mac, but seems to me that those 5 hours should be spent working with/on v.h.f.(?)) For those of you interesting in writing to Mac, the mailing QTH is KH6CMM, 59-216 Kam Hiway, Sunset Beach, Oahu, Hawaii.

144 Mc. & Up

I'm sure that when a great many of you read that Grid, W4GJO, is authorized to run full power on 432 Mc. you'll give a loud cheer and get down to completing that equipment you started building a year or so ago. Grid seems to be a natural-born "spark plug" and his enthusiasm for v.h.f. work slowly catches those who come in contact with him. Grid sez: "Present operations are rarely hampered here by radar. There is only one radar heard with any regularity here. It has a repetition rate of about 15 seconds (1 r.p.m.), and seems to peak with beam headed roughly toward West Palm Beach. It's not heard all the time, but at times it is extremely strong, sometimes for only a few minutes, sometimes for hours. The other night Lou, WA4BYR, and I heard another radar for an hour or so, very strong at times. It peaked about NE, swept past about every 9 seconds and seemed to have a higher pulse rate than 'old reliable'. Sure wish we had access to some directory, so we could possibly identify these. "Would help greatly in predicting band openings." (Anyone have any dope on those in the northeast area which would help us to identify them?)" "When band conditions are hot to the northeast, we can surely expect garbage from Wallops Island, Montauk Point and perhaps stuff in between. Maybe we better start building that blunker."

Grid also tells us that K4NTD has completed his 4060A tripler and Central Florida and the Orlando area will soon be represented on 432 Mc.; W4UWH in Auburndale is so strong with his beam on Grid that he can be copied with either the six- or two-meter beams, or with the antenna change-over relay to the 432-Mc. beam open; WA4BYR is copyable from Englewood on c.w. with his dummy load; K4XYZ in Nokomis is 10 over 9 at Grid's QTH with his just-completed 4060A tripler driven by a Twoer and fed into a folded dipole; and K4QHN in Sarasota is building a 4060A tripler and will soon be working on his converter. Lou, WA4BYR has built a 432-Mc. version of the "skewed planar" and is disappointed with it although it does work satisfactorily. Hopes that when mobiles do get on in the area it might prove its worth as an all-round omnidirectional, all-purpose antenna.

Interesting information received from Norm Foot, WA9HUV, also. "What with only limited experience



Everybody knows you can't work out on 50 Mc. with low power—except Bob Berg, K5LFL, of Fort Worth, Texas. Using the Heath Lunchbox, Bob has worked 48 states and 7 countries on six. He has 65 different Canadian stations worked, and is the proud holder of a certificate for working 100 Ohio stations. He has earned scores of other awards for his 50-Mc. contacts, and has used up four logbooks in three years on the band.

on 432, but with considerable technical experience in the field of antennas and propagation my conclusions from all this is that if a guy has a kw. input and has an 18-db. antenna, and a parametric amplifier, and if the antenna is 40 feet up or more, then he should have little trouble working 300-400 miles fairly consistently, even in the winter. The interesting part of wintertime is that signal strength degradation, from what I've read in the literature, at short ranges is very high, possibly as much as 40 db.; but at long range like 400 miles, the summer-winter difference is only about 10 db. I think this is a most interesting fact! Evidently we just do not have enough facts on the band yet, because there aren't enough stations on, at least as far as fast data gathering is concerned. What I've learned from 432 so far is that it takes good equipment on both ends." (Ain't it a fact!)

"Nobody out here (Elmhurst, Illinois) has been hearing 3s, 4s and 6s, although I'm sure I could hear 6s if there were any on within 300 miles of here. There are plenty of 8s however, and in particular Toledo, Ohio, runs S3 to S5 nightly and with my power (2 watts) I can't work them either.

"I have managed only four states on 432 including those three which border on Illinois. W9GAB works W8RQI regularly which is quite a nice haul. He has a kw. Bob is my best DX to date but with 2 watts I certainly couldn't expect more. There is only one station on in the Minneapolis-St. Paul area that I know of, W0CTM. I have a long list of stations worked and a longer list of stations heard from here in Elmhurst, and have logged over 30. Generally there is at least one contact each evening which is within hearing range of me, but sometimes, like on Mondays, the band is really alive with QRM! We have lots of local ragchews lasting up to an hour when long-range tropo is not good, but when it is, we make our calls short and move around to avoid QRM to our neighbors. The fellows use the piggy-back techniques for DX which sure helps. All stations here are located between 432.000 and 432.110 although we usually tune to 200." Lots of good information; thanks, Norm.

A number of stations in California have taken advantage of the increased power limit on 432 Mc. and are running from 200 to 1000 watts on the band.

Alan Margot, W6FZA sez that his kw. is operating beautifully and providing 50% efficiency in AB₂. He's been having fun with skeds and finds that he has worked the same DX (tropospheric) in every direction that he's worked on two and six meters, including W6AJE, 280 miles; W6VSV, 220 miles; K6JC, 210 miles; K6HCP, 200 miles; W6UID, 150 miles; and W6NLZ, 170 miles. Al sez: "Although W6AJF is the only one running the same power, signal strengths seem within 2 to 5 db. of those on the lower frequencies over those mountainous paths, and those db. might well be loose ends. Skeds kept nightly with K6HCP proved that signals were always there with the high power, always Q5 on c.w., and about half the time the signals were strong enough for Q5 armchair s.s.b. Since Porterville is 200 miles from the nearest surplus store (you poor thing), 60 miles from the nearest parts house and 150 miles from the nearest 432-Mc. ham, ideas for the 432 final are simple and original. The drive requirements are 20 watts for 1 kw. AB₂ and 500 out, making for a power gain of about 14 db. Since adequate drive was available, no great effort was made to optimize the grid circuit." Al has also been toying with the idea of two-meter skeds via Oscar III and anyone interested in such skeds can contact him by writing to Alan Margot, W6FZA, 167 Leggett Drive, Porterville, California.

In the Bay area a number of 432ers operate nightly at 1930 local time. This includes W6AJF, W6AUZ, K6AXN, W6BHR, WA6BQO, WA6BAN, W6DFU, W6EDC, W6ENX, WA6GYD, W6HXY, K6JC, W6NNS, W6OHQ, W6OSA, W6PBC and W6VSV. Frank, W6PBC, sez that in his case the straight-through final uses a 4CX250B running 225 watts input with a measured output of 121 watts at the antenna. As he sez: "Most of us believe that, more than anything else, the greatest over-all improvement can most readily be obtained in use of proper feed lines and properly matched antennas. As an example, K6JC works W6AJF with $\frac{9}{10}$ watt output over a distance of about 62 miles over intervening hills." This area frequently has activity on 432 Mc. on c.w., f.m., a.m., s.s.b., all during the same period of time. We are beginning to get a bit more news from the West Coast boys concerning 50 Mc. and up, and we really appreciate their efforts.

At New Orleans W5JFB and W5TVW completed transceivers for 432 Mc. and on December 15 had what is believed to be the first 432-Mc. transceiver-to-transceiver contact in that area.

In Tennessee tests on 144 and 432 Mc. continue between K4CLE in Charlotte and W4HHK in Collierville (175 miles). Every attempt to get signals across on 432 Mc. has been successful and reliable contacts are easily made with high-power s.s.b. on 144 Mc. K4CLE reported a significant improvement in 432-Mc. reception when he changed from a 416B r.f. stage to one using a 6299-type tube. At Kingsport, Tennessee, K4SHY reports that a few stations in that area are experimenting on 220 Mc., most notable being K4VZZ and W4OBD. In North Carolina K4QIF reports working W4VIII on 432 Mc. with extremely strong signals both ways (50 miles). Howie is looking for skeds on 432; his frequency is 432.051.

News of activity on 220 and 420 Mc. is provided this month through Jim Hagan, WA4GHK who sez that 220 is inactive and he is still looking for contacts around Florida. Frequency is 220.067 and he is usually on at 9:00 p.m. local time. Frequency on 432 is 432.250 Mc. and Jim looks for contacts on that

band at 10:00 p.m. "432 seems to provide reliable communication over the Central and South Florida areas and a number of new stations will be on the band shortly. I have just completed a new 7077 432 converter," sez Jim. "which seems to have a good edge over the centimeg unit I have been using for the past several years." Reliable contacts on 432 for Jim are K4NTD (75 miles), WA4BYR and W4GJO (135 miles).

W4UWH in Auburndale has a transmitter going on 432 and has had some fine crossband contacts over a 75-mile path; while W4VTJ has a good receiver for the band and has been providing crossband contacts also. K8ZES, K7ICW, K2DDK and WA2UDT are among those building equipment to get on 420 Mc. K2DDK sez that he is "still wiring the 417A i.f. strip for the new 432-Mc. converter". WA2UDT sez he has "scrapped 432-Mc. converter and starting over again." Building for 220 Mc. are WA9FVD, K7ICW and W3JYL. W3JYL sez he intends to be very active on the band again and is presently trying to complete his high-power transmitter for 220 Mc.

At Bryn Mawr, Pennsylvania, K3ADS now has an image orthicon camera and expects to have live TV by the time this column is in print. Larry built a 24-tube retina standard sync generator for a local sync source. W8PT is also building for 220 Mc.: a new converter with two stages of grounded-grid r.f. into the triode mixer — all Nuvistors. Jack also sez that QSOs on 432 are now very hard to come by with K9UIF being the only regular contact. Wintertime signal attenuation up to 60 db. across Lake Michigan, comments Jack.

Clubs

The following information was received from Dave Zeph, W9ZRX: "Serious amateur experimentation on the v.h.f. bands above 220 Mc., especially in the realm of 420-Mc. television transmission, has not yet begun on the same scale in the United States as it has in Great Britain. . . . In an attempt to stimulate interest in 420 Mc., especially in the area of television, a group of electrical engineers and members of the Naval Avionics Facility Amateur Radio Club have begun the first of a group of serious experimental projects on 420 Mc. Nearly all the members of the club are now engaged in TV transmissions up to fifty miles on 420 Mc.

"As a club project we are in the process of building a rotating beacon similar to one in use for several years at the M-O Valve Co. Ltd. in England. The Beacon will incorporate a precision frequency standard for equipment calibration, a kilowatt transmitter, and a continuously rotating skeleton slot antenna. Range capabilities may possibly extend from Indianapolis to Chicago, St. Louis, Louisville, Cincinnati and Dayton. Because of the width of the 420-Mc. band, the exact frequency placement of this beacon is quite a topic for discussion and we would appreciate any comments that QST readers would have on the project and the frequency location of the beacon. Successful completion of this project could lead to further experiments such as a TV translator." Sounds like a real sound project to us! Hope you get lots of help, suggestions and success.

144 Mc.

W9OEQ sent us a list of 18 stations regularly heard at his QTH (Mokena, Illinois), on 144-Mc. s.s.b. The list includes stations in Missouri, Illinois,

(Continued on page 166)

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

When:

Talk about the flight of time — this, fellows, is the 25th anniversary of the Big One. If you're a real DX vet you know what we mean. You'll never forget the Big One. Sure, we're talking about the 1939 ARRL DX Contest, the greatest world-wide DX spree of all time.

Ah, there was a strange something in the air in those early months of '39. Europe was plainly on the verge of war again, and somehow hamdom seemed to sense that the curtain was coming down on a DX golden age. Radio conditions were just great, for one thing; for another, the Great Depression still lingered, and low-cost parlor sports were in maximum vogue.

Brother, the Big One was a whopper! It remains in a class by itself. When the dust of intercontinental battle finally cleared, more than 2100 logs had arrived at ARRL, a response still unsurpassed. This is all the more remarkable when you consider that there were scarcely one-fifth the number of amateurs around today, and that only 40, 20 and 10 meters were available for that epic 1939 brawl.

Official results of the fantastic event were well documented in the October 1939 *QST* by W1UE, now W4IA, and are must reading for the well-rounded 1964 DX hound. You'll note in the U.S.A. rundown that 15 of the 67 section c.w. leaders used homemade receivers including three trusty t.r.f.s; six of the 66 U.S. phone winners rolled their own. Transmitters and antennas in both divisions, of course, were almost totally homespun. Only 16 c.w. winners used rotary beams, but 21 phone leaders had them. Top c.w. scorer W3CHE did it with a half-wave 10-meter vertical, two fixed 14-Mc. beams and a 7-Mc. tuned doublet. W3EMM led all W/VE phones with a Vee, a trio of six-element 14-Mc. Sterba curtains and a two-element 28-Mc. rotary.

Lots of catchy photos in that contest write-up, too, including one of W4BPD's layout, the jazziest bunch of breadboards you'll ever see. Gus was just as great a DXer in those days, winning the Big One for South Carolina on both phone and c.w. with 852s in the final, a homebrew superhet and some Vees.

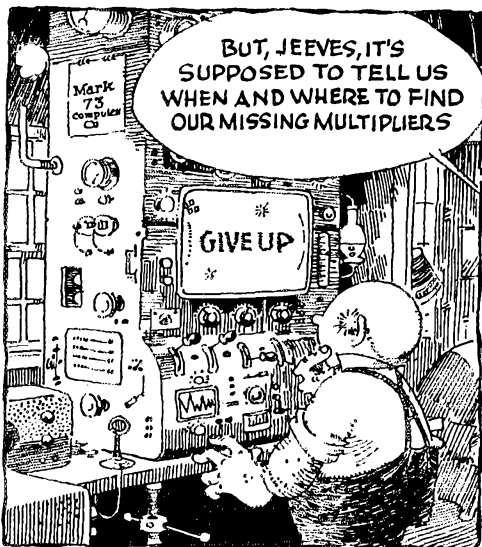
But to this day the most astonishing feature of the Big One is the spectacular performance turned in by the phone DX gang. For the 1939 voice free-for-all ARRL received 235 logs from non-W/VEs in 61 countries (101 logs arrived from 51 countries in 1963). Not only that; in the 1939 affair six U.S. phones (Ws 3EMM 2UK 6ITH 6GRL 6OCH and 3EOZ in order) each made more QSOs than any U.S. c.w. entry.

That radiotelephone DX *tour de force* of a quarter century ago was executed on ordinary old a.m. using just 10 and 20 meters! Apparently only lack of a 40-meter phone subband kept the entire c.w. action from playing second fiddle. Our new DX generation surely has a long way to go to match this competitive achievement of home-made "ancient modulation." Chrome-trimmed installment-plan opinions to the contrary simply don't jibe with ham history. They fail to reckon with the phone DX boom of the late 1930s, and especially the Big One.

What:

Latitudinal comparison of recent "How's" mailbag receipts confirms that high-frequency DX openings at this stage of the sunspot cycle are growing highly selective. U.S. Fours and Fives, and southern Sixes and Sevens, sometimes have all-day romps on, say, 15 meters while fellow countrymen up north sit and twiddle their knobs to little avail. This geographical inequity, unless recognized and graciously accepted, may cause a frustrated Idaho Seven to saw down his beams, saw up his kilowatt, and switch to tropical fish. Or he can move to south Texas where Novices still hobnob with 21-Mc. Europeans. . . . You've probably got a fresh, lengthy stalk list all ready for the upcoming final week ends of the current ARRL DX Test, but let's see what noncontest items have been interesting column correspondents on 14 Mc. lately. The legend "(020) 14" is Jeevesian shorthand for "14,020 kc. at 1400 GMT." . . .

20 phone for a starter, then, with asterisks representing non-s.s.b. holdouts. Our reporters are Ws 3HNK 4HKJ, 3NJF, Ks 2AGJ 2UYG 3SLP 5IIX 7CAD 8JPL, WAs 2HLH 2KSD 2ZVJ 4CZM 5AER 5EAM 5HJX 9AEA, WBs 2BEV 6CGP and assorted club gazettes. Here's the bag: AC3PT, APs 2AR* 2NM 15, 51C (280), 5GB 5KC (290), BV1s US USC USG, GN8AQ, COs 2FA* 7RM 8RA, CX2s BK* CO PI, CRs 6CY 6JK* 7CR 7GF (125) 20, CTs 1MC* 2AJ* 3AV, DU1s AA AB (100) 15, AP BSP DC, EAs 8CM (125) 19-20, 9AZ 9DM* (190) 21, ELs 2E 7A, EP2s AR AU CN DJ, ET3s GB USA*, F9s RY/FC UC/FC, FG7s XL XR XT, FK8AU, FM7WQ, FO8AQ,



* 7862-B West Lawrence Ave., Chicago, Ill. 60656.

HB9YG/4W, HC3JF, HE9LAA, HIs 4XAB* 8XAA
 8XHS, HIs 5KBB* 14, 9KA 9, 9KH (267), 9KR, HP3FL
 FCC-tahoe8 H51s B I L S X, HV1CN, HZs 1A1, 1AB
 2AMS, ITISMO*, JAs 1B8 (315), 1BLD 1CWP 3BOA
 3UY 8BA/1 0IA, JTIs CA KAA 10-11, Ks 6LVB/T8
 7NNE/KG6, KAs 2s CM (320), 2HO 2KS, KCs 4USK
 4USP 4USV 6BK 14, 6BL 6BO 12-13 6FP, KCs 1RH
 1FR 4BQ 6AJT 6AKR 6A1V 6SE (282) 12-13, KH6FHE/
 KJ6 (323), KM6s BI CB CH, KR6s BF* EH 13, EW* OJ
 PS, KV4AA, KX6s BI BU, LA9MI/p, LU3Z (250) 5-7,
 LX3BW, MIB* MF4s BRW BELD MAP MAT TAY TAX
 TBA, UAs 1DS 8V4 PD, PH, OD5X, OX5DL* OYs 2A
 7ML, P1I* P12AA, PZL AX BJ BR CG, ST2As, SVs
 1AB 0WF 0VGG 0WL* 0WV* 0WR, TC3Z 18, TF3AT*
 TG9SC, TL2s 10V JIC USA* TT8AN (315) 19, TU2s
 AE AU, UAs 9KCE 9KSC 0BP 0RV, UB5s FS* JD,
 UC2CU, UD6AA, UG6s 4W 17, KAR, U18AG, UL7s
 FA KAF, UM8s FZ KAB, UO5RO, UP2KAB, UQ2s
 KAA RB*, UT5KDD, VE8s AH RN, VKs 4JQ (147)
 14 of Willis, 6MK 6RU 6RX 6TX 8KK 9AS of New Guinea,
 9DR (122) 14, 9CR 9LA (115) 14, VO1s BR FM* VP8
 2AP 2CU 2KJ (218) 14, 2SU 2SV 2V3R 2V3HAG 12, 4TI
 5A* 6KL 6RG* 6WR 7CC 7NS 8GQ 8H 8V 91D
 9EH 9SF, VO2s 2AB 2BK 2CS* 8AZ* (286) 15-16, 9HB,
 VRs 1G (300) 8-11, 2BC 5-8, 2DK* VSs 1GJ JV* 1P
 1MA* 4RS 9AAA, 9AJR 9AMN 9MB, VU2NR (246) 13,
 W4s QAC/KJ (319) VGL/KG6 (347) 10 of Marcus, XEs
 1AE 2U, 2FA (289), XW8s AL AU AY (105) 14-15, XZ 2AD,
 YA1AN, YK1A* 15, YNs 1HD 1IG 1LL 1NS 4VD*
 YS1s 1M 4JO, ZSD (105) 16, ZBs BX* RM* ZD3A*
 ZEs 1JE 4JA, 2RS 5AO (130), 17-18 3LD* (165) 20, 7R
 7S (169) 19, 3A2s AM CV (268) 16, 4S7, 8R* GV* 1W PV
 YL*, 4UITU, 1K 4K BK 1J DK MS* ON* OQ XW*
 5A 1TR* 1TW 2TM 3TB* 3TV* 4CU* 5TH 5TR*
 5TW (252) 16, 5B4C6* 5H3 AC EV* 1HJ JI JR, 5N2s
 1JA 8MW, 1KO 5F5AD 2H3 19, 5U7s AC (115) 18,
 AH, 5X1U, 5Zs 4A 4Q ERR RF (287) 16, 6O1W,
 6YADM* 9GLs 4M* 4Y EC* 9LIs 1X (300) 22, RL
 RO 20, 9M2s CL* CR DQ (120) 12-13, FR* 9N1s DD
 MM, 9Qs AB HF* JW (129) 20, UC and 9U5CA.

20 c.w. is discussed by Wa 1YYM 2BTQ/KH6 3HNK
 4HKJ 4NJF 7DJU 8IBX 8YGR, Ks 1RHZ 1VKO
 2SPG 2UKQ 2YUG 2YFE 3SLC 3SLP 3VDH 6SXN/4
 7CAD 7PIG 0JPL, WAs 2HLH 2KSD 2ZVJ 4CZM HTK
 5AER 5EAM 6VAT 9AEA 9IJJ, WBs 2ALF 2BEV 2F1K
 6AKZ 6CGP 6I0EJ and 1IER, and the radiotelegraphic
 spotlight shines on AC5PN (22) 14, APs 2AD 2AR (55) 12,
 5CP (60) 13, 5HQ (18) 12-13, BV1USC, BY1PK, Easter's
 CE6AC (60) 13-14, CN8s FE FW (30) 15, CG GB (45) 19,
 GO2BB, GP5EZ, CRs 4AD 6CA 6CH 6JJ (45) 18-19, 7IZ
 (40) 19, 7LU 8AD of Timor, 9AH, CT3AE (54) 16, DMs
 3JBM 4PL, DU 1Fm 7SV (19) 23, EAs 8BF 9AY, ELs
 2AD 2N 2P 2Y 8F 8S (57) 21, 0B/mm, EP* 2AD AO 14,
 1M RH, ET3s FF JW MB/mm PT (55) 20-21, FB8s WV
 (17) 1 of Crozet isle, XX YY ZY (30) 19, FG7s XC XK,
 FK8s AB AT AU, FY7s YE 17, YF (10), YJ (28) 20,
 FO8AA (61), FR7s ZD ZF, FU8s AA AG (70) 9, GCs
 2FMV (35) 14-15, 2FZC (81) 15, 4LI (61) 17, GD3FXN
 (32) 17, HB9s APT/4W (70) 15, YG/4W (65) 18, HCs
 5CN 8LS (55) 1, H18MMN (10) 14, HK6AI (11) 22, HL9s
 KI (27) 1, KT (10) 23, HP1IE, HR2FP, HZs 1AB 2AMS,
 IT1AQ (10) 16, JAs 5AI (50) 22, 0NB (60), JT1s AG CA
 KAA, Ks 3QWF/VP9 5YAA/VO1 7VAX/KS6, KAs 8VB
 (33) 1, 9WB, K6BCP, KCs 4USB (23) 23, 4USK (50) 1,
 6HO, KGs 4AM 6AA 6FAE 6SA, KP6AZ/mm, KR6s
 CG (20) 0, DI JZ (40) 22-23, KV4s AA (81) 20-21, CI DE,
 KZ5EM, LA1LG/p, LUs 3ZI (22), 4ZI (26) 2, LZ1KPC,
 MIB, MP4s DAH (65) 14, TAs, OAs 3M 4PF, OD5LX,
 OX3s AY KW, PJ2s CK ME (37) 17, PZ1s BG BH,
 SL8AY/mm, SM3BPY/9Q5, ST2AR, SU11M, SVs 1AV
 (18) 15, 0WDD (60) 14 of Rhodes, one TAIWA, TC3ZA
 (70) 13, TF3KB, TG9s AC (22) 15-16, AD FA SC, TT2s
 ES PZ, TL8SW (2) 20, TN8AF (55) 20, TU2AU (61) 0,
 UAs 1KED (44) 15 of Franz Josef, 2AC (45) 14, 2KBC
 9JL (65) 16-17, 9UE 9XB (70) 18-19, 0BL (90) 14, 0KFG
 (27) 1-2, 0KYA 8, 0LS, UB5s KBG (50) 12, KDS KJE
 (75) 15, UW, UC2BF, UF6s CW KPA (35) 14, U18s FB
 LB, UJ8KAA, UP2s CT (80) 14-15, NR UF, UQ2s CM
 (60) 14, GA (75) 13, KAE KRU, UR2KAN, UT5FI
 UWs 3AF 0FK (59) 0IN 16, VEs 6AMX/SU (11) 8,
 0NM/mm, VKs 8RU 6WT 78M 9DR 9LA 9XI 0VK,
 VOAs 1AQ 1BA 1GI 2DB, VPs 2AV 2KJ 2MV 4LA 5RII
 (41) 23, 6LN 6PJ 8GQ 8GR 20, 8GV (32) 2, 8GZ (29) 1-2,
 8HD (20) 4, 8HF/mm (20) 3-4, 8HO (25) 2, 9AD, VOs
 2JC 2BS 2W (60) 19, 8AI (35) 18, 8BT (30) 17-18, VRs
 1B 1G 2DK (52), 2EA 2EM (23), VSs 1FZ 1JY 1LH 1LV
 4FS 4IH 4RS 6EY 6FF 9AJR 9AMN 9ITT 9MB 9OC
 (90) 13, VU2s AY CG GWZ KXZ LEZ (55) 15-17, ND
 SO, Ws 4VGL/KG6 5HCZ/VO2 7ZQV/KG6, XE1DDX,
 XZ2KN (60) 13, Y1IWs, YO 2BB 7DO (64) 15, YSIO
 (60) 3, YVs 1DP 2AH, ZB1s BX (37) 16, CR (16) 16,
 ZDs 3A 6LA 17, 6OL 17, 7SE 23, 8HB (15) 22, 8WF, ZEs
 1AE (55) 20, 1AZ 2KV (40) 16-17, 3JJ (20) 20, 8JN (12)
 19-20, 8JW (65) 20, ZL4s JF and LY of the Campbells,
 ZSs 2MI (54) 19, 3EW 9A (76) 17, 9M (1) 18, 3A2BT,
 4U1ITU, 4X4s FA FU HC ON SW, 5As 1TA 1TF 3TX,
 5B4s IP (35) 15, KW, 5H3HZ (35) 16, 5N2/FWB (40)

18-23, 5R8s AA AB AI (40) 18, CQ 5T5AD (22) 20, 5X5s
 1G (36) 20, IU (40) 21, JR JG, 5ZAs DW (39) 16-17, ET
 CT 1G (49) 20, IV JN (38) 20, ER, 6N5X, 6O6BW (35) 19,
 6W8s AB AC (50) 19, DD 21, CU (37) 22, 6YAMI, 7G1X,
 7X2NI, 9G1s 0Z 03, 9K2AN, 9L1s 1HX (66) 20, LB NH
 (8) 22, PH TL (10) 21, 9M2s FR (43) 12-13, PT GJ,
 9N1AM, 9Q5s EI (60) 20, MH (9) 18, SC (50) 20, TJ,
 9X5s MH (10) 17, MW (31) 20 and OH.

* * *

Next month, space permitting, we'll check up on other
 DX bands with the aid of (15 c.w.) Ws 6YKs 8YGR, Ks
 2UKQ 7QXG 0AID, WAs 2ZVJ 4DZU 4ITK 5AER
 5EAM 9ICQ, WB2s ALF 1WI, KN3ZBK, WN2FY L,
 1IER; (15 phone) Ks 3VDH 7VMO 0AID 0BPL, WAs
 2KSD 4DZU 5AER 5EAM; (40 c.w.) Ws 4NJF 6YKs
 7DJU 8IBX 8YGR, Ks 21KQ 2UYG 5JVF 7CND 7QXG,
 WAs 2KSD 2WIJ 5FTP 6VAT, WBs 2IWI 6DEJ; (40
 phone) K2UYG, WA6VAT; (80 c.w.) Ws 7DJU 8IBX,
 Ks 1UIW 3SLP 5JVF, WA2KSD, WB2ALF; (75 phone)
 W3HNK, VK2AVA, J. Gentry; (160 c.w.) WIBB, K5JVF
 and a batch of additional informants. Spring's just around
 the corner for a DX fillip — good fillin!

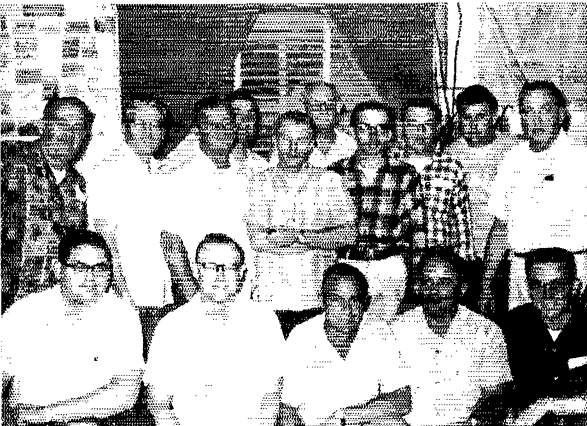
Where:

SOUTH AMERICA — CX2AM segregates the current
 VPs 8R as follows: VP8s GP GK GZ HQ, South
 Georgia; CR GV GY, Deception; CW GJ HA, Stonington;
 EF GS, Hope Bay; GW HG, Argentine Islands; GQ GT,
 Signy; HA HB, Halley Bay; HIH, Adelaide; IG, Bird
 Island; AB AH AI AS AS BJ BN DF DJ DK DG DR DU
 DV DW DZ ED EM DY FT FG FH FI FJ FK FL FM FN
 FO GG GI GJ GM GN GP GU GV GH HD HI HJ HK HO
 HH and HS, Falklands; VP8s IIC HD HF and HP are
 franchised to operate aboard ships *Shackleton, Darwin,
 Biscoe and Protector*, respectively. QSLs for Falklands and
 South Georgia VP8s may be sent via CX2AM, P.O. Box
 806, Montevideo, or through the RCU Bureau, P.O. Box
 37, Montevideo. Cards for other VP8s can be routed via
 RSGB — — — K7VMO suggests Radio Club of Surinam,
 P.O. Box 505, Paramaribo, as a possible PZ1 QST, channel
 — — — G3PAG, QSL kicker for VP8GQ, vows continuation
 of all Peter's QSOs in due time but pleads for patience,
 please.

ASIA — "VS9OC operator Jeff Rackstraw has returned
 to England," confirms W1DD. "Earl Druce, the present
 op, will continue active on Masirah until September of this
 year. Much of his VS9OC mail, however, is mistakenly
 being forwarded to Jeff. Earl will QSL his own QSOs as soon
 as cards arrive from the printer." The revised VS9OC
 QTH appears in the list to follow. — — — "My QSL policy
 is 100 per cent," assures VU2GWZ of Madras. — — —
 Ex-MP4DAH-MP4QHG-5A3BC is back at G3NMQ but-
 toning up QSL matters for his 4000-QSO Das and Qatar
 DX doings. — — — "Less than five per cent of VS1MB's
 QSOs have been applied for QSLs," declares QSL manager
 R7GCM. "Logs are on hand for Ted's QSOs made between
 July 29 and September 23, 1963." Dave requires self-
 addressed stamped envelopes from W/Ks, self-addressed
 envelopes with International Reply Coupons from others,
 and Greenwich Mean Time QSO data. — — — WGDXC
 QSL tidbits: K1LBB may be of assistance toward 5B4WS
 confirmations. ON4XJ welcomes inquiries regarding QSLs
 for 1962 LX3QX contacts, and W4ECI had mailed forth
 20,000 W4BPD/DX pasteboards for all Gus's DXcursions
 up to Kuria Muriya by mid-December. — — — According



M1M (DJ0HZ) rattled off 1400 San Marino QSOs on a
 week-end DXcursion in late '63. Al expects to return to
 K3KMO this month and welcomes inquiries on tardy QSLs.



KAZUSF's recent field day outing brought together a flock of Air Force, Army, Navy and civilian personnel. In the group at left, front l. to r., are KA2s RJ LL HO SF BC; rear, KA2s AP MP RF CM DO AE YA CF YP and RC. The lads worked some 300 stations in 30 countries and 35 United States with their BC-610, HT-37, 1-A and two rotaries. At right FEARL's brass, KA2s RC CM and CF, get the boys down to business at a quarterly meeting.

to LIDXA, W2MES can help stir up UA1CC/UA8 QSLs, and W4QCW is mentioned in connection with XW8AU wallpaper.

AFRICA — Concerning Morocco QSLs, CN8FW enlightens, "USAF bases here are now closed, so APO addresses no longer apply. The eight U.S.-personnel CN8s remaining can be QSL'd via the AAEM bureau. W2CTN handles cards for CN8s EE FW and GB." "My QSL manager is WA4FXE," affirms G06BW (K4JLD), specifying s.a.s.e. from W/Ks, with GMT a must. "One Z82QK/a, claiming an Antarctica QTH, told WA4ITK to QSL via SARL." "TL8SW cards are going out as fast as possible," states W1BPM who has Syd's logs at least up through November 30, 1963. "IRCs to 9L1TL net QSLs plus fancy postage," finds K5JVF. "You ought to see his envelope." "5Z41Q tells W1WPO via W8YGR that all VQ4L-5Z41 QSLs were dispatched in late December." "5N2RSB guarantees, "All 131 5N2RSB/TJ8 QSOs will be QSL'd on receipt, direct if IRCs are provided, otherwise via RSGB." He returns to England this month to tackle the task. "Ex-5A3CI, back in Scotland at the address in the list to follow, promises 100-per-cent QSL for his many Benghazi contacts." "K2UYG says that W0IFQ can help confirm TT8AJ single-sideband QSOs dating October 31 through December 4, 1963 (operator Tom). Other TT8AJ contacts (operator Yves) are confirmable through K2UYG who adds, "Patience is requested, for a year's delay in log deliveries from Yves is not uncommon." "NEDXA learns that three outbound bags of Ascension isle mail were lost at sea in late '63." "WGDXC has it that Hammarlund DXpedition, GPO Box 7388, New York, N. Y., 10001, is the address for ZD6PBI-bound QSLs." "S.a.s.e. to TU2AU, using mint I.C.R. stamps obtainable through W2SAW, get fast response from Smitty, according to LIDXA.

OCEANIA — KC6BC apprises ARRI, Assistant Secretary WIECH that "There is no official QSL bureau in KC6-land, so the best procedure for QSLing KC6 stations is by direct mail. Almost all stations now are accessible by weekly airmail or monthly ship mail. Regular domestic U.S. rates cover postage requirements. We of school station KC6XA are glad to lend a hand in forwarding QSLs but it is faster to mail direct." "LIDXA mentions VE7ZM as a possible QSL route to KG6SE, and hears that VS4RS still takes a very dim view of cablegrams and radiograms, with or without coin of the realm, grounding him for QSOs and/or QSLs.

EUROPE — "Despite my inquiries, no LA5PI/p logs for contacts made on or after February 20, 1963, have been received," laments LA8LF. "LA5PI returned from Spitzbergen last summer." "QSLs for OI2s BM DL EK EQ HW KA KL KO LT MU OI RY SA WC WE WR YL and ZP should go direct or via OE2HW, according to the latter's letter to W2YQN." "Ex-ON5AH is back at K9KRZ now and welcomes QSL inquiries." "Those F5 calls are all okay, says F8HA." "G5GH promises prompt response to QSLs for his GM5GH Kirkbrudshure DX excursion of this month and next, s.a.s.e. plus IRCs rate direct, answer, otherwise by bureau." "K3KMO (LJ0H7) expected to have his M1M QSL backlog erased by early February." "An IRC with s.a.s.e. to SM6CUK will quickly confirm an N88AY/mm QSO, says K3SLP.

HEREABOUTS — NNRC's LeRoy Waite, who manages the busy SWL/QSL Bureau at 39 Hannum St.,

Ballston Spa, N. Y., reports a decrease in DX QSL routings to his s.w.l. clients. The 1963 total was around 2100 or 2200 compared with 2814 for the previous year. Roy's volume apparently will continue to shadow the sunspot cycle curve. "K3SLP and friends, with 100-per-cent response from Alaska, put in some good words for the KL7 gang in defense against recent QSL disparagements." "Those WPE-style s.w.l. "calls" originate with Popular Electronics, 1 Park Ave., New York 16, N. Y." "Statistics accumulated by W4NJF confirm to his dissatisfaction that single-sideband DX stations QSL much more reluctantly than c.w. DX stations (one would think the latter more susceptible to writer's cramp) and K7PIG thinks QSL tardiness is becoming more the rule than the exception these days." "Hup! K1TZQ wants QSL/QTH data on EA1GZ, FA8RJ, LZ1KBD and ZB1JF worked in 1962 Novice days; K1VKO wonders about 5A1TF; K3SLP desires dope on PX1NE, SU2JV and SV0WC; W4NJF yearns for scoop on SV0WQ of Rhodes, 487WP and 9L1RO; and W4HKJ hunts hints on KA0IJ and VK9AD hooked back in '59." "This month's "QSLers of the Month" include CR6FW, FB8ZZ, FS7MB, FR7ZD, KG6AAY, KP4s BNT CC GI RK, TL8SW, VP2KJ, VQ8AI, YS10, YV6AX, ZS1N 2MI 6AMS, 9L1TL, 9M2DQ and 9U5BB, plus QSL pushers W1BPM 2CTN 4ECI 4QVJ, ZS1OU and 5H8BC, as nominated for this distinction by "How's" correspondents Ws 2NR 4NJF 8YGR, Ks 3VDH 7PIG 7QXG 8JPL, WAs 2VOW 4CZM 4DZU and 4TK. Any quick QSLers you'd like to see represented in this rubric? Slip Jeeves the word. OM." "W2NR feels that F9LL rates "Awards Manager of the Month" listing for consistently thorough and punctual attendance to REF certification duties, FR, Edmund! And let's add W1WPO, more or less affectionately known as the ARRL DXCC Desk's great White father." "Time to salivate over a few direct or "via" postal suggestions from the readership now, keeping in mind that none of the specifications is necessarily "official," complete or accurate:

- AP5GB (via W4RF1)
- CE0AC (via CE3HL)
- CR6ARC (via LARA)
- CR7AD (via LREM)
- EL6B, c/o Holy Cross Mission, Kailahun, Sierra Leone
- GM5GH (to G5GH)
- HB1MB (to HB9MB)
- HB9s AET/4W YG/4W (via USAK)
- HC6CM, P.O. Box 374, Latatinga, Ecuador
- HI4SAD, Radio Club, Box 157, Santo Domingo, D.R.
- HI8MMN (via WA5DAJ)
- HS1X, c/o C. Anderson, W1WTE, 3½ Winter St., Montpelier, Vt.
- JA8AO/I, S. Mitsumata, 405 Rindo, Iwatsuki, Saitama, Japan
- K7VAX/KS6, W. Conway, Box 458, Pago Pago, U.S. Samoa
- K8KW/KH6, M. Stanley, VR-21, Navy 14, Box L, FPO, San Francisco, Calif.
- K8SSO/KH6, Lt. Col. J. Murphy, Box 322, Hq. PACAF, APO 953, San Francisco, Calif.
- ex-KA2BM (to K8SSO/KH6)
- ex-KA2LL, R. Rhodes (K6LTL), Box 38, Navy 3923, FPO, San Francisco, Calif.
- KA7DR (via FEARL)
- KG4BX (via W2CTN)
- KH6EGL/W1, G. Hall, 604 Woburn St., Wilmington, Mass.
- KL7EEH/W4, H. Loree, 755 Englewood Dr., Columbus, Ga.

KP6AZ/mm (to W6FAY)
KZ5DGN, D. Gittins, Hq. & Hq. Co., Ft. Davis, C.Z.
OH2s AH/B YV/Ø, Hammarlund DXpedition, Box 7388,
 (P.O. New York 1, N. Y.)
ON5AH (to K9KRZ)
ex-PK4DA-PAØFM (to VK2AVA)
PY8DR, P.O. Box 71, Belem, Para., Brazil
SV0WGG, c/o 907 Church St., Baltimore, Md.
TG9SM, c/o U.S. Information Svc., Guatemala City,
 Guatemala
TT8AJ (see preceding text)
UT5AA, L. Yailenko, Box 27, Donezk 66, Ukrainian S.S.R.,
 U.S.S.R.
VEØNM/mm (via VE1AHG)
VP6AO, J. Bond, St. Peter, Barbados
VP8HJ (via RSGB)
ex-VØ1IZ (to K6PUC)
ex-VR3G (to G3KDE or MP4TAS)
VS1MB (via K7GCM)
VS9OC, Cpl. T. E. Druce, Tt35, RAF, Masirah, BFPO
 69, c/o GPO, London, England
W3AHM/KL7, Capt. E. Gladding, USN, Box 30 Navy,
 230, FPO, Seattle, Wash., 98791
W4HQZ/mm, Staff CCD-18, USS *Essex* (CVS), FPO,
 New York, N. Y.
WA6LED/KG6, W. Broder, Box 116, NavCommSta, Navy
 926, FPO, San Francisco, Calif.
XØ1CS (to K61CS)
YV2GI, P.O. Box 299, San Cristobal, Venezuela
YV6DW, L. Alberto, Box 56, Ciudad Bolivar, Venezuela
YV6EN, P.O. Box 27, Ciudad Bolivar, Venezuela
ZD6LA (via ZD6OL)
ZD6PBD (see preceding text)
ZD8HB (via W2CTN)
ex-5A3GJ, S. Gibbs, 11 Rowand Ave., Giffnock, Renfrew-
 shire, Scotland
6Ø6BW-K4JLD/6Ø1 (via WA4FXE)
6YAXG, P. Wingle, P.O. Box 628, Kingston, Jamaica
7X2NJ (via RØP)
9A1VU (to DL1VU or via DARC)
9QJ5G (via UBA or direct)

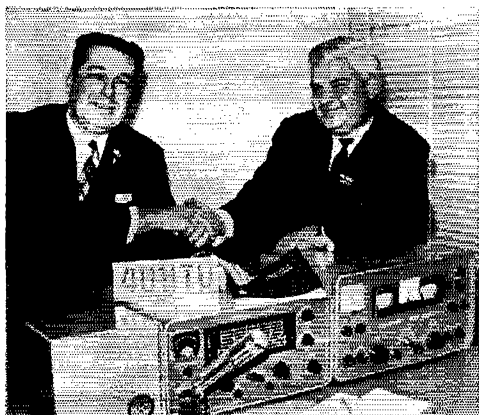
These offerings come courtesy **W1** 1ECH 1UED 2BTQ/-
 KH6 2GBB 4NJF 61D, **Ks** 2UYG 3SLP 3VDH 4OGV
 5JIX 5JVF 7VMO 8EZH 8JPL, **Was** 2KSD 4DZU 4ITK
 9ICQ, **WN5GZX**, **KH6BZF**, **KP4BJM**, L. Waite, DARC's
DX-MB (DLs 3RK 9PF), DX Club of Puerto Rico *DXer*
 (KP4RK), Far East Auxiliary Radio League *News* (KA2CM),
 International Short Wave League *Monitor* (12 Gladwell
 Rd., London N.8, England), Long Island DX Association
DX Bulletin (W2MES), Newark News Radio Club *Bulletin*
 (L. Waite, address in preceding text), North Eastern DX
 Association *DX Bulletin* (W1BPW, KINOL), Northern
 California DX Club *DXer* (WA6TGY) and West Gulf DX
 Club *DX Bulletin* (W5IGJ). Come again, colleagues!

Whence:

EUROPE — "Poor propagation conditions are making
 E contacts between France and the U.S. more and more
 difficult," regrets P8HA. Possibly with this in mind, French
 authorities have just raised the power ceiling for the E gang
 to 100 watts. . . . For those who still have some steam
 left over from the ARRL DX stamp now in progress,
 VERON (Holland) will hold its 1964 PACC Contest on the
 25th-26th of next month. Participation particulars next
 QST. . . . Fifteen-meter reports on my 7-Mc. dipole
 impressed me with the importance of good contest equip-



KC6BO's S-line outfit feeds an antenna farm 250 feet
 above Koror of the Palau, Western Carolines. **K8ETI**,
 left, and **WB2ELT** have a TA-33 tribander, 7-Mc. ground
 plane and 80-meter dipole hung on lofty towers of a
 troposcatter installation. Dale and Wayne normally prefer
 20- and 40-meter work. (Photo via W3NKA,
 W. Penna. DX Society)



4U1TU now has a second operating position thanks to
 equipment contributed by **W2GHK**, left, president of the
 Hammarlund Company and godfather of that organiza-
 tion's DXpedition of the Month series. **HB9AEQ**, president
 of the International Amateur Radio Club, Geneva, and an
 International Telecommunications Union functionary,
 accepts the layout from **Stu**.

ment." writes **K3KMO** to **W1VG** concerning his MIM
 sojourn of late autumn. "Namely, a good call sign! Ten
 meters never opened for me, and 80 was good for only one
 Statesider. **W4BVV**. I operated atop Mount Titanus, and
 when you can look down from your hamslack and see jet
 fighters flying by, you have a good location. Being a traffic
 man, in 12 years of hamming I myself have yet to work
 San Marino. . . . **G5GH** aims to make plenty of
 3.5-, 7-, 14- and 21-Mc. noise as **GM5GH** in the final week
 ends of the ARRL Test. . . . **ØHs** 2DG 2XK 2XZ
 5TM and 8RJ, with trappings supplied by **W2GHK** & Co.,
 were behind the multiband Alands action of **ØH2s** AH/B
 and YV/Ø in January. . . . **LA4WH/p** disports an
 HX-20 on Jan Mayen, according to **NCDXC**.

ASIA — **VU2GWZ** has a hundred countries stashed away
 in one year on the air and soon will drop the "Z" in his
 call to become a General Classman. "I run only 25 watts to
 a dipole, receive on an HRO with Gelo-so front end, and
 I'm active almost daily at 0100-0300 and 1100-1600
 GMT." Fast QST delivery is taken for granted by **W/K/VEs**
 but **VU2GWZ** has to wait 45 days for his. . . . **9A2DQ**
 tells **W4NJF** that country-hunters impair his rag-chew
 style. Jim would like to get to know a few Yanks but it's
 hullo-good-bye when those rare good 14-Mc. openings come
 along. . . . **HL9s** now may use 3500-3550 kc. from
 dusk to dawn. Other 'round-the-clock USFK allocations are
 7000-7100, 14,000-14,350, 21,150-21,250 and 28,450-28,550
 kc. . . . **W1TYQ**, hying for ArAmCo in Saudi Arabia,
 tells **W1YYM** of ARRL that individual HZ licenses may
 soon become less difficult to obtain. Vic wants to help
 activate those neutral zones. . . . From **K7GCM**:
VS1MB's new suburban location permits more W/K con-
 tacts on 14,250-14,280 kc. around 0100-0700 GMT, a.s.b
 preferred, with a Viceroy, KW-77 and vertical. You may
 have worked Ted previously as **G3NJM** or **DL2GA**.
VS1MB may try a Borneo DXpeditionary venture later
 this year. . . . **K5JVF** finds **K4OKZ** pumping the 7-Mc.,
 key of **KA2KS** from 0730 GMT to fade-out. . . . **AP5s**
CP on 14,015 and 14,060 kc., and **HQ**, 14,010 kc. impress
K2UFG with the steady workability of both Pakistans
 around 1300 GMT. . . . More from the East via the Paki-
 stans, **W4BPD** may follow more **YA1A** and **AC3PT** DXing
 with a VS-land swing, after which a Stateside vacation
 beckons (Gus. . . . **HZ2AMS** (ex-5N2AMS) holds Neutral
 Zone credentials as **7Z2AMS** and **8Z2AMS**, plus Yemen
 papers as **4WIZ**. A few more crystals and a pair of 14-AVS
 phased verticals to go with his **KWM-1** should generate
 plenty of 14-Mc. DX cursonary action this season. **Angus's**
KYL reserves such **MP4** calls as **BYL** **MYL**, **QYL** and
TYL. . . . HS amateurs are banding together in attempts
 to have Thailand removed from ITU/CCU banned-country
 status. **W6CYI** is a fresh hand over there. . . . **AP2MI**
 (ex-5A5TM) schools in Texas for a Trucial tour. . . .
XW8AU emcees a southeast Asia a.s.b. net on 14,320 kc. at
 1430 GMT week days, 1200 on week ends, and juicy pre-
 fixes abound. . . . **XZ2s** AD and SY on sideband, **DW** on
 a.m., **BB KN KH** and **KT** on c.w. keep Burma well rep-
 resented on 20 meters. . . . **JARAQ/1** now handles **JARL**
 awards matters at the address listed in "Where." **JAIADN**

can supply info on the Worked All Asian Countries certification, and FEARL awards manager KA2GM answers inquiries on that society's Worked 5 KAs, Worked 25 KAs and Worked 7 KA Districts diplomas. KA2s CO (W7GYQ), FF (K6VFF), HT (K9UAF) and LS (K4ZRL) hold new or renewed FEARL memberships. Ex-KA8MA now signs K1RTD/4 at Homestead AFB, Fla. W4HQZ/mm sports a 500-watt s.s.b. outfit and multiband vertical on 14,300 kc. aboard USS *Essex* in Middle Eastern waters.

AFRICA — Via W1WPO we hear that 606BW (K4JLD) has a 3S-2, 75-S3A and TH-4 spinner on 14,125-, 14,325- and 21,410-kc. sideband, 14,034-kc. c.w., from Kismayu while constructing a port with USAID. "I expect to be here about fifteen months. W/Ks come through at 1800-2200 GMT, peaking about 2000, on 14 Mc." Whew — Bee is only 32 miles from the equator. ZD60I, tells W1YYM that he and ZD6HJ finished building the latter's single-sideband sender in time for the ARRL Test. Alan and ZD6LA expect to try a Test week end or two atop 6000-ft. Zomba mountain. ZD60L says, "The U.S.A. season is in again, and I'm active most nights pending openings on 14 or 21 Mc. from 1700 GMT onwards." ZS3EW married the lass who lured him away from the '63 ARRL DX Contest, according to W1YYM. "Twill be interesting to see how Brian makes out in the current clambake.

K0EZH heard VQ1LZ go QRT for an abrupt return to K6PUC. Man, Zanzibar is rare again. 5N2RSB/TJ8 collected QSOs from 30 countries during his rugged Cameroons DXpedition in December. His borrowed SR-150 and SX-117 got a good bouncing in a Land Rover, and conditions were such that only ten W/Ks made the grade. Did you catch 5N2RSB from Dahomey last month?

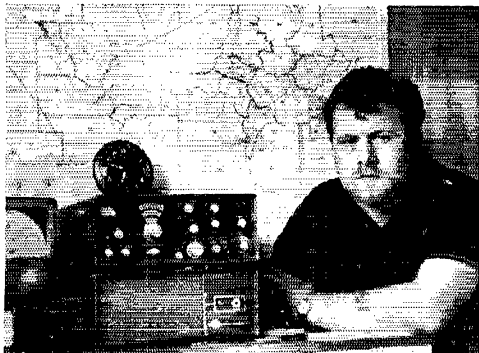
Africa addenda courtesy aforementioned club journals: VQ9HB, armed with HB97T's sideband shooter on 14,108, 14,114 and 14,119 kc., should be checking in from Chagos, Rodriguez, Agalega and St. Brandon isles by this time. FH8CD is expected to boost Comoros 21-Mc. output in the year ahead. DXpeditions to Marion island may have to swim for it. Only one ship a year, as a rule. Members of the new Radio Society of Sierra Leone are 9L1s NH and TL with 75 watts of c.w., JR on 14-Mc. a.m., JC on c.w. and a.m., and HX with single-sideband, 9L1s GM and RO are also active.

OCEANIA — "I'll be working all bands, specializing in 40 c.w.," warns WA6LED/KG6. Bill wants to shake up the 7-Mc. Novice gang with out-of-the-blue DX QSOs. VK2AVA (ex-PK4DA-PA6FM) worked 8PPO on 75-meter s.s.b. at 0745 GMT recently. The QSO was long-path and signals stayed in for a half hour on the 14,000-mile haul. VB6TW/mm, with a KWM-1 and multiband vertical aboard training ship *Golden Bear*, will close its tour of the Galapagos, Cook Islands, Tahiti, Ecuador and Peru this month. Operator K6MQC is especially interested in s.s.b. contacts on 10, 15 and 20 meters. Pacific patter provided by club pressmen: W6FAY opened another Pacific prowl with KP6AZ/mm radiations and hopes to include VS4 5W1 K84 and Navassa on the jaunt. KG6SE and W4VGL/KG6 show up on 20 sideband from Saipan and Marcus. VR1B is back on Tarawa for a year or so, and VRIG keeps Ocean Isle available at 0600-1100 GMT on 14-Mc. s.s.b. VS4IH reportedly knocks off for a Rhodesian assignment.

SOUTH AMERICA — Connoisseurs of YL-type DX take note that VP8s DQ DR DV DZ FG FH FI GG GM GN HC and HS are all on the distaff Falklands side. YL VP8HQ is even rarer on South Georgia. Remember that VP8HF intends to serve a juicy South Sandwich this month. PY2CWU wants to work more 14-Mc. W/Ks on single-sideband in the evenings but 20 has been ragged after dark. DXCPR hears that Chilean research vessels now occasionally sign CE8ZI on 20.

HEREABOUTS — W3AHM/KL7 writes from remote Adak island where club stations KL7s AIZ and AZN

propagate profusely. "There are also a few private stations here such as KL7s BT DHH and my own. Most activity is on 20 meters, with 15-meter operation when the band is good, and occasional nighttime excursions to 40. We're about 4000 miles from Washington, D. C., and 2000 miles from Honolulu, pretty good DX from the 49th State." DL9KRA (FF8CW-GW8CW-PT8BV) recently visited W2EQS and found him laid up with some fractured ribs and a broken 1.5-Mc. antenna. Jon couldn't do anything about Charlie's ribs but he insisted on repairing the long-wire in midwinter snow before departing. That old ham spirit, of course. KB9PL invites the overseas gang to look for Missouri pals in the 1964 Missouri QSO Party from 2300 GMT, April 25th, to 0200 on the 27th. Suggested rallying frequencies are (c.w.) 3550, 7050, 14,050, 21,050 and 28,050 kc.; (phone) 3850, 7250, 14,250, 21,350 and 28,650 kc. K9GSV will accept results. Virginia Century Club's 1963 DX Certificate for outstanding contribution to the advancement of DX was awarded to W4ECI, the OMI behind the scenes in the continuing DX odyssey of W4BPD. Ws 4BPD 2CTN, UA3CR and HB0TL were honorably mentioned. W4NII and others express disgust at excessive CQing by W/Ks in wide-open DX bands. Also contributing to the general confusion are rare DX stations who do not clearly identify the chaps they work. K0ICS hopes to sign XE0ICs in the final DX Test week ends upcoming. Every DX man has his favorite, if not quite justifiable, candidate for status as a DXCC List country. WA6VAT's is Hunza, an isolated



MP4DAH-MP4QBG of Das Island and Qatar looks determined to rule his next pile-up with an iron fist. Bing signs G3NMQ back home, and also is well known as former 5A3BC. (Photo via W5VA-W5AI)

clunk of Himalayan Kashmir where centenarians play soccer. W8YGR and Buckeye Net buddies on 3580 kc. are running into TVI troubles with color-TV neighbors. Seems that short-sighted designers incorporated a vulnerable 3579-kc. circuit in the monsters. Back to the drawing board and DX, Jack. W6s AM GPB LD1 HOC EBY and BVM lead NCDXC DXperts with countries totals of 305, 303, 292, 291, 289 and 288. Voice-only toppers are W6s AM LCF, K6s VVA EYE and WA6TGY with 300, 231, 216, 192 and 149. NCDXC's big men in band-countries are W6s AM BYB, K6VVA, W6s PQW KG and BVM with totals of 1042, 900, 809, 803, 801 and 787. KP4s H1S BPW MO and K8MZT are new DX Club of Puerto Rico recruits. Is it really true that more meaningful reports are traded on CB channels than on amateur bands? NCDXC editorially flays the liddish practice of handing out worthless inflated RS and RST readings. **QST**

Strays

Outstanding New England Amateur Radio Operator

The Federation of Eastern Massachusetts Amateur Radio Associations will present an award to an outstanding New England amateur radio operator. Only hams in the first amateur call area are eligible and should meet any one of the following qualifications:

- a) Performed a meritorious public service to his community through the medium of amateur radio;
- b) Made a major contribution to the science of amateur radio;
- c) Helped greatly to stimulate interest in amateur radio to others;
- d) Aided other radio amateurs to acquire a greater knowledge and skill in operating or building amateur radio equipment.

This honor will be presented at the New England American Radio Relay League Convention May 9-10 at Swampscott, Mass. The recipient receives a cash gift of \$150 plus a handsome plaque.

Nominations are urgently requested. They should be sent to Mr. Eli Nannis, W1HKG, 37 Lowell St., Malden, Mass. The closing date for nominations will be April 10, 1964.



Operating News



F. E. HANDY, WIBDI, Communications Mgr.
 GEORGE HART, WINIM, Natl. Emerg. Coordinator
 ELLEN WHITE, W1YYM, Ass't. Comm. Mgr.

ROBERT L. WHITE, W1WPO, DXCC Awards
 LILLIAN M. SALTER, WIZJE, Administrative Aide

Amateur Radio Public Service Corps....	79	DX Century Club Awards.....	98
ARRL Activities Calendar.....	98	Emergency Frequencies.....	80
Brass Pounders League.....	96	RACES News.....	81
Code Proficiency Program.....	97	RTTY Frequencies.....	97
WIAW Operating Schedule.....		97	

ARRL Code Proficiency Awards. More and more amateurs show their CP rating on their QSLs, along with their other certificate listings. Here is a little information for those starting on the business of earning our award. 10 w.p.m. is the lowest speed rating to earn a certificate. One first gets a certificate showing the initial speed at which he qualifies. Endorsement stickers are given subsequently, for each five-w.p.m. improvement over your initial speed. This may continue up to and including 35 w.p.m. WIAW transmits on eight bands at the same time — the frequencies as specified monthly in *QST*. As the seasons change our signals may gain or drop in signal strength, so check the WIAW signal on the different bands from time to time, as necessary. Whatever one's speed, to *gain* speed it is necessary to copy down on paper all the characters that are recognized. Our early-evening WIAW code practice is always sent at 10, 13, and 15 w.p.m. This is in addition to the hour of transmission in mid-evening. The speeds then go as low as 5 w.p.m. on four days of the week and as high as 35 w.p.m. the three other days. Always remember to try to copy something faster than you can readily put to paper, as your means to speed up in your copying ability.

The expansion of WIAW services to provide two code practice runs each day (see page 97 December '63 *QST*) seems to have met with wide approval. Our tape-sent c.w. bulletins (at 18 w.p.m.) can be just as useful practice as the peri-

ods devoted to that. These are sent twice each evening. One such transmission directly follows the early practice. Since bulletins change at approximate weekly intervals and are sent twice on c.w. nightly it is easy to check one's own copy on a subsequent transmission of the OBS message. Once every month, instead of just practice tapes, WIAW and W6WP schedule *Qualifying Runs*. All CP certificates issued by ARRL are based on these monthly qualifying runs. To be certified it is necessary that we find in the copy you submit to us one full minute of consecutive copy without any error or omission.

Certificate Issuances July '63 through December '63. The number of *different* amateurs code-certified in the ARRL program has now reached over 44,000. During the year 1963 there were 3739 papers submitted for correction, 2053 receiving initial certificates, 1249 code proficiency stickers issued and 437 failing on the initial submission.

Most certifications were in the 10- 15- and 20-w.p.m. speed ranges. *Very special credit* is due those who go on to achieve the full 30- and 35-w.p.m. rating. It gives us pleasure to present a report of those who were certified in this final six months of '63 at these higher speeds:

ARRL certified at 35 w.p.m.

K1AEC*	W42LRI*	W4EXM/3*	W6BRG*	W9HHV
K1LJV*	W2MTA*	W4HUP/3	W6BYS	K9WSR
W1NJJ*	K2RCO*	W4KLD	W6PCDE*	W9EEP*
K1WKK*	W42VYS*	K4KWQ*	W46DMS*	K9EIV*
W42AUH*	W42WEE*	W4ZJY*	W6BTJ*	K9GIC*
W2BVE*	K3BHL	W46FHR	W46VFN*	W9PCT*
WN2BXX	K3HTZ*	W6HRR	W48BYN*	W9ZWK*
WN2HAH*	W4EJP*	W5LLC	W48EGG*	KZ5FP
WB2IKJ*	W4EJQ*	K5TLG		

Donald Zelenka, Canal Zone

ARRL certified at 30 w.p.m.

KN1YRP*	WA2VLK*	K4NIX*	K6SXX/4*	WA9DHI
W2AYU*	WA2VSW*	K4QFV*	W46VFN*	W9FRS*
K2BZX	K3HTZ*	W4SEEM*	K7CHH*	K9GSD*
W2CFV*	K3QDD*	W5HTM*	K7QXG*	K9HFP
K2HBA*	K3SMT*	W5JA/W5ALY*	K7UCH	W9NPC
K2JBX	W4EJQ*	W6BQR*	W8AXI	W9PMD
WA2MYS*	K4E0F*	W460RS*	K8BSH*	VE6ALS
WA2PUM*	WA4FNQ*	W460WF*	W48ENO*	HP9XJ
W2RSE/V01*	W4JA	K6PKH*	W48FIO	
W2SKX*	W4JYB*	W6RQZ	W8NOW	
W42VEB*	W4KEZ*	W6RZO*	K8VWN*	

Pete Wood*, Aloha, Oregon Thomas F. Keena*, Farmington, Conn.

* Endorsement sticker.

For Full Break-In. KØHZF recently wrote us that more *QST* attention was needed to stress



LET'S AVOID SPEECH-MAKING ON BOTH VOICE AND CW

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are per GMT)

Mar. 6: CP Qualifying Run — W6OWP
Mar. 11-15: DX Competition (phone)
Mar. 17: CP Qualifying Run — W1AW
Mar. 28-29: DX Competition (c.w.)
Apr. 2: CP Qualifying Run — W6OWP
Apr. 11-13: CD Party (c.w.)
Apr. 15: CP Qualifying Run — W1AW
Apr. 18-21: CD Party (phone)
June 13-14: V.H.F. QSO Party
June 27-28: Field Day

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of *QST* issue in which more details appear.

Feb. 29-Mar. 1: Mar. 11-15: YL-OM Contest, YLRL (p. 77, last month).
Mar. 16: WIEIA High Speed Code Test, Conn. Wireless Assn. (p. 95, this issue).
Apr. 25-26: PACC, VERON (next issue).
Apr. 25-27: Missouri QSO Party, Northwest St. Louis ARC (next issue).

break-in for c.w. as well as voice work. "So many operators simply do not know what I am talking about when I mention break-in. A common response is that the operator is controlling the station by using *merely one switch*. Break-in should always be defined as indicating *that one can be interrupted at once, at will, between dots and dashes or in pauses during voice transmission*. Some operators have to turn down their receiver gain while sending and so can't hear the other operator and the advantage of break-in is missed. Most modern equipment lends itself to break-in with simple modifications. There is a great bonus in added pleasure one gets in operating a station with break-in properly arranged. I find nothing sweeter than listening to a couple of good operators, each of whom has break-in." This can curtail needless transmission if interference pops up on the operating frequency. Break-in is one of the tools every operator should have and use to meet increased band occupancy. Have a break-in system. Using it constantly in either c.w. or voice work is a mark of the good operator and often a refreshing contrast to the operating procedure of many newcomers in the game who could easily install and use break-in to advantage.

Everyone Handle Some. "Everyone should handle some traffic each month. The count should be reported to the net manager and the SCM of the ARRL . . ." Marge of K8JUH writes thus in the Michigan PON Newsletter. The item includes a tabulation of results; such makes a concrete showing of our amateur service as a public service. Each licensee owes it to himself as well as the fraternity to develop basic ability so in a disaster he could formulate and

This excellent photo was recently used on the cover of the Capital District IEEE *News-Bulletin* and shows, left to right: E.N.Y. SCM/Asst. Dir. W2EFU, EC/OPS Union College Physics Professor K2HNW (at his operating position) and WA2CGD, Disaster Chairman, American Red Cross Chapter.

March 1964

handle emergency communications effectively. Accuracy, net know-how, and procedure are developed *only* in the main through handling some *short* of a disaster situation.

"Everyone handle some traffic." To swim one gets in the water; to become traffic-knowledgeable just report in with "QTC 1" on the most convenient traffic net . . . *your* section's net whose frequency is given in the ARRL Net Directory. Should you send us a message or write ARRL for a Net Directory, ask us for two or three Form 1 reporting cards. These (also gratis) are for monthly reports of your traffic to your SCM. — F. E. H.

RTTY NOTES

Coast to coast 3620-kc. contact using amateur radio teletype is getting quite common under these winter night conditions. K8DKC and K7DMZ both have new Mod. 28 ASR. K4YJA is running traffic on 80. Cass, W3NMP, was snowbound. K5DFW, an engineer for Texaco has his own homebrewed TU, and works his Dad, K5DFW. W5ACK has a 750-watt signal, and the K5JEX TU is under construction. W9GDW is heard "all over" and W9AOV, Cuba, Ill., gets out with a 4-1000.

Some of the quite regular check-ins on the South RTTY Net are W5s, POG, IDZ, UY, JUM/5, WVY, TCZ and K5s ANS/5, BTZ, BVS, LQL and FMS. W5UJC is getting on RTTY with W5TUH assisting. W5TCZ at Lubbock reports there will be two more on RTTY here soon. This net works on 7140 kc. Sunday morning. A number of the East Coast gang are operating in this band, using narrow shift, 170 c.p.s. Also on 14,090 kc., among the regulars W8AJL, W8BZB/HC2, WA4GTA, K5RAV and W8DKC; several use narrow shift. K5LQL to whom we are indebted for the above information reports 21,090 kc. good for his contact with the west coast and New England stations.

NCARTS bulletins are sent regularly by K6ESZ, Richmond, Calif. As of the year's end he transmitted a slick tape constituting a complete '64 calendar for the benefit of all on RTTY. The tape was designed by K6AJA, edited by W6FT and K6QQL and transmitted with best wishes for the New Year. W7WWG in the Pacific Northwest continues to issue *F-1* every other month. The RTTY group meets rotationally monthly in members' homes in the Portland (Ore.) area.

HIGH SPEED CODE TEST DATA

Conditions were anything but good, last September 16, when the Connecticut Wireless Assn., W1EIA, with the assistance of honorary members K6DYX and W6EOT, put on another High Speed Code Test. Nevertheless, some 20 applicants submitted copy and 11 qualified at four different speeds, despite the poor conditions. Those qualifying at speeds indicated were (at 40 w.p.m.) W4DVT, W4KLD, W4USM, W4VHK; (at 45 w.p.m.) WA2EXP, K2KTK, W8LEX; (at 50 w.p.m.) W6EDG/K3RXO, W6FZX, W6OWP; (at 55 w.p.m.) W2LYH. Several tried at 60 w.p.m. but none made it this time.

The next special test transmission is scheduled for March 16, at 01:30 GMT. If you *still* (after all we've tried



to teach you!) persist in using local time, this will be March 15 at 2030 EST, 1930 CST, 1830 MST, 1730 PST. We expect K6DYX and W6EOT will again be transmitting on 3690 and 7005 kc. respectively, in addition to W1E1A simultaneously on 3637 and 7120 kc. The call-up starts at 0100 GMT and lasts for a full half hour, to allow listeners to pick the frequency best suited for reception at their locations. Very important instructions start at 0130 GMT, and test runs, starting at 40 w.p.m., begin at 0145 GMT. Five-minute transmissions at 40, 45, 50, 55 and 60 w.p.m. follow every ten minutes. You have to copy one minute consecutively solid of the 5-minute transmission to qualify at that speed. If you have qualified before but want another certificate to show it was no accident, be our guest (and we won't tell if you think the second time!).

W1E1A or WINJM or other member stations transmit code practice at speeds varying from 15 through 65 w.p.m. every Monday (Sunday to those addicted to local times) at 0130 GMT simultaneously on 3637 and 7120 kc. Give a listen, get your speed up and get one of these CWA certificates. They're a very impressive status symbol!

OPERATOR OF THE MONTH

Vote Once

Can you think back over the month of February and pick out one operator who, by virtue of his clean signal and extra-special skills and courtesy, merits your "vote" as operator of the month?

Considerations to bear in mind include good keying, careful enunciation, correct procedures, judgment and courtesy. The League's Operating Aid No. 11 lists further examples.

If you come up with one nominee (just one, please), jot down his call, the band and mode on a postcard along with your name call and address and send along your vote for "Operator of the Month" to the ARRL Communications Department, 225 Main Street, Newington, Connecticut 06111.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for December Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
W3CUL	676	4997	4193	726	10592
W3NKK	191	4010	3087	829	7337
W6LGG	473	1657	1496	78	3704
W9IDA	17	1475	1422	12	2926
W9JOZ	20	1437	1432	0	2889
W1PEX	237	1180	1084	43	2544
W9HDR	53	1072	1053	14	2192
K9KZB	9	1029	929	36	2121
W9AOW	21	1044	917	125	2107
W7BA	1	1006	982	21	2098
K6EPT	98	973	658	315	2044
W3VR	73	911	892	8	1884
W6GYH	191	778	772	4	1745
W6RSY	28	857	550	305	1740
K4KP6	30	852	765	87	1734
W4ZGPT	37	856	757	79	1729
W3IVS	18	779	735	44	1576
W8UPH	26	775	663	106	1570
W6WPF	5	729	725	54	1563
K6BPT	10	753	717	36	1516
W4OCCP	18	782	637	74	1511
W7DXZ	15	746	691	18	1470
W1TXL	97	653	625	23	1398
W3EML	22	706	615	12	1355
W6JXK	47	637	259	378	1321
W4QCCX	18	687	622	24	1318
W4JYV	18	679	559	1	1257
K7CTP	26	581	488	130	1225
W4ZUZK	17	583	557	24	1181
W2EW	76	541	216	309	1142
K9DHN	13	591	518	14	1137
W4NTA	37	548	482	53	1120
W6BBO	51	505	448	19	1021
K1DQC	21	502	430	67	1020
W9MML	2	497	446	30	975
W4ZVLK	22	472	451	18	963
K8MDD	0	473	450	23	946
K3BHT	12	448	438	7	905
K9ZLA	18	426	422	7	868
K6BCX	48	272	272	272	864
K6IUV	17	423	395	28	863
K2VNL	9	404	394	30	837
K7IWD	48	400	357	31	836
W4DLA	15	399	406	5	825
W4EYA	39	390	365	17	801
W5PPE	10	374	352	22	758
W6EOT	1	369	378	1	747
W4ZRU	163	297	248	34	742
K9IMR	40	360	108	229	737
W2GVA	29	347	286	33	703
W2RUF	42	345	181	130	729
W4ZEX	2	361	321	28	712
W4KJPC	19	342	339	3	703
W2OE	116	334	227	19	696
W6QAE	41	327	300	24	692
W6STP	68	349	258	9	685
W6SCT	12	338	21	313	684
W4PQP	111	285	243	43	682
K7JHA	16	348	314	2	680
W5DTA	8	340	219	110	677
W4ZKQG	18	326	313	17	674
K9IVG	30	312	303	17	652
W4B8RG	49	305	267	31	645
K9GSD	8	312	295	25	640
W4ZYS	17	310	256	39	622
W4DAE	46	299	153	109	607
W4ARDNZ	18	295	283	6	602
W4SAUM	25	284	279	3	591
K8MVO	21	286	267	14	588
W4ZWAJ	10	288	283	6	587
K8HLR	40	273	212	61	586
K1WKK	51	274	246	11	582
K9ZSQ	16	276	233	51	576

Call	Orig.	Recd.	Rel.	Del.	Total
W4ZHSB	11	281	267	14	573
K8GOU	11	270	139	153	573
W9AYB	30	255	152	133	570
WB2DEP	142	216	161	45	564
W9ZWL	3	383	137	40	563
K6PZM	11	270	254	16	551
K1WKF	150	200	174	26	550
W4WTK	3	272	240	34	549
K4VFF	16	261	231	30	538
K3MPZ	56	239	237	2	534
W4ZBLV	14	249	221	49	533
W4ZWGN	130	200	185	15	530
K1RYT	1	283	263	0	547
W2URP	23	251	239	12	525
WB2ALF	115	205	199	1	523
K3QOO	239	143	109	30	521
K3DKH	10	254	252	2	518
K1ZBN	44	248	223	0	515
W4ZPVW	105	205	130	75	515
K5IBZ	21	247	229	18	515
K1ESG	197	168	121	27	513
W4AKBU	297	99	28	89	513
K4LIT	291	106	96	10	503
W6EPL	21	241	229	12	503

Late Reports:

W4AKE (Nov.)	19	571	562	4	1156
W6WPF (Nov.)	7	371	343	28	749
W6BBO (Nov.)	69	309	272	3	653
W6GYH (Nov.)	30	284	263	14	641

More-Than-One-Operator Stations

Call	Orig.	Recd.	Rel.	Del.	Total
W8IAB	1057	6440	6018	390	13905
K8RMD	340	3065	3038	27	6470
W6YDK	3439	988	883	103	5411
K8GDI	385	1785	1740	45	3855
K8GCF	2741	68	140	62	3011
K8RMB	1706	120	43	72	1941
K8RCP	1123	170	153	17	1463
K8RMB	1310	75	0	68	1453
K6FPC	32	339	313	27	711

BPL for 100 or more originations-plus-deliveries

K6GZ 386	W6RFF 138	W4HRG 111
K3OWS 298	W3PUD 135	W1FTV 110
W9NZZ 250	W48HJ 134	W9BTU 110
W4PCJ 232	W4ARJ 134	K3OWN 109
W7APS 220	K7EWZ 134	W7OCX 108
W44FC8 208	W4AR1 125	K9CYZ 108
W4B9Y 192	W4DGE 123	W4AKE 107
W1LES 177	K4MCL 122	W9DYQ 107
W428A 171	W4NML 121	W4RHA 105
W3EEB 163	K8LUI 121	W5DTR 105
K3PYS 160	K8CIP 120	K9OZM 105
K6GJM 149	K8KMQ 119	W4ZCF 102
W44HC 146	W6TK 117	Late Reports:
W4Y 145	W8EG 115	K6HFP (Nov.) 130
WB2HC 139	W3FLP 111	W4RZP (Nov.) 108

More-Than-One-Operator Stations

W4PDS 175	Late Reports:
W4PFC 134	W6UW (Oct.) 175
	K6RJE (Oct.) 132

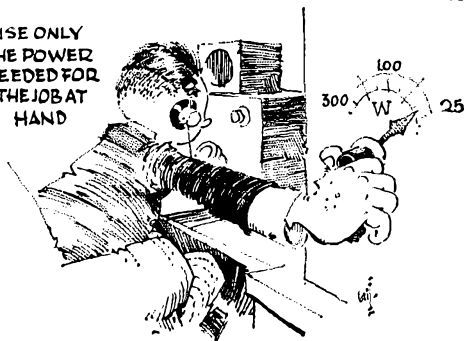
BPL medallions (see Aug. 1954 QST, p. 64) have been awarded to the following amateurs since last month's listing: W4ZBLV, W4JYB, W9AYB.

The BPL is open to all amateurs in the United States, Canada, and U.S. Possessions who report to their SCM a message total of 500 or a sum of origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

**SUGGESTED
OPERATING FREQUENCIES**
RTTY 3620, 7040 14,090 21,090 kc.
WIDE-BAND F.M. 52.525 146.94 Mc.
GMT CONVERSION

To convert to local times subtract the following hours
ADST - 3, AST - 4, EDST - 4, EST - 5, CDST
- 5, CST - 6, MDST - 6, NST - 7, PDST - 7,
PST - 8, Hawaii - 10, Central Alaska - 10.

USE ONLY
THE POWER
NEEDED FOR
THE JOB AT
HAND



CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Mar. 17 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on 1805, 3555, 7080, 14,100, 21,075, 28,080, 50,900 and 145,800 kc. The next qualifying run from W6OWP only will be transmitted Mar. 6 at 0500 Greenwich Mean Time on 3590 and 7129 kc. **CAUTION:** Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0230 GMT Mar. 17 becomes 2130 EST Mar. 16.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Daily tape-sent code practice transmissions are available on an expanded basis this season. These start at 0030 and 0230 GMT and are sent simultaneously on all c.w.-listed

W1AW frequencies, with about 10 minutes practice given at each speed: 5, 7½, 10 and 13 w.p.m. on Sun. Mon. Wed. Fri. (GMT date) from 0230-0320 — 15, 20, 25, 30, 35 w.p.m. on Tues. Thurs. Sat. (days in GMT) from 0230-0320 — 10, 13 and 15 w.p.m. daily from 0030-0100 GMT.

To make the practice more beneficial the order of words in each line of the text is sometimes sent reversed. The 0230-0320 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your list by sending in step with W1AW and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0230-0320 GMT practice on those dates:

- Date Subject of Practice Text from Jan. *QST*
Mar. 2: *It Seems to Us*, . . . p. 9
Mar. 5: *A Simplified Frequency Synthesizer*, p. 11
Mar. 11: *Meet the Oscilloscope*, p. 18
Mar. 24: *A Compact 500-Watt Transmitter for 50 Mc.*, p. 25
Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Mar. 25: *Series and Parallel*, p. 17
Mar. 30: *Alternating Current*, p. 18

W1AW SCHEDULES

March 1964

Operating Visiting Hours

Monday through Friday: 3 P.M.-3 A.M. EST.
Saturday: 7 P.M.-2:30 A.M. EST.
Sunday: 3 P.M.-10:30 P.M. EST.

The ARRL Maxin Memorial Station welcomes visitors. The station address is 225 Main St., Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent on request. The station will be closed March 27, Good Friday.

Operating Frequencies

C.w.: 1805 3555 7080 14,100 21,075 28,080 50,700 145,800.
Voice: 1820 3945 7255 14,280 21,330 29,000 50,700 145,800.

Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibrating purposes.

Official Bulletins

Bulletins containing latest information on matters of general amateur interest are transmitted on the above frequencies according to the following schedule in GMT:

C.w.: Mon. through Sat., 0100; Tues. through Sun., 0500.
Voice: Mon. through Sat., 0200; Tues. through Sun., 0430.

Caution: Note that in the U.S. and Canada bulletin hours usually fall on the evening of the previous day by local time.

W1AW CONTACT SCHEDULE

Would you like to work W1AW? W1AW welcomes calls from any amateur station in accordance with the following schedule:

GMT	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0120-0200 ¹	7080	3555	7080	3555 ²	7080
0210-0230 ¹	3945	50.7 Mc.	145.8 Mc.	3945	3945
0330-0430	3555	3945	7080	1820	3555
0440-0500 ¹	3945	14,280	3945	14,280	3945
0520-0600 ¹	3555 ²	7255*	3555	7080 ²	3945
0600-0700	14,280	14,100	3555	14,100	.....
0700-0800	7255*	3945	7080	3945	7255*
2000-2100	14,280	21/28 Mc. ³	14,100	.....	.....
2100-2200	14,280	21/28 Mc. ³	14,100	21/28 Mc. ³	21,330	.....
2200-2300	14,100	14,280	21,075 ²	14,280	14,100	.....
2330-2400	7255*	.....	7080	.....	7255*	.....

¹ General-contact period on stated frequency begins immediately following transmission of Official Bulletin which begins at 0200 and 0430 on phone and at 0100 and 0500 on c.w. Starting time is approximate.

² W1AW will first listen for Novices before checking the rest of the band for other contacts.

³ Operation will be conducted on either 21,075, 21,330, 28,080 or 29,000 kc.

* Operation may be on s.s.b. as announced at the beginning of the period.

Station Staff: W1QIS, W1WPR, K1MET.



DX CENTURY CLUB AWARDS



Honor Roll

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given, including deleted countries. Positions in cases of ties are determined by date of receipt. All totals shown represent submissions received from December 1, through December 31, 1963.

W1FH...306/332	W8MPW...305/323	W2HMJ...303/323	W2BOK...302/319	W0BFB...300/319
W2AGW...306/330	W2LPE...305/326	W7GBV...303/327	W2ZZX...302/321	W1ZW...300/317
W6GUO...306/331	W9YFV...305/329	W5ASG...303/327	K2DCA...302/319	W0SYK...300/318
4X4DK...306/324	W3KVT...305/329	G4GCP...303/327	VE7ZM...302/326	W2FNN...299/313
W8BRA...306/329	W1ME...304/327	W6YU...303/323	W3JTC...302/325	K4LNM...299/313
W3GHD...306/330	K2GFO...304/325	W8LKH...303/323	W2LV...302/321	G3YF...299/321
KV4AA...306/330	W5ADZ...304/326	W6GPB...303/324	W8BKP...301/323	W2OKM...299/317
CX3CO...306/327	W9HUZ...304/324	W6EBG...303/328	W2ZGB...301/324	W2ZGB...299/315
W1GKK...306/331	W9LNM...304/327	W3ECR...301/318	W4LY...301/319	W4LY...298/319
W2TOC...306/325	K3UPG...304/328	W0AIW...303/326	OE1ER...301/323	G3AAM...298/322
W9RBI...306/331	W4OCW...304/321	HB9J...303/327	W0ELA...301/324	K6EVR...298/315
W7GUV...306/329	W2JT...304/323	W4TM...303/325	W5CKY...301/320	W7AC...298/322
W8JIN...306/331	W8KML...304/325	W1CLX...303/326	W5SUC...301/318	G8KS...298/316
W8UAS...306/327	W1BIH...304/328	DL3LL...303/327	W7ENW...301/325	W4VFD...298/315
W4DOH...306/330	W5MMK...304/325	G3FKM...303/320	W4ML...301/321	W2QHH...298/319
W4GD...306/327	W2BXA...304/328	G2PI...303/326	K2BZT...301/318	W2GUM...298/320
PY2CK...306/329	W3LMA...304/326	W3JNN...303/327	W8DAW...301/324	W4OPM...298/313
W8POO...306/323	W0DU...304/326	LU6DJX...303/327	W0ODF...301/318	W1HZ...298/316
W9NDA...305/329	W0QVZ...304/325	DJ1BZ...303/321	K6ENX...300/317	W4GXB...297/318
W7PHO...305/323	W8JBT...304/323	W6AM...303/327	W5AEK...300/325	W2UVE...297/315
W8KIA...305/329	W1JYH...304/327	W5ABY...302/319	W4AT...300/317	W0N7...297/317
W8BF...305/326	CE3AG...304/328	W5KC...302/325	W9AMU...300/317	W3GAU...297/320
W8DMD...305/327	W2DEC...304/320		W6CYV...300/318	W8KPL...297/315

Radiotelephone

W3RIS...306/331	4X4DK...305/323	W1FH...303/324	W4DOH...302/323	W2BXA...298/320
CX3CO...306/327	W8GZ...305/328	VOAER...303/325	W2JF...298/312	W3JF...298/312
W9RBI...306/329	W8BF...305/326	W8KML...303/324	W3JNN...301/322	W6M...297/321
PY2CK...306/329	W8POO...304/321	PY4TK...303/320	W0AIW...299/320	W4OCW...296/321
W7PHO...305/323		W6YY...302/322		W9JF...296/313

New Members

From December 1, through December 31, 1963 DXCC Certificates and Endorsements based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

K0TJW...230	WA2GIX...113	K0EZH...105	SM5AM...103	K6YVY...101	K6INT...100
W5LPH...142	TP1R...111	DL8DL...105	W42LW...102	K9ZGX...101	K1RDP...100
UA4PW...141	ZK1AR...109	W0OR...104	W2X...102	VE8JY...101	W1RW...100
PY5ASN...127	ON5Z0...108	OESFX...104	K3NBU...102	HA5BG...101	W4BWS...100
HC2AW...122	K9RNQ...107	K1TUQ...103	DJ3GY...102	LA9AF...101	W46CZ...100
DJ5PN...116	K2ISP...105	W42CPG...103	UA3IR...102	UC2AF...101	K0ALL...100
W6BRV...115	K4RCS...105	W2HTX...103	W42PW...101	ZS6JG...101	SM5CFU...100
F2NB...115	K8NFD...105	W4ADZU...103	W6FET...101	9G1GN...101	SM7UV...100

Radiotelephone

DL7FT...125	W9YT...109	K2ISP...103	W9WFS...102	K5SGK...101	K5ILX...100
F8YO...121	W0OGW...109	W3NM...102	DJ8CB...102	W8VBJ...101	K8WOT...100
HA9OZ...110		K9RNQ...102		NE1AZ...101	

Endorsements

W6EPZ...312	K4WIS...260	K0MNO...223	K6ASL...184	DJ2XP...158	K9YOE...140
G3AAE...312	W9TKD...260	K6TOR...183	K1HTV...183	K4GRD...156	KLDTF/B...139
HB9EU...312	OE1FF...253	W1IKR...220	OH2VZ...181	DL1AA...156	W2FVI...133
W3WGH...310	SP9KB...253	W5VA...220	K1IMP...180	DJ5LA...153	K4EF...133
W5BRR...301	W7BA...252	W0SIR...220	VE7PU...180	K8GJD...152	K4CEF...132
G2BVN...301	K2JGG...251	W9WJH...213	SP9ADU...180	K8RDE...152	W1HOZ...131
W4BQY...300	W3LPE...251	K0LZL...212	W4GP...178	UA6KOD...152	ON4UN...131
W9KXK...296	K4HRG...251	W9NLJ...210	W4PZ...176	K1JGO...151	YU2AKL...131
W2BRV...293	W4THZ...251	VE3LZ...204	W5CME...175	K1LWV...150	K4RZK...130
W2FXA...290	HB9MD...250	W0QMD...203	E9A9A...172	W1MX...150	W6UMI...130
VE3ES...287	W46TCY...245	K1YRO...202	OE8KI...172	K2OXN...150	W46GQW...130
JT1TAI...286	W5KFT...243	K0IGT...202	VE4NJ...171	K3MINJ...150	W9WGW...130
KP4VD...285	W8DUS...240	K6CYG...201	W5AL...170	K4QIE...150	SP5AFL...130
W8S2S...284	W2MJ...237	W6AAO...200	K7BJE...170	W0HNA...150	OH7PJ...128
VE4XO...284	HK3LX...234	SP6FZ...200	W6QKC...170	DJ1UE...150	K8BCK...125
W7CMO...282	W4DLG...233	K9WTS...194	K04AO...170	DJ2SR...150	K5AEU...124
W6HYG...280	F3DJ...232	W7LZF...194	OH3UO...168	KC6BK...150	HA5KQ...124
G3AIZ...280	SP9RF...232	W1DGJ...192	W2CFZ...165	OZ8U...148	W6AJB...122
K8ONV...275	K5JZ...230	DJ3GJ...192	K6TUV...164	W2GRA...146	W1KYK...122
W4JDR...273	W8CUT...230	K9BLT...191	K2JUS...162	W9WV...145	K2RNV...120
W2EMW...272	W8TTN...230	W48NU...190	K1MEM...161	K5QVH...141	W44EDY...120
W2MES...270	LU8RAJ...230	E3ZU...190	W2LJF...161	VQ8AL...141	W46OEH...120
K2ZKU...270	K5RFJ...229	C3GSZ...190	W4HOS...161	K1GUD...140	K7EQM...120
W4AVY...270	W61PH...228	K3DNU...189	W42DL...160	W1YYM...140	OE1TZ...120
W9W10...270	OH6BA...227	W45DY...189	K3JHG...140	K8JHG...140	CX3SO...111
K4EDF...260	K8WOT...224	W42LEK...186	W6WGC...160	K8AJK...140	W9LKL...110

Radiotelephone

W3KT...310	G3AAE...243	VE3ES...214	W1DGJ...190	W7QPK...163	W2CZF...144
W9WHM...310	K8LSG...241	K0TJW...213	W7BTH...184	EA4GZ...162	W9LAA...142
W1ONK...303	K8ONV...234	K4BVG...211	K3DNU...183	DJ30J...161	W2LEC...141
Z56Q...293	W4DCR...233	W4DLG...211	W5DYV...178	W2GRL...160	W1PH...141
W3WGH...293	HK3LX...230	OE1FF...210	W3LPH...172	ZS6BBP...160	KC6BK...136
W1ZW...272	DL3DW...223	9M2DQ...205	K4HRG...172	DJ5LA...152	W9KDJ...121
K1XG...271	K2JGG...222	SM5RY...201	K6CYG...172	W2GRY...150	W8NKK...121
W5LZW...261	W2FGD...221	K2GNX...200	F2MO...172	W4NI...150	K4SBI...120
W1HX...261	W88ZS...220	W2DEC...200	JT1TAI...170	W6KUT...150	K5SGJ...120
K2BZT...260	K0MNO...220	K8ORC...199	SP9KJ...169	W46LW...150	K9VRV/4...120
EA7D...259	W4CZ...220	W7CZ...191	W4JDR...160	W7DMJ...150	LU8RAJ...120
W6HYG...254	VE4XO...216	DL7AA...191	W5CME...163	LU1DJU...150	VE3CTX...111
				K9UKN...146	WA2FQG...110

THE SINGLE SIDEBAND AMATEUR RADIO ASSOCIATION

THE SINGLE SIDEBAND Amateur Radio Association was founded in 1956 to promote the technical and operating advantages of single sideband. With dedicated leadership and enthusiastic membership, the organization grew from seven members in 1956 to thirteen hundred members in 1962 with international participation. Late in 1962, the SSBARA realistically faced the fact that it had successfully accomplished its original aims and purposes and turned to a new field — that of making philanthropic awards to institutions which serve handicapped people.

THE FIRST GRANT was to the Braille Technical Press which relies solely on contributions in order to carry on its world-famous work on behalf of the blind under the brilliant direction of Robert Gunderson, W2JJO.

AT THE CLOSE OF 1963, a second grant was made to the St. Albans Naval Hospital, Queens, New York. The Hospital was presented with a transceiver and microphone to inaugurate its ham station and is now operating under the call of WB2GMZ/2 until its own call is assigned to it. As one of the largest Naval medical installations in the country, St. Albans has a complement of about 1500 patients and personnel representing all fifty states. Thus far, many of the patients have been able to talk back home through amateur radio. It is hoped that, during the current year, the amateur radio facilities donated by the SSBARA will be made good use of in reuniting other patients and personnel with their families.

THE ORGANIZATION holds its meetings, open to all amateurs, in New York City and devotes its programs to matters of interest to sidebanders. Officers of the SSBARA are John F. Rider, W2RID, President; Harry Dannals, W2TUK, Vice-President; Ezra Markson, K2UUJ, Treasurer; and Dorothy Strauber, K2MGE, Secretary. Members of the Board of Directors are Mort Kahn, W2KR; Arthur Greenberg, W2CYK; David Talley, W2PF; Henry Marcus, W2AJX; Buddy Robins, W2JKN; Lawrence Bargebuhr, W2FGZ; Monroe Freedman, W2ASI; Stanley Rosenberg, WA2GFV; George Scott, W2LFX; and Irving Binger, W2CMM.

THE SINGLE SIDEBAND Amateur Radio Association hopes to continue its worthwhile project through the support of its members and of those attending the now-famous Sideband Dinners, the next of which will be held on March 24, 1964, at the Statler Hilton Hotel in New York City. Tickets are ten dollars per person for the all-day Hamfest and Buffet Dinner and may be obtained from Buddy Robins, W2JKN.

AMATEURS throughout the world are urged to renew their memberships in the SSBARA in order to expand the scope of its philanthropic activities on behalf of amateur radio. The organization is hopeful that it may also receive additional contributions from members of the amateur fraternity so that the new aim of the group may be successfully achieved. Membership dues of three dollars per year and contributions may be sent to the Treasurer, Ezra Markson, K2UUJ, 51 Beaumont Avenue, Massapequa, New York.

WE LOOK FORWARD to your participation in the Single Sideband Amateur Radio Association.

73

JOHN F. RIDER, W2RID
President



W. J. Hooley W9AC

Levin Marshall K9EBE

hallicrafters

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Allen R. Breinor, W3ZRQ—SEC: W3DUI. RM: W3EML. PAM: K3CAH. V.H.F. PAMs: W3SAO, W3SGL. OBS appointments go to K3EMA and K3BHU. W3UMK is a new OBS. The Central Penn. 6-Meter Traffic Net held 30 sessions and handled 647 pieces of traffic. KN3YIC started a Novice net on 7185 kc. at 0400 GMT. K3KTH is now NCS for 3RN. K3TEJ was active in the Virginia QSO Party. KN3YEO is active with an HBR 25-watter. W3URE is working 20-meter DX. New Gear Dept.: A new mic and 75-meter whip to W3AHZ; an HB keyer to K3OMP; eleven elements on 6 meters to K3ARR; 6-meter transceiver for W3JKX assisting in local traffic coverage; a kw. linear for K3MNT; a new 2-meter mobile unit for EC K3ZDK; an HW-12 in the mobile of W3PYF. K3ZZS and K3FLG are now General Class. New operators in the Fasset area are KN3ZOI, KN3ZOK and K3FSM. W3BKF received the Public Service award. K3YQJ was QRT a few days because of B-plus troubles in his HQ-129X. K3MTF has been temporarily inactive because of rig troubles. New club officers—leading RC: W3WJC. pres.; W3EYN, vice-pres.; W3UQC, secy.; W3CDS, treas. Philmont Mobile RC: K3GNI, pres.; W3EQV, vice-pres.; W3WPD, secy.; W3MHR, treas. The ARTICS have a club technical library for the use of the membership. Activity at W3KEK was down because of deer hunting. He got his deer. W3FEY has changed QTH and has erected a 65-ft. mast for the new v.h.f. antennas. SEC W3DUI was admitted to the Veterans Hospital with a bad throat infection. The January V.H.F. SS gave our Official Observers quite a workout. Even a baseball game has rules. What say, fellas, let's try to follow the rules of good amateur operating practice. W3ID visited his jr. operator W3SKL at State College. While writing this report a terrific snow-storm is in progress, 21 inches in fact. This should prompt some ECs in some very interesting conditions encountered in the section. Traffic: W3CUI 10,592. W3YR 1884. W3IVS 1576. W3EML 1355. K3BHU 905. K3MVO 588. K3MQE 428. K3OMP 283. K3CAH 262. W3FLP 241. W3RV 234. K3LTI 145. K3KTH 121. K3HT 116. K3YQJ 114. K3ARR 106. W3JKX 75. W3QDW 71. W3VAP 65. K3SME 60. W3ZRQ 54. W3LXN 49. W3NNL 44. K3MNT 43. W3LC 42. W3ELI 36. K3TMR 30. W3YO 28. K3TEJ 28. K3LSX 24. K3KNP 23. W3EEN 22. K3JHF 20. K3EMA 19. W3PTF 18. K3ZDK 18. W3BFF 14. K3HTZ 10. W3ADE 8. W3BKF 8. W3PDJ 8. W3BUR 5. K3ORG 5. K3TSO 5. W3ID 3. K3RFH 2.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Andrew H. Abraham, W3JZY—SEC: W3CVE. RM: K3JYZ and W3ZNV. The MDD Traffic Net meets on 3649 kc. daily at 0000Z. The MDDS (slow) Traffic Net meets on 28.1 Mc. at 0130Z. PAM: W3FQK. The MEPN meets on 3820 kc. MWF at 2300Z and Sat. and Sun. at 1800Z. W3BKE is taking an active part in traffic work again. W3CDQ is active on the amateur bands again. W3CQS received a new NCX-3, a Hi-Gain four-band trap antenna and a Shure microphone for Christmas. Ed has held the same call for the past thirty-eight years. K3DNO is busy with school work. W3HQE has been busy on 40 meters. W3YVC is studying electronics. Red took time out to help with the holiday traffic. K3JYZ has a new automatic keyer using a tape and has been working in all the contests. K3LLR has his 8-meter rig in the car working fine. W3OHI is busy on the MARS frequencies; he also checks into the s.s.b. nets in addition to the a.m. nets. W3QCW has a 40-watt emergency transmitter and receiver ready for use and reports that the 80-meter band has been very bad for traffic because of long skip. (Why not use the 6-meter c.w. band when conditions are bad?) K3QDD won an HA-6 Hallicater in a contest. K3QOO has been appointed

NCS on 3RN for Sat. nights. K3RGB reports that the Baltimore Amateur Radio Club provided communications for the "Toys for Tots" campaign, in which 13 mobile stations were used to pick up the toys. K3SGD, Baltimore Area EC, activated his AREC group for Snow Emergency Communications on Dec. 23. A total of 28 stations responded for the net operations. W3TN had to give up traffic handling and will take it easy for a while. Dave has done a wonderful job in keeping the traffic level high and has kept the MDD Net operating to a high standard for the past year. K3TUI and KN3YNF passed the General Class exams. Bill will be active with his Seneca. K3URZ participated in his first (4) Party. K3VX reports that KN3FUW is on 2 meters and K3TEL is operating on 6 meters. W3YKQ also is active on 6 meters. Harvey is building a new s.s.b. exciter for 75-20-15 meters to drive a half-kw. linear. W3ZNV reports that Calvert County finally has come up with a KACES program. Traffic: (Dec.) K3QOO 521. K3QDD 247. W3TN 214. W3YVC 171. K3JYZ 122. W3QCW 87. K3VBI 83. W3PQ 61. K3OSX 57. W3ATQ 6X. W3OHI 68. W3HQE 40. K3RGB 40. W3EOV 27. W3AHO 24. K3SGD 18. K3URZ 9. K3LLR 4. K3LLV 2. W3ZNV 2. (Nov.) K3OSX 57.

DELAWARE—SCM, M. F. Nelson, K3GKF—PAM: K3LEC. RM: W3FEB. DEPN meets Sat. on 3905 kc. at 1830 local time. DSBM meets Tue. on 50.4 Mc. at 2100 local time. Renewals: K3BBR as OBS; K3EWK as OPS; W3EKO and W3HC as ORSs; K3LEC as PAM. A new Technician in Dover is K3WEH. The Delaware Six Meter Net had a transmitter shut Nov. 24. K3DZG, K3OBU and K3OZM report in from the U. of Del., where they are freshmen. K3MPZ and K3VWY furnished mobile communications for the Jewish Chanukah Relay Race. Congratulations to W3FER, W3FUD, K3MPZ and K3OWS for winning the first Delaware Section BPL certificates. Next month's column will include a recap of the 1963 "Operation Holiday Greetings". Traffic: (Dec.) K3MPZ 534. K3OWS 472. W3FEB 338. W3EKO 226. K3GKF 204. W3FUD 135. W3CFA 91. K3AZH 59. K3EWK 51. W3YI 28. K3RNZ 26. K3BYJ 12. (Nov.) K3OWS 178. W3FEB 97. K3KAJ 1.

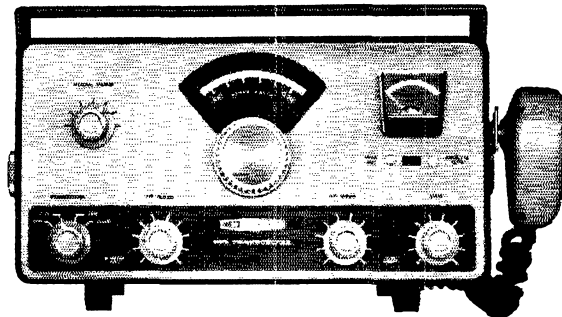
SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: K2ARY. PAM: W2ZL. RM: WA2VAT. N.J. Phone and Tic. Net Dec. totals: Sessions 31, QNT 550, traffic 322. WA2BLY is the new NJN mgr. The Net's Dec. totals are 32 sessions, QNT 452, traffic 569. K2CPR merchantville, now has a 1DXCC score of 282/278. WA2LBL reports that the Princeton YWMC Radio Club, K2PWK, is remodeling its operating room. K2RXB, Margate, plans to spend a month vacationing in Florida. WA2BLY made the BPL again. The Southern Counties AR Assn. has elected WA2OZQ pres., K2CIR vice-pres., WA2TVU secy., WA2SIP treas. Many SCARA members have received the Public Service Award for their work during the flood emergency in March, 1962. The NJRA's newly-elected officers are W2OSD pres., WA2GSO vice-pres., W2FYS rec. secy., W2LBN corr. secy., K2BG treas. In a recent NJRA photo contest W2LY placed first, W2BQ second and K2PI third. K2BG visited the Port City ARC during the holidays. This club issues the WANE certificate. The Gloucester County AR Club has as a project building twenty-two "Six Pack" transmitter and converter kits. K2JKA, Gloucester County EC, is the editor of the club paper, Crosstalk. WA2KGD is the publisher. The club held its Annual GCARC Birthday Party during January. Contact WA2AFZ, the club's corr. secy., for information on club activities. No news was received this month from clubs in Mercer, Cumberland, Salem or Cape May Counties. News and activity reports should be mailed to me by the first of each month. Traffic: (Dec.) WA2BLV 533. K2RXB 193. W2RG 135. W2ZVV 103. W2MMD 93. W2ZI 53. WA2VAT 31. WA2WLN 29. K2SHE 21. K2JJC 15. W2BEL 12. K2CPR 12. W2IU 2. WA2KAP 2. (Nov.) WA2VAT 35. WA2WLN 23. WA2WVF 4.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ICZ. RMs: W2RUF, W2EZR and W2FEB. PAM: W2PVI. NYS C.W. meets on 3670 kc. at 1900; ENS on 3590 kc. at 1800; NYSPTEN on 3925 kc. at 1800; NYS C.D. on 3610.5 and 3993 (s.s.b.) at 0900 Sun.; and 7102.5 kc. at 1930 Wed.; TCPN 2nd call area on 3970 kc. at 1900; IPN on 3980 kc. at 1800; 2RN on 3690 kc. at 0045 and 2345 GMT. BPL certificates for December traffic go to W2GVA, WA2KQG, WA2HSB, W2RUF

(Continued on page 102)

Big in Power and Popularity

Little in Size and Cost



Heathkit Single Band SSB Transceivers... \$119.95

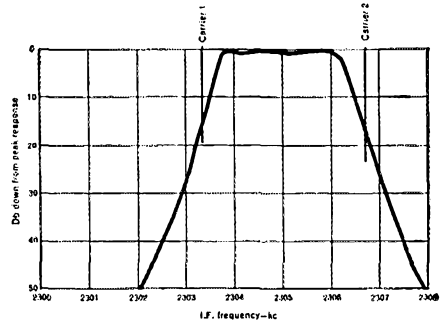
It's easy to see why the new Heathkit SSB Single Band Transceivers are heard so often on the air today—in both fixed and mobile operation! They are compact (less than 1/2 cubic foot), lightweight (only 12 lbs.), loaded with versatile features and pack more input power-percentage than any other comparable unit (200 watts PEP). And best of all you save two thirds the cost of three band units by buying only the band you need. Assembly is a marvel of simplicity (only 15 hours) with over 90% of the components mounted on a heavy-duty circuit board. The rugged one-piece steel chassis is welded and braced to withstand plenty of abuse . . . dependable operation with maximum stability. Choose 80, 40, or 20 meter models, or all three, now and enjoy versatile, power-packed performance at lowest cost!

Check These Features!

- True Transceiver for one-band, one sideband operation
- 200 watts PEP RF input
- Crystal filter type SSB generation
- Automatic level control
- PTT and VOX circuits built-in
- Low frequency VFO (1.5-1.7 mv) for greater stability
- 2 kc dial calibration
- 6" of bandspread
- Vernier tuning
- Provision for operation with Linear Amplifier
- Fast, easy, circuit board assembly
- Complete with one-piece steel cabinet and "gimbal" mounting bracket.

- Kit HW-12, 80-meter (LSB) . . . 15 lbs. \$119.95
- Kit HW-22, 40-meter (LSB) . . . 15 lbs. \$119.95
- Kit HW-32, 20-meter (USB) . . . 15 lbs. \$119.95
- Kit HW-42 (all 3 models) 45 lbs. Save \$39.85 . . . \$320.00
- Kit HP-13, DC power supply . . . 7 lbs. \$59.95
- Kit HP-23, AC power supply . . . 18 lbs. \$39.95
- GH-12: Push-to-talk microphone . . . 2 lbs. \$6.95
- Kit HR-10A: Plug-in 100 kc crystal calibrator. 1 lb. \$8.95

SPECIFICATIONS—RF Input: 200 watts PEP. **Sideband generation:** Crystal lattice bandpass filter method. **Stability:** 200 cps per hour after warm-up. **Carrier & unwanted sideband suppression:** 45 db. **Frequency coverage:** HW-12, 3.8-4.0 mc; HW-22, 7.2-7.3 mc; HW-32, 14.2-24.35 mc. **Receiver sensitivity:** 1 uv for 15 db S+N/N ratio. **Receiver selectivity:** 2.7 kc @ 6 db, 6.0 kc @ 50 db. **Output:** 50 ohm fixed (unbalanced). **Operation:** HW-12 & HW-22, LSB; HW-32, USB. **Audio output:** 1 watt @ 8 ohms. **Mike input:** Hi-Z. **Panel controls:** Frequency, final tune, function (OFF-PTT-VOX-TUNE), RF gain, AF gain, (pull for crystal calibrator), VOX gain, meter. **Front panel screwdriver adjust** for S-meter and VOX delay. **Rear panel controls:** Mike gain, tune level, final bias. **Tube complement:** Fourteen tube heterodyne circuit; (3) 6EA8's mic. amp., VOX relay amp., IF amp., RF amp., Rcvr. mixer; (5) 6AU6's, VFO, VOX amp., IF amp., Xmt. mixer; (1) 6BE6, VFO isolator (HW-12), Het., Osc. and mixer (HW-22 & HW-32); (1) 12BY7, Driver; (1) 12AU7, Xtal osc. product det.; (1) 6EB8, Audio amp. and output; (2) 6GE5 RF output. **Power requirements:** 800 VDC @ 250 MA peak, 250 VDC @ 100 MA, -125 VDC @ 5 MA, 12 VAC or VDC @ 3.75 amperes. **Cabinet dimensions:** 6 1/2" H x 12" W x 9 3/4" D.



A "pre-designed" full lattice crystal filter provides selectivity and unwanted sideband suppression comparable to the most expensive transceivers. Note the narrow bandpass (2.7 kc at 6db), steep skirts (6.0 kc at 50 db), and low passband ripple (less than 1 db).



HEATH COMPANY

Benton Harbor, Mich. 49023

In Canada: Daystrom, Ltd., Cooksville, Ont.

9-3-1

Enclosed is \$ _____ plus postage. Please send model(s) _____.

Please send my Free 1964 Heathkit Catalog.

Name _____

Address _____

City _____ State _____ Zip _____

Prices & specifications subject to change without notice. AM-145

FREE CATALOG

Send for your free copy today! Fully illustrates over 250 exciting Heathkits at savings of 50% or more! Choose from the world's largest selection of quality Test, Amateur Radio, Marine, Hi-Fi, Educational and General Hobby kits.



Station Activities

(Continued from page 100)

and W2OE. Congratulations! New appointments: K2-KTK as OBS and W2BDMU as OES. Endorsements: K2DNN as Chemung County EC. W2FEW won the Most Valuable Station Award in NYS C.W. for '63. NYS C.W. had a total of 365 sessions and 6738 messages in '63. K2LWR is going to erect a 200-ft. tower and full-size 40-meter beam. W2OE will be in W6-land until May 1. W2RPI and W2CUZ got married. Sandy was given away by OM W2TOP. Congratulations! W2JCE passed the General Class exam. The statewide 2-Meter V.H.F. RACES Net has changed frequency from 144.125 to 144.200. Mc. W2RTE, net mgr., will communicate with stations south of Poughkeepsie at 9 p.m.; north of Poughkeepsie at 9:15 p.m. and to the west at 9:30 p.m. each Tue. Stations desiring to assist can obtain authorization from State Radio Officer, N.Y.S. C.D. Commission, Public Security Bldg., State Office Bldg., Campus, Albany, N.Y. 12226. The NYS RACES call, W2JVG, plus a station unit number will be used for the V.H.S. RACES Net operation. A 6-meter net will be organized shortly. The Western New York Hamfest, sponsored by the Rochester ARA, will be held May 23, two weeks later than usual and at a different site. The executive committee has decided on Vice's fifty acres as the 1964 hamfest site. It is located on U.S. route 15, 4 miles south of Thruway exit 46. Congratulations to W3YA and W3ECP on their reelection as Atlantic Division Director and Vice-Director, respectively. W2LJI is president and instructor of the Laurens Radio Club (Box 183). He is the only ham at present but the club conducts code and theory every Mon. The ARATS elected W2QUP pres., K2RTQ secy., W2RPO vice-pres. and treas. Traffic: W2GVA 733, W2RUF 729, W2OE 696, W2AKQG 674, W2HSB 573, W2EZB 468, W2FEB 232, W2HYM 150, K2KTK 141, W2FCG 88, K2RYH 37, K2-OFV 34, K2AYQ 31, K2IMI 30, W2RQF 29, W2BDPR 27, K2LNN 22, W2ADAC 9, W2EMW 8, K2HOH 8, W2-QKQ 3.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mroczka, W3UHN—SEC: W3LIV. RMs: W3KUN, K3-OOU and W3NUG. PAM: W3TOC. The WPA Traffic Net meets Mon. through Fri. at 2400 GMT on 3585 kc. The Keystone Slow Speed Net (KSSN) meets at 2330 GMT Mon. through Fri. on 3585 kc. I wish to announce that W3TOC has consented to take the appointment of Phone Activities Manager (PAM) for the Section. Bill's address is 3 Vine St., Etna, Pa., and he will welcome any inquiries on phone activity. K3ENM and K3CMN are a mother-and-son team on 6 meters from Butler County. Congratulations to K3DKH, K3PYS and K3-OWN on making the BPL for the month. The Brezeshooters' recent Ground Wave Contest on 10 meters was a success. W3GJY now is 294/286. K3AKR now has a 100-watt 2-meter rig on the air. The Nittany ARC is proceeding with the building of a structure at NARC Park. W3IYI has an HT-37. K3VCU and K3VXQ now have their General Class licenses. The Two Rivers ARC at McKeesport is editing a club paper called *Spark-Gap*. The Coke Center RC reports: K3VHP and K3-QQN now have Generals; new Novices on 40 are KN3-FCQ, KN3FLW and KN3PCW; W3RUW recently was hospitalized. K3KUZ now is on s.s.b. K3UTR now has a Vibroplex bug. The section AREC program is growing under the able leadership of W3LIV as SEC. The ECs have been doing a swell job; most noticeable recently was K3IFK of Allegheny County. The Uniontown ARC reports via *The Maapie*: K3YIG received his Technician Class license; K3CYR has a new tape recorder; W3CAV won the Fayette County Men's Singles Duckpin Tournament; K3AUE is attending St. Vincent College; K3SAA has a transmitter on 432 Mc. K3OOU, net manager of KSSN is getting out a bulletin on the net. K3PYS had a perfect attendance for QNs on the WPA Net for December. Traffic: K3DKH 518, W3MFB 427, K3NZR 410, K3PIE 341, K3PYS 331, W3KUN 200, K3OWN 178, K3TEZ 100, W3UHN 86, W3LOS 66, W3-OBQ 42, W3NEM 27, W3SMV 25, W3KWO 24, K3VPI 19, W3GJY 14, K3SMB 11, K3HID 9, W3IYI 8, K3COT 4, K3RGV 1, W3UIU 1, K3UTR 1.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—RM: W9USR. PAM: W9VWJ. Cook County EC: W9-HPG. Section net: ILN, 3515 kc. Mon. through Sat. at 1900 CST. The new officers of the Central Illinois Radio Club, Inc. (Bloomington), are K9GMY, K9WMD and W9BNU. K9MBS, K9IMX and W9GCGJ have been enjoying QSOs on 432 Mc. W9SMD reports the Illinois Post Office Net meets on 3925 kc. at 5 p.m. week days. Our sympathy to the family and friends of W9YUC, who recently passed away. The Illinois RM has returned from a two-week vacation in the Panama Canal Zone and also Panama. W9FBB, K9CON, K9RZP, K9CNX,

K9RUC and K9MTW were elected as officers of the Eastern Illinois Ham Society (Carm). The Chicago Area Radio Club Council has been having public discussions with its area clubs in regard to the Chicago Zoning Code, which prohibits antennas and towers. This is described as a serious threat, not only to amateurs but also to television viewing and public service and other types of transmission equipment. K9EAB is sponsoring a new Land of Lincoln Award. The County Hunters Net meets on 7220-kc. s.s.b./a.m./c.w. daily from 8 a.m. to 4 p.m. with K9UTI as net control. The Starved Rock Radio Club elected W9IEU, W9RHV, W9QLZ and W9-NIU as its 1964 officers. New appointments include W9A9EVT and K9RVC as OESs and W9OCCP as OBS. W9A9CKQ has received his WAS certificate. W9TV spent the Christmas vacation with his 3rd harmonic grandchild in Portland, Ore. W9JID and W9EU have new KWM-2s in their cars. W9PBY is DXCC on s.s.b. with a homebrew kw. K9JAW has a new GSB-KW and 200V exciter. The North Central Phone Net handled 3194 messages, and the IUN traffic count was 113 during the month of December. K9VJSJ has a new TA-33 on a 40-ft. tower. K9ILJ is experimenting with the big wheel antenna on the entire 2-meter band. K9BTE is working good DX with the new Drake TR-3. W9IDA also is sporting a TR-3 and is making plans to go mobile with it. W9APT has built a new Heathkit DX-60. New calls heard were Generals WA9GQK and WA9GVW. The Elgin Radio Society is planning to conduct classes to improve the technical knowledge of its members. W9EEP has a new 40-meter 8JK beam. W9IDLZ now extends his contacts by telephone relaying. This writer wishes to thank the many amateurs who were thoughtful in their holiday card remembrances. K9ZNU has been experimenting with homebrew-design 6-meter gear. BPL certificate recipients for December traffic include W9IDA, K9KZB, K9GSD, K9OZM, W9A9CCP and K9CYZ. Traffic: (Dec.) W9IDA 2928, K9KZB 2121, W9A9CCP 1511, K9GSD 640, K9OZM 306, K9CYZ 293, W9SMD 231, W9-JXV 169, K9YIMZ 105, W9USR 80, W9A9JF 76, K9LNR 74, W9ADKAI 56, W9AIK 36, K9RAS 22, W9APT 17, W9PRN 16, W9VYG 8, W9HPG 6, W9LNX 4, W9HISZ 3, K9PNB 1. (Nov.) K9CYZ 93.

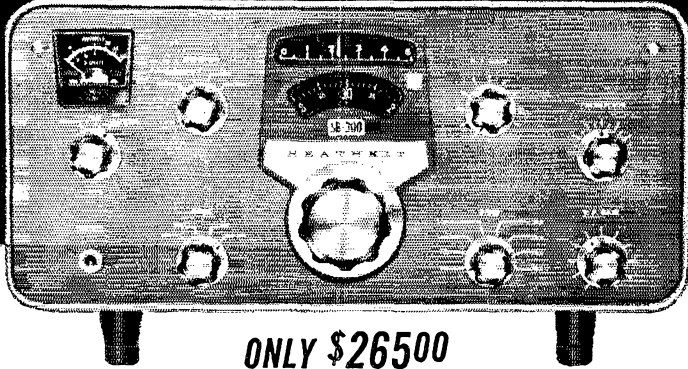
INDIANA—SCM, Ernest L. Nichols, W9YYX—Asst. SCM: Donald Holt, W9FWH. SEC: K9WET. PAMs: K9CRS, K9IVG, K9GLL. RMs: K9JHN, W9JOZ, W9TT. Net meets in GMT: IFN, 1330 daily and 2300 M-F on 3910 kc.; ISN, 0030 daily (2330 during winter) on 3920 kc.; QIN, daily at 0000 and RFN at 1200 Sun. on 3656 kc. New appointments: K9IVG as PAM of IFN, K9CGQ as EC of Marion County, K9EBK as EC of Vigo County, W9LNC as EC of Warren County, K9BSL as OPS, W9A9AM and W9A9ECX as CRSS. New officers of the Indianapolis RC: W9APB pres., W9CKB vice-pres., W9OCCX secy., K9EUC treas. The Gibson ARC is building up a net on 50.58 Mc. New officers of the Svmour ARC: K9BGR pres., W9JRW vice-pres., W9-YDP secy.-treas. W9CLY of Purdue has a new IIX-500 transmitter. QIN honor roll: K9VHY, K9DHN, W9A-ECX, W9QLW, W9A9AM and W9T. Those making BPL: W9JOZ, W9A9ECX, K9JHN, W9AMI, K9ZLA, K9-IVG, W9A9AM, W9NZZ, W9BUQ. Amateur radio exists *because of the service it renders*. Dec. net reports: IFN 374, ISN 1219, QIN 231, Hoosier V.H.F. 183, RFN 82. Traffic: (Dec.) W9JOZ 2889, W9A9ECX 1318, K9DHN 1137, W9MIM 975, K9ZLA 868, K9IVG 652, W9A9AM 591, W9NZZ 384, W9BUQ 368, K9LEJ 239, W9TT 208, K9-KTL 171, K9RWQ 137, K9GEO 121, K9ARW 107, W9CC 107, K9INF 97, W9ABWY 81, W9OG 71, K9LAU 58, W9-YX 57, K9GEL 56, W9BTT 53, W9DCA 51, K9ILK 50, W9A9ELY 46, K9JSK 46, W9FWH 34, W9RTH 32, K9VHY 29, K9JQY 28, K9QXI 26, K9JRI 22, W9ZT 22, W9PYM 21, W9A9EV 20, W9OU 20, W9A9GI 15, K9BSL 15, K9-PAR 14, K9ZLB 12, W9FJI 10, W9DOK 9, K9CFT 6, W9-JSY 8, W9SNQ 8, W9DZC 6, W9BID 6, W9A9ERR 6, W9-BYJ 5, K9DHI 4, K9FPA 4, K9UHQ 4, W9AQW 3, K9PNJ 2, W9ADVJ 1, K9GHN 1, K9PNP 1, W9TKK. (Nov.) W9JSV 2.

WISCONSIN—SCM, Kenneth A. Ebnetter, K9GSC—SEC: W9HCC. PAMs: K9TMR, W9NRP, W9NGT. RMs W9KQB, W9AKE. Nets: WIN, on 3535 kc. daily at 0045Z; WTN, on 3710 kc. Tue. through Sat. at 0130Z; BEN, on 3950 kc. daily at 2400Z; WSNB, on 3985 kc. daily at 2315Z; SWRN, on 50.4 Mc. Mon. through Sat. at 0300Z. New appointees: K9DKU, W9NGT and W9A-9QT as OBSs; W9A9FNS as OES. Renewed appointments: W9NRP as EC; W9NGT as PAM; W9WJH and W9DYG as ORSs; W9GFL, K9GDF and W9LTK as OOs. W9PBB, K9CYD and K9FLT are making plans for a trip to VPT-land over Easter. New officers of the Washburn County RC are K9REB pres., W9QEX vice-pres., W9NITS secy.-treas. K9DBR has a 180-watt linear on

(Continued on page 104)

DELUXE HEATHKIT® SSB RECEIVER

SB-300



ONLY \$26500

CHECK THESE FEATURES!

• Professional styling & features at 60% savings! • Complete coverage of 80 through 10 meter amateur bands with all crystals furnished, plus provision for VHF converters • Prebuilt, calibrated linear master oscillator (LMO) • 25 KC per tuning knob revolution offers bandspread equal to 10 feet per megacycle • Built-in crystal calibrator • 2.1 KC crystal bandpass filter • Stability of 100 CPS after initial warmup • Wiring harness & two heavy-duty circuit boards for easy assembly

CHECK THESE SPECIFICATIONS!

Frequency range (megacycles): 3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 21.0 to 21.5, 28.0 to 28.5, 28.5 to 29.0, 29.0 to 29.5, 29.5 to 30. **Intermediate frequency:** 3.395 megacycles. **Frequency stability:** 100 cps after warmup. **Visual dial accuracy:** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps on all bands. **Backlash:** No more than 50 cps. **Sensitivity:** Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation. **Modes of operation:** Switch selected: LSB, USB, CW, AM. **Selectivity: SSB:** 2.1 kc at 6 db down, 5.0 kc at 60 db down (crystal filter supplied). **AM:** 3.75 kc at 6 db down, 10 kc at 60 db down (crystal filter available as accessory). **CW:** 400 cps at 6 db down, 2.5 kc at 60 db down (crystal filter available as accessory). **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Audio response: SSB:** 350 to 2450 cps nominal at 6 db. **AM:** 200 to 3500 cps nominal at 6 db. **CW:** 800 to 1200 cps nominal at 6 db. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at Mute socket. **Crystal calibrator:** 100 kc crystal, ±.005%. **Front panel controls:** Main tuning dial; function switch; mode switch; AGC switch; band switch; AF gain control; RF gain control; pre-selector; phone jack. **Rear apron connections:** Accessory power plug; HF antenna; VHF #1 antenna; VHF #2 antenna; mute; spare; anti-trip; 500

ohm; 8 ohm speaker; line cord socket; heterodyne oscillator output; LMO output; BFO output; VHF converter switch. **Tube complement:** (1) 6BZ6 RF amplifier; (1) 6AU6 Heterodyne mixer; (1) 6AB4 Heterodyne oscillator; (1) 6AU6 LM osc.; (1) 6AU6 LMO mixer; (2) 6BA6 IF amplifier; (1) 6AU6 Crystal calibrator; (1) 6HF8 1st audio, audio output; (1) 6AS11 Product detector, BFO, BFO, amplifier. **Power supply:** Transformer operated with silicon diode rectifiers. **Power requirements:** 120 volts AC, 50/60 cps, 50 watts. **Dimensions:** 14½" W x 6¾" H x 13¾" D.

The SB-300 SSB Receiver is the first in an exciting new series of Heathkit SSB amateur gear designed to bring you the finest in communications facilities at great savings. Its professional styling, quality and features offer performance never before found in kit equipment.

Features include a crystal-controlled front-end for same rate tuning on all bands; prebuilt, Linear Master Oscillator (LMO) for linear tuning with 1 kc dial calibrations; built-in crystal calibrator; hermetically-sealed 2.1 kc crystal bandpass filter; smooth, non-backlash vernier dial drive mechanism; optional AM & CW filters; high frequency I. F.; AGC control; provision for transceive operation with matching transmitter available soon.

Kit SB-300...17 lbs....no money dn., \$25 mo....**\$265.00**
SBA-300-1 CW Crystal Filter (400 cps)...1 lb..... **\$ 19.95**
SBA-300-2 AM Crystal Filter (3.75 kc)...1 lb..... **\$ 19.95**

WATCH FOR ANNOUNCEMENT OF OTHER MODELS
IN THIS DELUXE HEATHKIT HAM SERIES!



FREE CATALOG

Send for your free copy today! Fully describes over 250 exciting Heathkits at savings of 50% or more! Choose from the world's largest selection of quality ham gear... "Mobile" ... "Fixed" and Accessories.



9-3-2

HEATH COMPANY Benton Harbor, Mich. 49023

- Please send FREE 1964 catalog
 Enclosed is \$265.00, plus postage. Please send model SB-300.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

AM-122R

Station Activities

(Continued from page 102)

6 meters. Net reports: WBSN, 1319 messages cleared by 1081 stations in 53:40; WTN, 4 cleared by 18 stations in 3:42; WIN (Nov.), 150 cleared by 253 stations 13:38. WTN needs more help. WA9AKK says it's getting lonely, only 4 different stations checked in in Dec. More reports are needed by the SCM for this column, both club and individual. Send whatever you have by the 5th of each month. QOS were led by W9VSO with 6 in Dec. BPL certificates for Nov. traffic went to WA9AKE; for Dec. (Dec.) W9AOX 2107, K9IMR 737, W9DYQ 471, WA9AKE 418, W9CXY 373, K9LDY 81, W9NQT 78, K9GDF 76, W9YT 55, WA9BWD 46, WA9FOM 32, K9GSC 30, W9KQB 30, W9WJH 28, W9HPC 26, W9OTL 19, W9FNT 7, W9FXA 5, K9VIE 4, K9DBR 3. (Nov.) WA9AKE 1158, W9CXY 264, K9GDF 36, W9FXA 3.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel, W0HVA—SEC: W0CAQ, PAM: K0TYY, W0VCQ will be on 2 meters soon. He will have a homebrew converter and 60-watt transmitter on the air soon. W0HAN is a newcomer to the North Dakota section. Traffic: K0ITP 225, W0CAQ 10.

SOUTH DAKOTA—SCM, J. W. Sikorski, W0RRN—SEC: W0SCT. Wedding bells rang out for K0TPF, K0TVJ was best man and K0YUZ was an usher. Sympathy is extended to the family and friends of K0PVL, who became a Silent Key the first week in January. WA0DEM installed a new Tri-band on a 55-ft tower. A new call in Sioux Falls is W9NDIW. W0SCT, W0ZWL and WA0CJ made the BPL in December. WA0CUC has been awarded a Section Net Certificate for c.w. operations. WA0CWX and W0DSK were elected directors of the SFARC. K0ALU is serving a hitch on the hospital ship *Hope*, in Ecuador. K0YNR and K0YWP have a new Galaxy. K0EEZ has moved to a new QTH in Sioux Falls. Traffic: W0SCT 684, W0ZWL 563, W0DYB 476, WA0CJ 289, K0TXW 183, WA0DEM 135, WA0CUC 132, K0VYV 128, WA0FUP 62, K0BMO 61, K0YGZ 43, WA0ARZ 37, W0DJI 34, K0BSW 28, K0TWT 24, W0ZLS 10, K0QYB 7, K0HJD 6, W0DCK 5, WA0EQV 5, WA0BMG 3, WA0EJ 3, WA0CKH 2, W0CMJ 2, WA0CCK 2, K0FQH 2, W0RRN 2.

MINNESOTA—SCM, Mrs. Helen Meidrich, W0OPX—Asst. SCM: Emerson Meidrich, W0RIQ, SEC: K0KIQ, RMs: K0ZRD, K0LJU, PAMs: W0YHR, K0VPI, MSSB: W0HEN. Newly-elected officers of the ARAC are K0PSH, pres.; K0PSI, vice-pres.; K0JXX, secy.; WA0CCA, treas. Endorsed as EC: K0JOA. OO K0ZZR plans a winter vacation in Idaho. WA0DVH, W0HEN, K0VPI, W0UMX, W0FHH, WA0BYO are newly-elected Noon Net NCSs. EC WA0BKA works nights at the Wilmar Post Office and checks into the S.S.B. Net. We welcome W0BCDG, who has moved into our section from California. WA0CAH has Viking mobile and home-brewed 6-meter rigs for EC work. W0OJG has rig and antenna problems but keeps active on RTTY. OES WA0CAG worked New Mexico, Texas and Louisiana in the recent 2-meter opening. K0BAD is very active on phone and c.w., performing as MSN NCS and as CAN, TEN and section liaison. WA0BYO made the BPL with 157 originations and is doing fine work as s.s.b. liaison to our section nets. Traffic: (Dec.) K0BAD 374, WA0ARA 365, WA0BYO 327, K0UXQ 182, K0ZZR 182, W0HEN 176, K0ZIW 98, W0UMX 90, WA0DVH 83, K0LJU 83, K0VPI 77, W0OPX 61, WA0DGW 59, W0YQ 56, K0ZRD 54, K0SRK 53, K0ZKK 48, WA0CPW 43, K0PWC 40, W0KNE 38, K0FYG 34, W0CIV 28, W0YHR 28, WA0EDN 25, K0FLT 23, WA0BKA 20, W0RIQ 20, WA0BUIO 18, K0FTB 17, K0YJ 15, W0YCV 13, WA0LW 12, WA0DXV 12, K0EPT 12, WA0FIK 12, K0IHD 12, WA0PNS 11, WA0ASV 10, WA0BZG 10, K0SNQ 9, K0RKU 6, K0LWK 6, W0LIG 3. (Nov.) K0ZZR 87, W0BCU 20.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: W9PHR/5, PAM: K5SGG, RAI: K5TYW. New appointments: W3CAM, EC Jefferson County; W5DYI, EC Saint Francis County. The Southeast Arkansas Amateur Radio Club prints an FB monthly club bulletin called *The Grid Drive*. The John Brown Univ. Club at Siloam Springs has a Viking II and a BC-779 tied to various antennas; the rig is located in a c.d. fallout shelter with emergency power available. The JBU Club officers are K0TPM/5, pres.; K7RWI/5, vice-pres.; Ray Zercher, secy.-treas. The ARC of the U. of A. sold

Christmas trees to raise money for a new receiver. Net reports for Dec.:

Net	Freq.	Time	Days	Sessions	QTC	QNI	Avg.
AEPN	3885	1200Z	M-Sat.	26	128	879	34
OZK	3790	0100Z	Daily	31	111	295	10

K6TYW is moving to a better antenna site. The Arkansas C.W. Net (OZK) met 274 times in 1063 and 1877 stations checked in. In seven months 681 pieces of traffic were passed. WA5AVO headed the QNI list with 205, W5DTR was second with 177, W9PHR/5 third with 151, with W5FUD 138 and K5TYW 135 following. Become a part of the Amateur Radio Public Service Corps by being active in the Amateur Radio Emergency Corps or by supporting your section NTS net. Better yet, do both. Traffic: K5TYW 444, W9PHR/5 383, W5DTR 377, WA5AVO 154, K5SGG 77, K0TPM/5 40, W5LZU 37, W5YM 16, WA5BBS 14, K5TCK 5, K5ALU 2.

LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—W5SHP, W5KAT and W5FYZ were presented awards by Shreveport Mayor Fant at a testimonial dinner for the volunteer members of the Caddo-Bossier CD Agency. K5GZR, K5IUH, K0JJC/5, KH6EVO/5 and W5ZBC, with a VW bus, an NCX-3, and emergency power plant, made a DXpedition into Red River Parish, where ham activity is low, in 20-degree weather, and worked some 50 stations in 10 different states and 47 counties. Help WAPL Award seekers and have fun as a club doing something in which we can all take part. Meetings were held by the SCM in Lake Charles and Monroe with very good attendance at both. W5CEZ, our RM, has been working very hard getting our section LAN Net going again. Louisiana is one of the very few sections which doesn't have a C.W. State Net. W5CEZ is on 3615 kc. at 5:30 p.m. each day when possible and will call the Louisiana net "Lan" at about 13 w.p.m., inviting all who can to check in. This will be repeated at 6:30 p.m. to determine which time is the better of the two. W5MXQ is steadily improving and on the road to recovery. New officers of the Springhill ARC are W5ADE, pres.; K5BCN, vice-pres.; WA5FRU, secy.-treas. That fine announcing voice that you hear on WWI, Radio belongs to Herb Holiday, W5CRQ, KH6EVO/5 is active in the 1215-Mc. band. K5JGW has been appointed an ORS. Traffic: K5FQN 14, W5FMO 10, W5EA 6, K5WOD 6, K5KQG 3.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—All stations interested in traffic handling should check into the following nets: Miss C.W. Traffic Net 7 days per week 3647 kc. at 1845 CST; Miss. Magnolia Net Mon.-Sat. 3870 kc. at 1900 CST. Sun. at 0800 CST; Miss. S.S.B. Traffic Net Mon.-Fri. 3890 kc. at 1800 CST. W5SEHZ is now WA5EHZ. K5LWS and K5YQZ are doing fine jobs from New Albany. W5OTD is very active again. WA5CAC, the new NCS for the C.W. Net, is doing a fine job. K5RRG and K5PNV are active from State. The Ole Miss. Club is being reactivated and State is organizing a 6-meter net for the campus. W5YE and W5YD are the club stations. K5PYS's new linear is going fine using a 4-837 in grounded grid. The Gulf Coast Sideband Net is growing daily with W5JHS doing a swell job. Some of its faithful stations are K5RIX, WA5CAC, W5UO, K5SYG, W5BWW, W5SHX, K5PPI, W5RIAM, K5RFF, W5CO, W5YOZ and K5UTE. K5ZRJ and WA5BMC are doing good jobs. WA5YZ and WA5FIN are putting in fine signals. Traffic: WA5CAC 157, W5WZ 43, K5LWS 32, W4EMM 12, WA5ALS 9, K5GAD 4, WA5BWE 3, WA5E HZ 1.

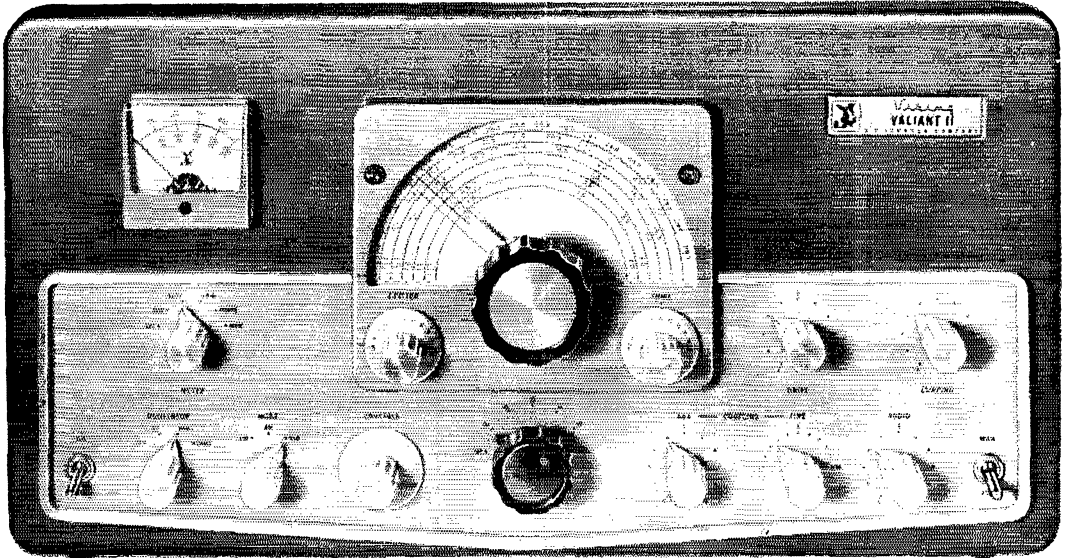
TENNESSEE—SCM, David C. Goggio, W0OGG—SEC: K4JIG, RMs: W4MXF and W4ZJY, PAMs: W4RMJ, WA4AIS, K4WVQ. Appointments: K4JIG as SEC, W4MXF as RM, WA4AWG as OPS, W4WZC as OO. Congratulations to BPL winners W4PQP, W4ZJY, K4ULT, WA4HRG and WA4IHG. There were two AREC alerts—the Memphis Operation Telephone when hospitals lost service and the Knoxville snowstorm operation. New officers of the Mid-South V.H.F.: K4FZJ, pres.; W4OQG, vice-pres.; WA4ISC, secy.; WA4IRX, treas. Net reports for Dec.:

Net	Freq.	Time	Days	Sessions	QTC	QNI	Average
TSSN	3980	1830C	M-Sat.	26	212	829	32
TPN	3980	0845C	Daily	31	406	819	26
EPTN	3980	0840E	M-Fri.	20	46	285	14
TN	3635	1900C	M-Sat.	26	180	152	6

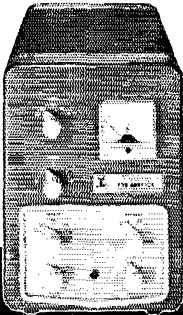
RN5 traffic was 1870 with Tennessee 100 per cent QNT. New officers of the Frye ARC: W4RMT, pres.; WA4—

(Continued on page 108)

VALIANT II—Outstanding flexibility and performance—
 band-switching 160 through 10 meters—delivers 275 watts input
 CW or SSB (with auxiliary SSB exciter or Viking SSB adapter) and 200
 watts AM! Low level audio clipping—differentially temperature compensated VFO
 provides stability necessary for SSB operation! High efficiency pi-network tank circuit—
 final tank coil silver-plated. Provision for plug-in SSB operation with no internal modification.
Cat. No. 240-105-1 Kit... Net \$375.00 **Cat. No. 240-105-2 Wired, tested... Net \$495.00**



VALIANT II SSB ADAPTER



SSB ADAPTER—Filter type SSB generator—band-switching 80 through 10 meters—more than 50 db sideband suppression—more than 45 db carrier suppression. Features built-in multiplier requiring VFO input only—design and front panel make operating practically fool-proof! Wired, tested.
CAT NO. 240-305-2 . . . NET 369.50

If you, like many of today's amateurs, find yourself with your interest fairly equally divided between working AM/CW and SSB, there's a real feeling of frustration with most available equipment. Why? Because most AM rigs require extensive modification to operate SSB—and few SSB rigs offer high level AM and Class "C" CW—and the end result is compromise in one mode or the other! Not so with either Viking SSB Adapter/Valiant or SSB Adapter/Valiant II combinations! Now, keep your contacts and work old friends no matter what portion of the band they operate in, and no matter what mode they use!

VALIANT OWNERS—You can make the conversion to SSB operation with a few simple modifications and the Viking "Valiant" SSB Conversion Kit.

Complete Catalog

Send for Amateur Catalog 962 giving detailed information on our complete line of amateur transmitters and accessories.



E. F. JOHNSON COMPANY
 WASECA, MINNESOTA, U. S. A.

A NEW DIMENSION IN 2 METER OMNI-DIRECTIONAL ANTENNAS FROM **Hy-gain**

Omni-directional Base Station Antennas

Hy-Gain's 2-Element Stacked Halo Array Delivers 3.4db Gain Model HB2-S2

Twin-stacked, center mounted, 2 meter base station halo that delivers 3.4db omni-directional gain through pattern compression and concentration of signal at the horizon. Constructed of hard drawn seamless aluminum tubing. Horizontally polarized for omni-directional radiation pattern. Designed for 52 ohm coaxial feedline. Top quality construction throughout. Supplied complete with halos, mast and coaxial phasing harness. May be side-mounted at the base or mounted on a roof saddle. **\$24.95 Ham Net**

Gain	3.4db
Power Limit . . . 1 kw PEP; 250 watts AM	
Halo Diameters	14 in.
Mast Length	8 ft.
Maximum Wind Survival	100 mph
Net Weight	8 lbs.
Mast Diameter	2 in.
Accepts Mounting Mast	1 1/4" - 1 3/8 in.

MECHANICAL SPECIFICATIONS:

Hy-Gain's 4-Element Stacked Halo Array Delivers 6.3db Gain Model HB2-S4

Quad stacked, 2 meter base station halo that delivers 6.3db omni-directional gain through pattern compression and concentration of signal at the horizon. Designed for 52 ohm coax...completely factory pre-tuned with no further adjustments required. Horizontally polarized for omni-directional radiation pattern. Constructed of hard drawn seamless aluminum tubing. Top quality construction throughout. Supplied complete with halos, mast and coaxial phasing harness. May be side-mounted at the base or mounted on a roof saddle. **\$53.95 Ham Net**

Gain	6.3db
Power Limit . . . 1 kw PEP; 250 watts AM	
Halo Diameters	14 in.
Mast Length	16 ft.
Maximum Wind Survival	100 mph
Net Weight	10 lbs.
Mast Diameter	2 in.
Accepts Mounting Mast	1 1/4" - 1 3/8 in.

MECHANICAL SPECIFICATIONS:

\$53.95 Ham Net

² Instructions supplied for simple conversion to extra high power

Hy-Gain's 2 Meter Base Station Halo Model HB2

Rugged horizontally polarized halo of hard drawn seamless aluminum tubing delivers outstanding omni-directional radiation pattern. Features unique Beta Match - is factory pre-tuned for 52 ohm coax. Easily installed. Furnished with instructions for installation as a stacked phased array. **\$5.95 Ham Net**

SPECIFICATIONS:

Halo Diameter	14 in.
Tubing Diameter	7/16 in.
Maximum Wind Survival	100 mph
Net Weight	6 oz.
Mast Diameter	1 1/4" - 1 3/8 in.

Hy-Gain's Colinear Gain Ground Plane Model GPG-2

The only single element, omni-directional gain antenna available for 2 meters. Vertically polarized, it delivers true omni-directional gain of 3.4db in measured field strength intensity. Vertical radiator is of seamless, aluminum tubing. Radials are 1/2" solid aluminum rod. Features rugged, double grip mast bracket with moistureproof solid state matcher. Molded high impact polystyron insulator is totally impervious to weather. All steel parts are cadmate treated to MIL specs. Designed for 52 ohm coaxial feedline. **\$14.95 Ham Net**

MECHANICAL SPECIFICATIONS:

Radiator Length	4 ft.
Radial Lengths	19 in.
Radial Diameter	7/16 in.
Radial Diameter	1/4 in.
Net Weight	2 lbs.
Maximum Wind Survival	100 mph
Mast Diameter	1" to 1 3/8" O.D.

\$14.95 Ham Net

GAINS REFERENCED TO ISOTROPIC SOURCE

Hy-gain The World's Largest Manufacturer
of Communications Antennas

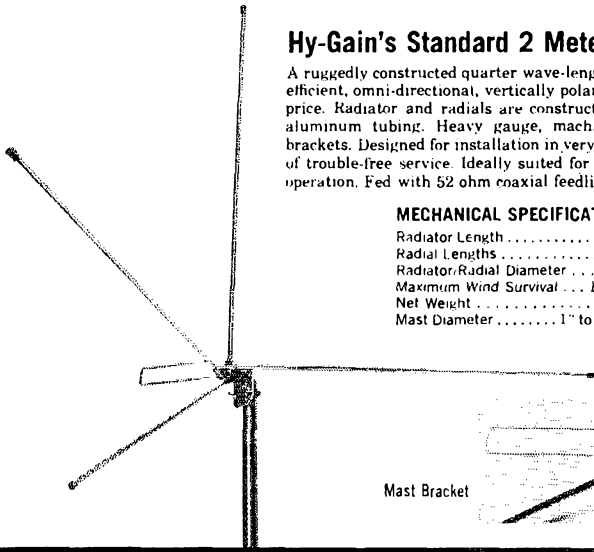
Hy-Gain's Standard 2 Meter Ground Plane Model SGP-2

A ruggedly constructed quarter wave-length ground plane that provides efficient, omni-directional, vertically polarized performance at a modest price. Radiator and radials are constructed of $\frac{1}{2}$ " extruded seamless aluminum tubing. Heavy gauge, machine formed mast and radial brackets. Designed for installation in very limited space...built for years of trouble-free service. Ideally suited for either permanent or portable operation. Fed with 52 ohm coaxial feedline.

MECHANICAL SPECIFICATIONS:

Radiator Length 19"
 Radial Lengths 19"
 Radiator/Radial Diameter 7.16"
 Maximum Wind Survival ... 100 mph
 Net Weight 2 lbs.
 Mast Diameter 1" to 1 $\frac{1}{2}$ " OD

\$5.90 Ham Net



Mast Bracket

STACKED JAY-POLE GAIN ANTENNAS

Hy-Gain's 2-Element Stacked Jay-Pole—Delivers 3.4db Gain

An all driven stacked array of vertical dipoles that are vertically polarized and deliver 3.4db of omni-directional gain. The driven element maintains an extremely broad band response and effective isolation from the supporting mast. Uniquely designed phasing and matching harness maintains a perfect parallel phase relationship and is center fed to minimize beam tilting for better low angle radiation. Entire antenna is at DC ground for lightning protection. Open construction minimizes failure due to moisture and condensation. All steel hardware is iridite treated to MIL. specs. Fed with 52 ohm coaxial feedline.

Model SJ2S2 \$29.95 Ham Net

ELECTRICAL SPECIFICATIONS:

Gain 3.4db
 Power Limit 1 kw PEP; 250 watts AM*
 VSWR (at resonance) 1.2:1
 Impedance 50 ohms
 Omni-directional Pattern

MECHANICAL SPECIFICATIONS:

Mast Height 11 ft.
 Insulators High Impact Styron
 Net Weight 10 lbs.
 Mast Diameter 2 in.
 Accepts Mounting Mast 1 $\frac{1}{4}$ -1 $\frac{1}{2}$ "

* Instructions supplied for simple conversion to extra high power

Hy-Gain's 4-Element Stacked Jay-Pole—Delivers 6.2db Gain

An all driven stacked array of dipoles that are vertically polarized and deliver 6.2db of omni-directional gain. Uniquely designed phasing and matching harness maintains a perfect parallel phase relationship and is center fed to minimize beam tilting for better low angle radiation. The driven element maintains an extremely broad band response and effective isolation from the supporting mast. Open construction minimizes failure due to moisture and condensation. Entire antenna is at DC ground for lightning protection. Fed with 52 ohm coaxial feedline. May be side-mounted on mast or mounted on a roof saddle.

Model SJ2S4 \$54.95 Ham Net

ELECTRICAL SPECIFICATIONS:

Gain 6.2db
 Power Limit 1 kw PEP; 250 watts AM*
 VSWR (at resonance) 1.2:1
 Impedance 50 ohms
 Omni-directional Pattern

MECHANICAL SPECIFICATIONS:

Mast Height 21 ft.
 Insulators High Impact Styron
 Net Weight 20 lbs.
 Mast Diameter 2 in.
 Accepts Mounting Mast 1 $\frac{1}{4}$ -1 $\frac{1}{2}$ "

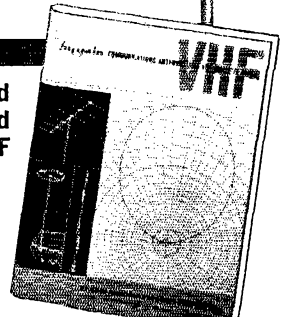


See all of the exciting new Hy-Gain maximum performance antennas and accessories for VHF. Base station and mobile antennas for 6, 2, 1 $\frac{1}{4}$ and $\frac{3}{4}$ meters...fully illustrated and described in Hy-Gain's new 16 page VHF catalog. Get yours today from your favorite Hy-Gain distributor.

All Hy-Gain maximum performance VHF antennas are available from your favorite Hy-Gain distributor.

HY-GAIN ANTENNA PRODUCTS CORPORATION

8407 N.E. Highway 6—Lincoln, Nebraska



Station Activities

(Continued from page 104)

MBL, vice-pres.; WA4MYR, secy.; K4IOP, treas. The IAC of Knoxville received publicity for the Christmas Parade and the handling of Christmas messages to overseas amateurs. W4CVG assisted. TPN certificates were awarded to W4s PIV, YTS, HBZ, KST, WBY, FLW, VJW, GNK, TYV, TZJ, VFL, GGM, POP, SGI, PSN, HW, LU, PFP, CSX, FMF, K4s MIF, TAX, HRY, SXD, NZN, PEQ, CPC, DJV, MOV, EWJ, CMZ, HBU, MOA, UMIW, WA4s BAIV, GLS, EQA, OHF, HRG and AWG. With deep regret we report W4PPZ and W4SRT as Silent Keys. The RATS of Nashville reports new officers: K4ONB, chairman; K4VPL, vice-chairman; WA4HUP, secy.; W4ROC, treas. Twelve Metro awards have been issued to date and a list of 536 calls in Nashville has been compiled. K4EQK is the Ham of the Year for Memphis. The Proposed Council of Clubs constitution has been forwarded. The State Emergency Operation plan has been distributed. Traffic: W4ZJY 1257, W4PQP 882, K4ULT 503, W4MFX 462, W4OQG 233, W44HRG 133, WA4HIG 172, K4WVQ 162, W4FX 138, W4RMI 94, W4TZI 80, WA4AWG 53, K4RIN 50, K4CPC 48, W4VTS 48, W4KAT 46, W4CVG 45, K4JNG 44, W4AKOG 42, W44HRR 41, W4WBK 34, K4OUK 33, K4UMW 32, W4PFP 27, K4ICH 25, WA4GLS 25, WA4AIS 24, W4UVP 23, W44BNL 22, W4TVY 22, W4YAU 22, W4GGM 19, W4OQG 18, K4VZI 18, W4ZAC 18, K4TTA 17, W4HEPN 15, W4LU 15, W4CAT 13, W4DIJ 12, W4AUM 11, W4UIO 11, W4VJW 11, W4VNU 11, W44EQ 10, W4ANWU 10, K4RQP 10, W44BXH 9, W4AGDO 8, W4ILA 8, W44LX 8, K4VOP 8, W44AJK 7, K4JMF 7, K4KVE 7, W4A5P 7, K4TAT 7, W44BUP 6, W44BHW 6, W44IZB 6, W44PBE 6, K4EJN 5, K4EPS 5, W4FMT 5, K4JIG 5, W44LSK 5, W44RPP 5, W44RS 5, K4CMZ 5, K4DEC 4, W44DN 4, K4HGL 4, W44ISC 4, W4HVV 4, W44MHD 4, K4QND 4, W4VJU 4, W4YMB 4, W4ZDK 4, K4ZYI 4, W44ROD 3, W4WBY 3, W4BIV 2, W4ACGF 2, K4CNC 2, K4ENA 2, W44GOL 2, W44GOM 2, W44HOV 2, W4PHC 2, W4PSN 2, W44PSU 2, W44PTC 2, K4RCT 2, W44SGT 2, W4VXN 2, W5RCE/4 2, W4OHDW/4 2, K4YLI/4 1, W44CGI 1, K4DJV 1, K4HRY 1, K4LPW 1, W4NGK 1.

GREAT LAKES DIVISION

KENTUCKY—SCM, Mrs. Patricia C. Schafer, K4-Q10—PAMs: W4SZB, W4BEJ, W4USE, V.H.F. PAM: K4KJQ, RM: W44LCH, RM (KNN): W44APU.

Net	Freq.	Time	Days	Sessions	QNI	QTC
EMKPN	3960	0630EST	M-F	22	259	89
MKPN	3960	0830EST	Daily	30	447	133
KYN	3600	0900EST	Daily	37	300	218
KPN	3960	1930EST	M-F	17	476	102

The Central Ky. Emergency 6-Meter Phone Net held 9 sessions with 87 QNI and 33 QTC. The Louisville and Jefferson County Area Emergency Net 11 held 12 sessions with 123 QNI and 47 QTC. The Louisville Gas and Electric Amateur Radio Club is now ARLL affiliated. W4IRA has been reelected club president. W4BEW, former SCM, received a plaque from the Ky. Council of Amateur Radio Clubs expressing appreciation to him for helping to form the council. K4DFZ and W4HOJ have started a code and theory class that will run for 25 weeks. W4PSE was elected president of the ARTS Club in Louisville. W44LCH monitors 3600 kc. 0930 to 1830 EST for traffic and liaison. W4CDA is in his new home. W4BYG has moved to Florida. W4BAZ plans a net on 21.150 Mc. at 2100 EST every night for encouragement in getting General Class licenses. A tri-state 6-meter net meets Tue. at 2000 EST on 50.05 Mc. Traffic: (Dec.) W44LCH 367, W44AGH 277, K4CSH 190, W4BAZ 122, K4NHY 93, K4ZIJ 65, W44CQG 64, W4BEJ 46, K4NVO 44, W44GFN 41, W44VSC 39, W4QCD 36, W4KJP 35, W44APU 32, W4KKG 31, K4HOE 28, K4OJO 26, W44ELK 25, K4TQZ 19, W44ENH 17, W4SZB 16, K4SWL 15, W4YYI 11, W4BEW 9, K4NLY 8, K4LOA 5, W44GMA 4. (Nov.) W4KJP 25, K4NVO 24.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8LOX, RM: W8EGI, K8QLE, W8FWQ, K8-KM/Q, PAMs: W8CQU, K8LQA, V.H.F. PAM: W8PT. Appointments: W8TBP and W8FX as ORS; W8SS as OPS; K8ZZV as OBS; W8SHEE and K8VEN as OBS. BPLers: W8BFJC, W8ADNZ, K8HLR, K8GOU, W8ARJ, W8ARI, K8KMQ, K8CIP, K8LUY. Mason is well represented by the Lannon family: W8ARK, Bob, Sr., XYL, W8ARJ, Roberta, and W8ARI, Bob, Jr. The 5th Annual OT Nite will be held May 30 at the Henry Ford Museum, sponsored by the Motor City RC. W8RUV made Extra Class. Wedding congrats to K8OJI and W8EMN of the Metro Racegawers Club! After a serious accident, W8GA tours Europe, then takes a Flor-

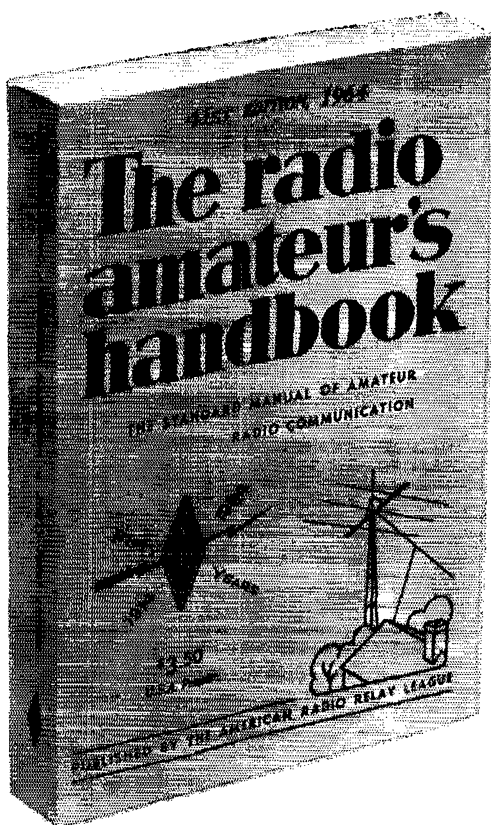
ida vacation. Watta man! W8AR heads for Texas. W8SS sold Christmas trees, but he ain't broke. W8JY is out of the hospital. The Cent. Mich. V.H.F. Club is off to a good start with its own bulletin. The Huron Valley ARA is plugging 144 Mc. for local area contacts. Congrats to the Michigan Six-Meter Club and K8LUY on their Veterans Hospital stint, plus assist by W8DSW, K8JOI, K8MDY, W8LBE, K8JGF, K8PJW, W8AJD and K8-SKZ. Don't forget the Great Lakes Division Convention, Apr. 3-5, at the Statler Hotel. Officers of the Saginaw Valley ARA: K8SWQ, pres.; K8JLD, vice-pres.; K8QAK, secy.; W8LNE, treas.; W8HZF, W8-CAM and W8QOK, directors. Officers of the Cent. Mich. ARC: K8ZNP, pres.; K8BGZ, vice-pres.; K8-ATU, treas.; K8ZJV, W8VPC and K8ZKH, directors. Howie Estes is now W5LTN and his XYL, Patricia, is W5LTL, P.O. Box 901, Mandeville, La. W8ARJ has a new GSB-100, K8JUN on an HT-37 and W8DSW a G-76, an HT-37 and a Viking 500. W8MPD is working 146.94 MC, wide-band fm. with 70 active stations in the Detroit area. W8RHF again is the club station of the Theodore Roosevelt High School ARC in Wyandotte. K8DX is back on; he was 8DX in 1920. The wind took down all W8ALG's antennas. W8CQR is Wadsworth Hall, Mich. Technical College. W8UA worked 3 continents RTTY. Traffic: (Dec.) W8FJC 703, W8ADNZ 502, K8HLR 586, K8GOU 573, W8ARJ 436, W8ARI 290, K8KMQ 269, K8LNE 207, W8ELV 206, K8CIP 190, W8COPH 188, W8BEZ 157, W8QFO 131, K8LUY 121, W8DZP 110, K8QKY 101, W8ARK 69, W8RTN 64, K8PKU 60, K8VCB 60, W8FWQ 57, K8TVP 56, W8FX 55, W8DSW 44, K8QLL 42, W8HKT 35, K8JED 34, K8LQA 32, W8ZHB 32, K8JMY 26, W8XCFT 21, W8BET 21, W8ZLK 21, K8VQY 19, W8ENO 18, W8ELV 14, K8VDA 14, W8AUD 11, W8MPD 10, K8CKD 9, W8AR 8, K8ZYI 8, W8EGI 6, W8MSK 6, K8GJD 5, W8RHF 4, W8DXW 3, K8DX 2, W8TBP 2. (Nov.) W8DZP 210, W8ARJ 78, W8ARK 78, W8UA 49, W8ASK 15, K8JMY 15, W8YAN 9.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE, SEC: W8HNP, RMs: W8BZC, W8DAE and K8LGB, PAMs: W8VZ, K8BAP and K8UBK. From the Warren ARA's *Q-Match* we learn that W8PYR, from the Astatic Co., gave a very interesting talk, the club issued 21 Worked Trumbull County certificates. W8EEH has a new HT-37 and an HT-41. W8MIL has a new Mosley beam and W8FZU received his Technician Class license. Greater Cincinnati ARA's *The Mike and Key* states the club held its Christmas Party. W8JXM received his General Class license and K8CKI received her General Class license. Queen City Emergency Net's *The Listening Post* tells us the 1964 club officers are K8DQU, pres.; W8PKD, vice-pres.; K4DEZ, secy.; W8MXR, treas.; K8MVF, comm. mnr.; the club took an active part in the Muscular Dystrophy funds collection and K8BAQ/4 has a new baby boy. *Smoke Signals* from the Indian Hills RC tells us the club held a Christmas Party. The Six Meter Nomad's *The Amateur Extra* informs us the club elected K8VGF, pres.; W8ADD, sr. vice-pres.; K8RWR, jr. vice-pres.; K8YQL, treas.; W8URV secy. and also held a Christmas Party. Toledo's *Ham Shack Gossip* names K8EHJ as its Ham of the Month and passes this news along to us: K8ZNC received her General Class license; W8SDZ was married; W8HUX married W8MGB; W8HNP, our SEC, spoke to the Toledo RC on AREC. Columbus ARA's *Carascope* informs us W8VHO is now home after a couple of weeks in the hospital and the v.h.f. section of the club elected K8HRR and W8KJM co-chairmen, with K8OQS secy.-treas. Seneca RC heard K8-ZAM talk on Analysis of Simple Circuits. Para RC's *P.R.C. Bulletin* announces 1964 officers as: W8CZM, pres.; W8ACV, vice-pres.; W8SUS, secy.; K8BQY and W8BIP, asst. secys.; K8JZJ, treas.; K8YSM, asst. treas.; K8NPH is in the Army, W8ZZC became a Silent Key and the Cleveland Area Council of ARCs, 1964 officers are W8UWJ, pres.; W8ACV, vice-pres.; W8EPM, treas.; K8OIS, secy. South East Arc's *Ham Fax* reports that K8ONA underwent a major operation. We are told we have received the last of Findlay RC's *W8FT News* issues. W8WE was its editor until he joined the Silent Keys several months ago. His XYL, W8OTK, carried on with it. Now, she has a job, along with her house work and is going to have to help her out or, No one in the club has even offered to help her out or to take it over. It would be nice if several members of the Findlay Club would take it over and keep *W8FT News* going. Watsa? Massillon ARC's *MARC Newsletter* tells us the club held an auction. The Ohio S.S.B. Net closed its second year with 440 messages handled in December and 7165 during '63. Dayton ARA's *Ham Carrier* says that W8ZTL spoke at a meeting and

(Continued on page 110)

1964 EDITION

AVAILABLE
NOW
!



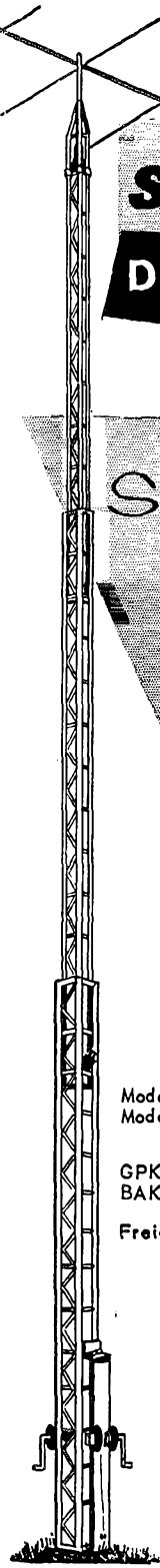
*T*HE STANDARD reference work and text for everyone—radio amateurs, engineers, lab men, technicians, experimenters, students, purchasing agents.

*A*nual revision is a feature of the *Handbook*, always with the objective of presenting the soundest and best aspects of current practice. The big, 1964 Edition contains many new descriptions of equipment. Semiconductor and vacuum tube tables are brought up to date. Every important aspect of amateur radio is covered: transmitting, c.w., a.m., sideband, radioteletype; receiving; mobile; v.h.f.; propagation; antennas; construction; theory; charts; diagrams; transistors; vacuum tubes; station assembly and operation. The complete handbook!

\$3.50 USA proper \$4.00 US Possessions and Canada \$5.00 Elsewhere
Clothbound Edition \$6.00 USA, Possessions and Canada, \$6.50 Elsewhere

The **AMERICAN RADIO RELAY LEAGUE**, Inc.
NEWINGTON, CONN. 06111

A T R I B A N D B E A M A T 6 0 F T - N O G U Y S



DESIGN

STRENGTH

DEPENDABILITY

**THREE REASONS WHY
YOUR BEST BUY IS...**

E-Z WAY
Satellite "60"

E-Z WAY AERO-DYNAMIC design decreases wind load and provides telescoping action that permits raising and lowering of tower sections. **CRANK UP TO 60 FEET, DOWN TO 25 FEET and TILTS OVER FOR ACCESS TO ROTOR OR BEAM.**

STRENGTH is built-in to every E-Z Way Tower...Heavy wall steel tubing legs, continuous diagonal bracing of solid steel rod and electrically welded throughout...no loose bolts or nuts here. E-Z Way design and strength are your assurance of **DEPENDABILITY** that you can count on year after year. See your nearest distributor today or write for free literature.

The SATELLITE

Model RBX-60-3P (Painted) \$335.00
Model RBX-60-3G (Galvanized) \$410.00

MOUNTING KITS:

GPK X60-3 (Ground Post) \$125.00
BAK X (Wall Bracket) \$17.00

Freight Prepaid anywhere in (48) U.S.A.



P.O. BOX 5767 TAMPA5, FLORIDA

Station Activities

(Continued from page 108)

club announces Apr. 24 and 25 as dates for its 1964 Dayton Hamvention. *The High Banders Log* states the club held a dinner at its December meeting. Tusco RC's *The Beam* reports 1964 officers as W8NBK, pres.; W8-EUK, treas.; W8BIM secy.; WA8EWH, act. mgr. (We were unable to make out the call of the vice-pres.) K8NYN has been approved as OO. W8DAE and W8-UPH made the BPL in December. The Eastshore V.H.F. Radio Club reports that W8DLG has a new NYL as of Dec. 28. Traffic: (Dec.) W8UPH 1570, W8DAE 607, K8UBK 369, W8BZX 312, W8MGA 254, K8DIU 250, K8PBE 239, K8LGA 230, WA8CXC 137, K8DHF 115, WA8AJZ 82, W8QZK 76, K8LGB 60, W8QCU 58, K8AAG 54, K8VWN 51, W8DIH 46, K8ONQ 38, K8YDR 36, W8DQD 34, K8LXD 34, WA8AJD 30, W8GRG 29, K8BAP 23, W8LZE 22, WA8JXM 21, K8-YML 19, WA8WV 18, WA8HDB 17, K8DDG 13, WA8-EEW 13, K8JIX 11, W8FRD 9, W8ILC 9, K8RFU 8, W8WEG 6, K8HDB 5, K8HDO 2, W8LQB 2. (Nov.) W8LT 24, K8AAG 10.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RMs: W2PHX and K2QJL. PAM: W2JG. Section nets: NYS on 3670 kc. nightly at 0000 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT; Emergency Coordinators on 146.550 kc. Fri. at 0130 GMT. Appointment: K2UTC as OO. Congratulations to three BPL winners for Dec. traffic: WA2UZK, WA2VYS and W2URP. This makes three BPLs for the first two and twice for W2URP. New officers of the New Rochelle Club include WA2TEQ, pres.; WA2RVT, vice-pres.; K2SJM, secy.; WA2JZE, treas.; W2RAE, trustee; WB2-EER, sgt. at arms; WA2NRB and WA2QMR, directors. Very successful Christmas Parties were held by the Albany, New Rochelle and Schenectady clubs. New Rochelle classes have graduated over 300 amateurs, either new or upgraded since 1958. An impressive record! The Westchester Co. AREC Net now operates on 146.178 kc. Fri. at 2100 EST. New members are welcome. The Condon Award for service to the Albany Club was received by W2ITQ, W2DTE and WA2HFT. In Schenectady, the second Broughton Award was given to W2FBS. Congrats to all. New officers of the Albany Club include K2BUF, pres.; WA2ELC, vice-pres.; WB2BZE, secy.; WA2RYF, treas.; K2EJV, dir. Among those in military service is WA2IBQ, NYS mgr. W2RUF reports that WA2VYS had 326 QNs out of a possible 365 for the best attendance in 1963. Traffic: WA2UZK 1181, WA2VYS 622, W2URP 525, W2UFB 254, WB2PCZ 161, W2THE 152, WA2HGB 89, WA2UBO 84, K2TXP 73, WB2HYB 66, K2DFM 45, W2PKY 41, WA2JWL 37, WB2FXB 31, K2SJM 29, WA2YHA 13, WB2FVD 10, K2UTV 2.

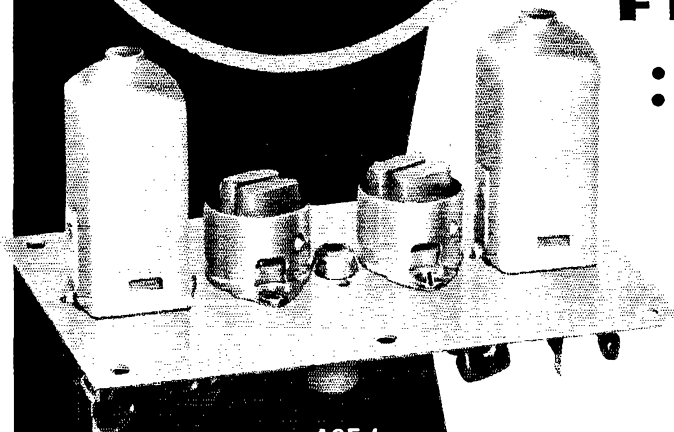
NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—SEC: K2OVN. RAJ: W2-WFL. V.H.F. PAM: W2EW. Section nets: NLI, 3630 kc. at 0015Z nightly; NYCLIPN, 3908 kc. at 2203Z nightly; V.H.F. Traffic Net, Tue.-Wed.-Thurs. on 145.8 Mc. at 0100Z and Fri. through Mon. on 146.26 at 0000Z; Mike Farad on 7238 kc. at 1700Z. K2UFT is in the Army. WB2BKS is active on 2-meter m.c.w. WA2EXP is using an HQ-180A and has received a 45-w.p.m. certificate. W2MTA is leaving for a new job in Owego and will be missed on the traffic nets. WA2SAZ reports many band openings on 6 meters. K2ULS is home and resting after his illness. W2HSB is Radio Officer for Oyster Bay and is using a new v.f.o. on 2. W2MQB is mobile on 160 meters in the car and airplane. WA2VKK is back on 2 meters. WB2IKI, WA2ZCU and WA2ZKG are now Generals. W2NBR and WA2KSD are Extra Class. K2UYG is on 40 meters and was elected Northeastern DX Assn. president. WA2LST and WA2LJT are building 430-Mc. rigs. K2LOE is active on 6 meters. WB2-HWB is active on 80-meter c.w. WA2TAQ has a "V" beam on 75. WA2BIT is rebuilding his 4-1000 final. W2YBU and WB2ECR are on s.s.b. W2QPQ is Queens RACES RO. New officers of the AUHF Club of Jamaica are W2MINX, pres.; WA2GFP, vice-pres.; K2QCV, secy.; W2QPQ, corr. secy.; K2BBO, treas. New officers of the Mid-Island ARC are W2SMQ, pres.; W2VL, vice-pres.; K2LCK, secy.; K2SYA, treas. The Wantagh ARC meets in its new room in the Chase Bank in Seaford the third Wed. of each month. W2ELK, EC of the Nassau 6-Meter Net, is looking for new operators. BPL certificates have been awarded to WA2GPT, W2-EW, W2MTA, WA2VLE, WA2RUE, WA2EXP, WA2-WGN, WA2PVW and WA2SAZ for December traffic.

(Continued on page 114)



AOC

SINGLE SIDE BAND FILTERS



- 9 mc center frequency
- Bandpass 6 db 3 kc (approximate)

ACF-2 Two-crystal filter circuit using low impedance link input and 2K resistive output load. Unwanted sideband rejection greater than 30 db. **\$9.95**

ACF-4 Four-crystal filter circuit using nominal 600 ohm input and output. Unwanted sideband rejection greater than 40 db. **\$18.95**

ACF-6 Six-crystal filter circuit using nominal 600 ohm input and output. Unwanted sideband rejection greater than 55 db. **\$27.95**

MATCHING OSCILLATOR CRYSTALS for the ACF filter series. Recommended for use in OS-4 oscillator.
CY-6-9LO \$4.40
CY-6-9HI \$4.40

OS-4 Crystal Oscillator **\$6.95**

SE-6F Mounting Case
Special AOC case for mounting filter plates. **\$5.50**

* Add-On-Circuit

ACF-4



WRITE
TODAY
FOR
YOUR
FREE
1964
CATALOG

International Crystal Mfg. Co., Inc.
18 North Lee, Oklahoma City, Oklahoma
Please rush 1964 catalog.

Name _____ PLEASE PRINT

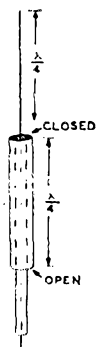
Address _____

City _____ Zone _____ State _____

**INTERNATIONAL
CRYSTAL MFG. CO., INC.**

18 NORTH LEE • OKLAHOMA CITY, OKLA.

NEW! SINGLE BAND COAXIAL ANTENNAS



Here are our brand new single-band antennas. In spite of the very low prices, these coaxial verticals are marvelously efficient, extremely simple to install, and present absolutely no operating difficulties. Coaxial antennas are a full half-wave, give 360° coverage, need no adjustments or measurements, are easily portable, yet rugged enough for any weather.

Everything you need is furnished, including mounting clamps and brackets. One 52 ohm coaxial feedline is used for both receiving and transmitting. The feedline is not furnished.

The coaxial antenna design prevents radiation from the bottom half of the antenna, effectively lowering the radiation angle, so that local and skip contacts are made more readily. An example of the effective ground range of coaxial antennas: 30 watts, antenna height 30 feet, on six meters, will cover an area of 243 square miles on ground coverage alone.

2 METERS.....	\$5.95
6 METERS.....	\$7.95
add \$1.00 postage to above prices	
10 METERS.....	\$9.95
11 METERS (CB).....	\$9.95
Because of size, express collect only	

COMMERCIAL FREQUENCIES

450-470 Mc.....	\$5.95
150-174 Mc.....	\$7.95
add \$1.00 postage to above prices	
25-50 Mc.....	\$11.95
Because of size, express collect only	

BEAMS

Rugged Yagi design, full half-wave, Gamma-matched

2 Meter, 12 Element.....	\$24.95
6 Meter, 4 Element.....	25.95
10 Meter, 4 El., #R10.....	40.95
15 Meter, 3 El., #R15.....	49.95
20 Meter, 3 El., Deluxe.....	59.95
15-20 Two-Bander.....	49.95
10-15-20 Tribander.....	59.95

NOTE: Specify frequency; otherwise band center

GOTHAM VERTICALS DELIVER THE CONTACTS

PROVEN! PROVEN! BY THESE EXCERPTS FROM UNSOLICITED TESTIMONIALS:

CASE HISTORY #71

"I am very delighted with the first V80 and want another for a different location." A. C., California.

CASE HISTORY #159

"I ordered a Gotham V40 Vertical Antenna and found it so successful that several others are wanting them, too. Will you please send me four more." W. A., Alaska.

CASE HISTORY #248

"I just wanted to let you know how pleased I am with my Gotham V80 antenna. I have worked a W.A.S. of 46/43, a WAC of 3/3, and DXCC of 14/12 in about 12 months." G. W., Maryland.

CASE HISTORY #111

"The V160 did a beautiful job on a VE1 for me. Also, I forgot to take it down during the hurricane of last week. It is just as straight as it was when I bought it." D. S., New Jersey.

CASE HISTORY #613

"I have never been happier with any antenna than I have been with the V80. I have worked all bands with it and have had tremendous success — i.e., DL4s, ZS3, etc., all solid copy." R. D. S., Penna.

CASE HISTORY #483

"My V80 is working wonders. I am able to maintain a 1:1 SWR all across the 40 meter band. After many years on 10, 15, and 20, the XYL and I are getting great kicks out of some of the lower bands." J. A., New Mexico.

CASE HISTORY #146

"I have had very good luck with mine (my V80) feeding it with a Johnson Adventurer; works fine on all bands." B. I., Nebraska.

CASE HISTORY #555

"Being an owner of your V80 vertical I would like to let you know of the excellent results I am getting with it, both working the DX and the local stations on the lower bands. It certainly is an excellent antenna system." F. H. Jr., New York.

CASE HISTORY #84

"A few months ago I purchased your V40 vertical and have achieved outstanding results on the air." K. G. B., North Carolina.

FREE CATALOG

AN ANTENNA THAT SURVIVES THE COMPETITIVE STRUGGLE CONTINUES TO BE ADVERTISED.

WHY

THE GOTHAM VERTICAL ANTENNA IS THE BEST ALL-BAND ANTENNA

- Absolutely no guying needed.
- Radials not required.
- Only a few square inches of space needed.
- Four metal mounting straps furnished.
- Special B & W loading coil furnished.
- Every vertical is complete, ready for use.
- Mount it at any convenient height.
- No relays, traps, or gadgets used.
- Accepted design—in use for many years.
- Many thousands in use the world over.
- Simple assembly, quick installation.
- Non-corrosive aluminum used exclusively.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.
- Ideal for novices, but will handle a Kw.
- Will work with any receiver and xmitter.
- Overall height 23 feet.
- Uses one 52 ohm coax line.
- An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price.

73.
GOTHAM

DO YOU KNOW

1. YOU WILL HAVE NO DIFFICULTY INSTALLING YOUR GOTHAM VERTICAL ANTENNA IN JUST A FEW MOMENTS, REGARDLESS OF YOUR PARTICULAR PROBLEM, SO ORDER WITH CONFIDENCE EVEN IF YOU HAVE RESTRICTED SPACE OR A DIFFICULT SITUATION.
2. LOADING COIL NOT REQUIRED ON 6, 10, 15 AND 20 METERS. FOR 40, 80, AND 160 METERS, LOADING COIL TAPS ARE CHANGED MANUALLY EXCEPT IF A WIDE-RANGE PI-NETWORK OUTPUT OR AN ANTENNA TUNER IS USED; IN THIS CASE BAND CHANGING CAN BE DONE FROM THE SHACK.
3. EVERY GOTHAM ANTENNA IS SOLD ON A TEN DAY TRIAL BASIS. IF YOU ARE NOT FULLY SATISFIED, YOU MAY RETURN THE ANTENNA PREPAID FOR FULL REFUND OF THE PURCHASE PRICE. THIS IS YOUR GUARANTEE OF FULL SATISFACTION.

FILL IN AND SEND TODAY!

Airmail Order Today — We Ship Tomorrow

GOTHAM Dept. QST
1805 PURDY AVE., MIAMI BEACH, FLA.

Enclosed find check or money-order for

V40 VERTICAL ANTENNA FOR 40, 20, 15, 10 AND 6 METER BANDS..... \$14.95

THE V40 IS ALSO MADE FOR CITIZENS BAND OPERATION, WITH SPECIAL INSTRUCTIONS. DESIGNATE CB-11 ANTENNA. PRICE SAME AS THE V40

V80 VERTICAL ANTENNA FOR 80, 40, 20, 15, 10 AND 6 METER BANDS. MOST POPULAR OF THE VERTICALS. USED BY THOUSANDS OF NOVICES, TECHNICIANS, AND GENERAL LICENSE HAMS... \$16.95

V160 VERTICAL ANTENNA FOR 160, 80, 40, 20, 15, 10 AND 6 METER BANDS. SAME AS THE OTHER VERTICAL ANTENNAS, EXCEPT THAT A LARGER LOADING COIL PERMITS OPERATION ON THE 160 METER BAND ALSO..... \$18.95

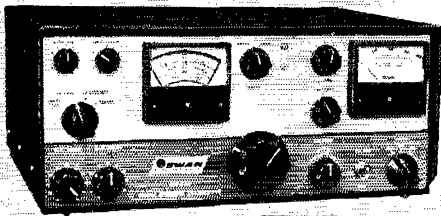
HOW TO ORDER. Send check or money order directly to Gotham. Immediate shipment by Railway Express, charges collect. Foreign orders accepted.

Name.....

Address.....

City..... Zone..... State.....

THE SWAN SW-240 THREE BAND SINGLE SIDEBAND TRANSCEIVER!



\$320

CRAFTSMANSHIP, RELIABILITY, UNEQUALLED PERFORMANCE

- 240 WATTS Peak-Envelope-Power SSB input, 200 watts CW input, 60 watts AM input.
- 6DQ5 P.A. TUBE. This rugged, reliable tube is one of the reasons why Swan Transceivers consistently show more talk-power than others.
- AUDIO RESPONSE. Flat within 3 db over the entire speech range from 300 to 3300 cycles. This is why Swan Transceivers are so well known for their excellent, natural sounding audio quality.
- FREQUENCY RANGE: Full coverage of 20 and 40 meters: 13,990-14,380 kc; 6900-7340 kc. 80 meter coverage: 3640-4030 kc. (Full 80 meter coverage available with accessory kit.)

SEE THE NEW SWAN TCU

TRANSCEIVER CONTROL UNIT COMPANION FOR YOUR SW-240

EXTERNAL VFO — PROVIDES FOR SEPARATE TRANSMIT-RECEIVE FREQUENCY CONTROL.

- Complete coverage of 20, 40, 75, and 80 meters.
- 100 kc Calibrator. • 15 mc Reception of WWV.
- VOX. Voice Controlled Operation — including Anti-Trip.
- Built-in Speaker. • Phone Jack.
- Plugs into ALL SW-240 Transceivers. (Installation Kit included.)
- Operates directly from Transceiver supply. No additional power supply is required. Those who now own an SW-240 and AC supply need to buy only the Swan-TCU.
- The new SW-117B AC supply may be installed inside the TCU cabinet if desired, thus making a complete home station in two matching units.
- SW-240 Transceiver may still be used in mobile operation by simply disconnecting the TCU, and inserting a jumper plug.

- complete with connectors and installation kit for use with all SW-240s.

\$115

ACCESSORIES

SW-117AC POWER SUPPLY	\$ 95
SW-12DC POWER SUPPLY	\$115
SIDEBAND SELECTOR KIT	\$ 18
MOBILE MOUNTING KIT	\$19.50
SW-117B POWER SUPPLY	\$75



ELECTRONICS CORP.
Oceanside, Calif.

SEE OR
WRITE YOUR
DEALER
TODAY!

Station Activities

(Continued from page 110)

Congratulations. This will be a big year for this section and amateur radio. The World's Fair and ARRL National Convention will bring thousands of hams and people here and they will have traffic to send. Our traffic nets will need new operators to help. Plan to participate in the Convention on Aug. 21, 22 and 23, 1964. Visit K2US at the Fair. Join a public service net (AREC RACES or Traffic). Welcome and help new hams. New officers of the Far Rockaway ARC were installed by the Vice-Director, W2TCK. They are WA2TAQ, pres.; W2BJM, 1st vice-pres.; WA2YNH, 2nd vice-pres.; WB2DBI, secy.; W2YBU, treas. Results of the election for NYC-LI SCM were K211B 679, K2OVN 511, K2HSY is building a new 2-meter rig, W2MMV, W2LQK and W2IAG are operating walkie-talkies on the Queens AREC frequency. The Manhattan AREC 6-Meter Net wants new members. Contact WA2MMW. This column was written by K2OVN. Acting SCM. I thank all the members who helped me during my appointment as Acting SCM. May I urge you to extend this cooperation to your new SCM, K2IDB. Please forward all station activity reports, QO and OBS reports, and all correspondence to Mr. Blaine Johnson, K2IDB, 266 Cypress Ave., Massapequa Park, L.I., New York. Traffic: WA2GPT 1729, W2EW 1142, W2MT 1126, WA2VLLK 963, WA2RUE 742, WA2EXT 712, WA2WGN 550, WA2PWV 515, WA2SAZ 291, WA2QJ 166, K2KYS 124, WA2GAB 123, W2GKZ 112, K2DNY 109, WA2YNH 105, W2ZXR 102, WA2PJL 96, WA2YL 96, WA2XJF 59, WA2UYQ 54, W2ELK 33, WA2KQC 33, WB2DUD 30, W2HSB 30, W2EFN 22, WA2WAO 21, WB2HWB 20, K2UFT 20, WA2QOL 18, WA2MPP 16, W2GP 13, K2SJP 11, W2SEU 9, W2PF 4, WA2TPM 3, WA2RAQ 2, K2YQK 2, WA2VKK 1.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—Asst. SCM: Louis J. Amoroso, W2LPO, SEC: K2ZFI, RMs: W2QNL, WA2GQZ, WA2SRK, WA2QPX, PAMs: K2SLG, K2SLG, K2VNL. Official Bulletin skeds: (all times local)

Station Freq. (kr.)	Time	Station Freq. (kr.)	Time
WB2ALF 3700	1700 ExSt	WB2ALF 145,000	2000 Sat.
WB2CVN 3620	2000 WSn	K2UCY 7080	1830 MF
K2UCY 145,800	1930 TTh	K2UCY 146,484	0900 Sn
WA2KIY 23,900	2000 Dy	WA2KIY 21,132	2100 FSS
K2OKA 50,400	2000 Wf	K2OKA 50,400	2300 MST
K2PQR 50,300	1930 Mt	K2PQR 50,300	2330 ThSt
WB2HBC 50,300	1230 ExTf	WB2HBC 50,300	2330 ExTf

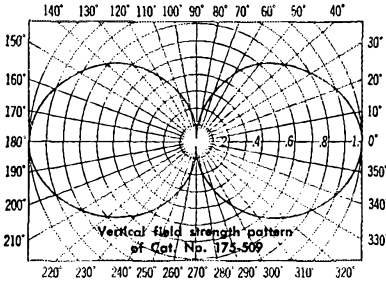
In case you can't decode the abbreviations, write to the SCM. Prospective OBSS: Please make your proposed skeds at such times that will avoid conflict. Note 6 meters has lots of skeds, but 2 meters needs more. New OBSS: WB2COZ, 144,700, 1830 MWFSn and 29200-2000 TThSt. Other new appointments: WA2TEK as OPS; WN2KDD, K2PIT, K2HXP, WB2GKF and WB2EZY as OBSS. Congratulations to WA2UGT on receipt of General Class and to WB2CVN on receipt of Extra Class licenses. New officers of the State Line RC: WB2A, pres.; K2YLH, secy.-treas.; WN2FXS, pub. mgr.; K2-GPK, act. mgr.; K2MAT and K2BPG, trustees, Garden State officers: WB2BOS, pres.; WA2GQI, vice-pres.; W2MPT, engr.; WB2KXG and WB2DXG, secys.; K2-HVT and W2GMB, treas. & asst. New equipment: WA2RIN has a new "Starline," WB2ALF a new NC-300, W2CVW a code tape punch, WA2ZRP a new Ranger, W2BNC a new 2-meter converter and v.f.o., WA2UOO a new Ranger and eight-element 2-meter beam. New officers of the Central N.J. V.H.F. Society are WA2KZP, pres.; WA2UDT, vice-pres.; K2MPD, secy.; WB2IXE, treas.; K2JRP, sgt. at arms. This club meets the 2nd Fri. of each month at Rutgers Agricultural Admin. Bldg., New Brunswick. WB2DEP solicited messages from the E. Orange Vet's hospital. WA2ZKT received some long-awaited QSLs from VE-Land. W2CPB is refurbishing a 1921 Westinghouse detector amplifier. WB2CVN reports 26 QNI for the E. Coast RTTY Net. Some very interesting ham equipment designs are reported by the group in Monmouth County—WB2HCS, WA2MNU, W2MPT and WA2VYN. W2NYI reports his shack is too cold for comfort! WN2MED is a new ham in Teaneck. WB2CRS has installed a scope to monitor audio quality. A meeting of RMs, PAMs, ECs, SEC, SCM and Asst. SCM, followed by another "Pre-Set" Exercise, will be forthcoming in the next few months. Write K2ZFI or W2CVW for details on this ARPS activity. Volunteers for EC appointments are welcome! Traffic: K2VNL 837, WA2WAJ 587, WB2DEP 504, WB2-ALF 523, K2UCY 453, WA2KYQ 289, W2CVW 179, WA2TEK 179, WB2FCT 158, W2QNL 153, WB2HBC 142.

(Continued on page 118)

C·P COMMUNICATION ANTENNA SYSTEMS

—mean CERTIFIED PERFORMANCE!

BASE STATION STORM CHAMPION UNITY-GAIN ANTENNA (Heavy-Duty, Precipitation-Static Resistant)



**Cat. No. 175-509
Frequency Range
30-50 MC***

Cat. No. 175-509 STORM CHAMPION Antenna is designed for service in areas where maximum physical strength and/or resistance to precipitation static is required. The antenna consists of a galvanized steel element support tube running from the grounded antenna base through the entire structure to a lightning arresting device at the extreme top. The shunt-fed coaxial radiating element is mounted on this element support tube and the entire structure inserted into a fiberglass tube which is permanently sealed. This design results in a reduction of precipitation static interference in the order of 20 db. This noise reduction will permit a communication system to render effective service when nearby installations with exposed radiators are completely inoperative.

Electrical Specifications:

- Nominal input impedance..... 50 ohms
- Maximum power input..... 500 watts
- Internal feedline..... RG-8A/U
- Flexible terminal extension..... 18" of RG-8A/U
- Termination..... Type N male with Neoprene housing
- VSWR..... 1.5:1
- Bandwidth..... ±1%
- Lightning protection..... Direct ground

Mechanical Specifications:

- Radiating element..... 2" dia. red brass tube
- Radiating element housing..... 3" dia. fiberglass tube
- Support pipe..... 4" dia. hot-galvanized steel, 24" length available for mounting
- Rated wind velocity..... 100 MPH with 1/2" of ice
- Lateral thrust at rated wind and ice load..... 150 lbs. at 30 Mc
- Bending moment 6" below top of support tube at rated wind and ice load..... 1400 ft. lbs. at 30 Mc
- Weight..... 80 lbs. at 30 Mc

*Exact frequency must be specified | Formerly STORM/MASTER



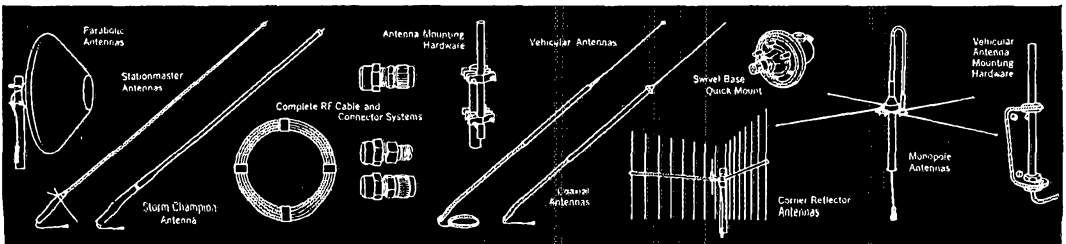
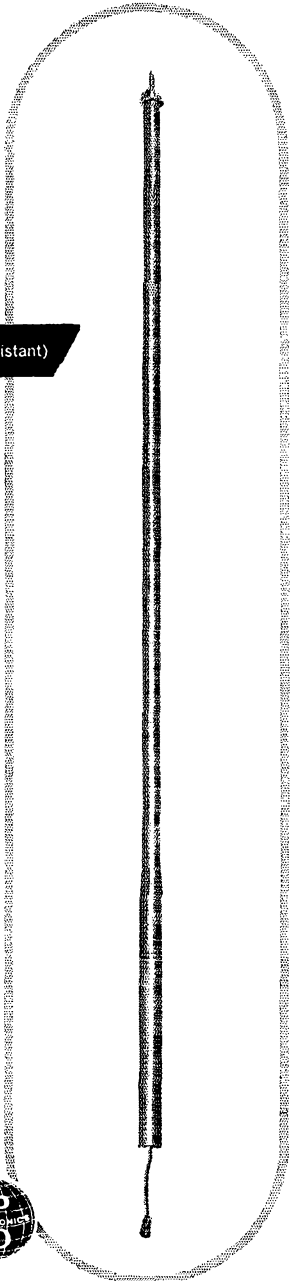
COMMUNICATION ANTENNA SYSTEMS FOR AMERICAN BUSINESS

Communication Products Company

DIVISION OF

PHELPS DODGE ELECTRONIC PRODUCTS CORPORATION

MARLBORO, NEW JERSEY — Telephone HOpkins 2-1880 (Area Code 201)
LOS ANGELES 65, CALIF. — Telephone CHapman 5-1143 (Area Code 213)





NEW IMPROVED CIRCUIT

UTICA 650 6 Meter Amateur Transceiver and V.F.O.



- Nominally rated at 22 Watts—input 100% modulated
- Built-in dual power supply for 117VAC and 12VDC operation
- Built-in adjustable BFO
- Built-in TVI filter
- Spot switch for frequency correlation
- 2 crystal sockets on front panel in addition to VFO socket
- Complete push-to-talk operation

Ask any ham why the UTICA 650 is the most wanted transceiver...



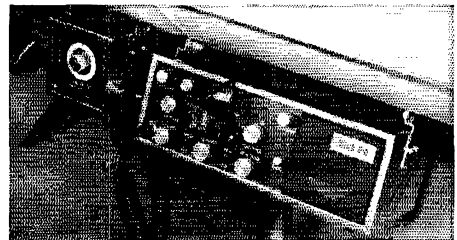
"Top features and more of 'em at rock bottom price," That's the answer

The hottest salesman in the world can't sell a ham just any old set. Hams are technical people. They *know* what they want. They *know* features. They *know* value.

Compare this Utica transceiver with anything on the market. Compare quality. Compare performance. Compare features. Compare value.

If you're an experienced ham, *you know* this Utica 650 is *the* buy. If you're just getting into the field, ask any old timer, or mail the coupon below.

- "S" meter and relative power indicator
- Transmitter indicator light
- Dual conversion superheterodyne receiver
- Series gated self adjusting noise limiter
- Adjustable squelch control
- Adjustable R.F. gain control
- VFO in separate cabinet



\$189⁹⁵

**SHOWN ABOVE —
UTICA 650 INSTALLED IN CAR**

**CLIP THE COUPON
AND MAIL TODAY**

UTICA

COMMUNICATIONS CORP.

Subsidiary of Continental
Marine Corporation
2917 W. Irving Park Rd.
Chicago 18, Illinois

UTICA COMMUNICATIONS CORP.
2917 West Irving Park Road
Chicago 18, Illinois

Please rush full details and specifications on

_____ UTICA 650 6-METER AMATEUR TRANSCEIVER AND V.F.O.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

March QST

Communications, mobile radio...

A First Class FCC License

...or Your Money Back!



Your key to future success in electronics is a First-Class FCC License. It will permit you to operate and maintain transmitting equipment used in aviation, broadcasting, marine, microwave, mobile communications, or Citizens-Band. Cleveland Institute home study is the ideal way to get your FCC License. Here's why:

Our training programs will *quickly* prepare you for a First-Class Commercial Radio Telephone License with a Radar Endorsement. Should you fail to pass the FCC examination after completing your course, you will get a *full refund* of all tuition payments. You get an FCC License... or your money back!

You owe it to yourself, your family, your future to get the complete details on our "proven effective" Cleveland Institute home study. Just send the coupon below TODAY. There's no obligation.

MAIL COUPON TODAY FOR FREE CATALOG

Cleveland Institute of Electronics

1776 E. 17th St., Dept. QT-28
Cleveland 14, Ohio

Please send FREE Career Information prepared to help me get ahead in Electronics, without further obligation.

CHECK AREA OF MOST INTEREST -

- | | |
|---|--|
| <input type="checkbox"/> Electronics Technology | <input type="checkbox"/> First-Class FCC License |
| <input type="checkbox"/> Industrial Electronics | <input type="checkbox"/> Electronic Communications |
| <input type="checkbox"/> Broadcast Engineering | <input type="checkbox"/> _____ |

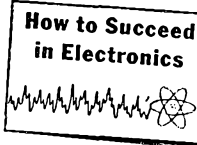
Your present occupation _____

Name _____ Age _____
(please print)

Address _____

City _____ Zone _____ State _____

Accredited Member National Home Study Council



K2SBS 122, WA2CCF 120, WA2SRK 103, WA2MYB 87, W2PEV 56, W2BYE 52, WA2UOO 51, W2LQP 43, WA2QPX 42, WA2ZQU 40, K2AGJ 24, K2SLG 24, W2TFM 20, WA2ZKT 20, WA2ZRP 19, WB2DEP/2 14, W2CFB 11, K2MFX 9, W2OXL 9, W2ABL 8, K2EQP 8, WB2EZY 5, WA2ZOW 5, W2EWZ 2, WA2KRC 1, K2VVL 1.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke, W0NTB—Asst. SCM: Ronald M. Schweppe, K0EXN, SEC: K0VBM, RM: W0LGG, PAMs: K0BBL, W0LSF. New Ida Co. EC: WA0AMX. We welcome K0EXN as Asst. SCM, K0VBM as our new SEC and K0LXL as Dist. EC for N.W. Iowa, New Ida Co. EC: WA0AMX, Story Co. EC: K0YLO, W0HHR/VOI, ex-W0CTJ, soon will be among us from Marshalltown. Crawford Co. AREC is solid on 6 meters now. Congratulations to W0BFB on making the DX Honor Roll. Would it be fair to base amateur power limitations on ERP rather than DC input to the final stage? It seems to me that 2K watts PEP on s.s.b. effectively defeats the purpose of power limitation in that it produces about four times the ERP that 1K watts of a.m. does. Would it not be better to limit s.s.b. power to 250 watts rather than to adjust a.m. power to compensate for the difference in ERP between the two modes? Elections—Iowa S.S.B. Net: K0HFU, pres.; K0JLW, vice-pres.; W0YDV, secy.-treas.; K0DBW, mgr.; K0CKY, coordinator; K0KAQ, tic.; W0PKH, Tech. D. Iowa 160-Meter Net: W0SRO, pres.; W0CGL, vice-pres.; K0TDO, secy.-treas.; K0ZCQ, act. mgr. Net reports—Interstate S.S.B.: QNI 1312, QTC 1167, sessions 31. Iowa 160-Meter Net: QNI 976, QTC 30, sessions 31. Iowa 75-Meter Net: QNI 1026, QTC 261, sessions 26. Hamilton Co. Net: QNI 257, QTC 9, sessions 31. Traffic: W0LGG 3704, W0BDR 2192, W0NTB 348, W0USL 78, K0TDO 37, W0HNE 20, K0ZCQ 20, K0BRE 19, W0JPJ 17, W0REM 16, W0DUA 15, K0KAQ 15, W0IHR/VOI 14, W0YDV 14, K0IHC 13, W0PTL 10, W0HTP 9, K0JMA 9, K0BBL 7, W0MMZ 7, W0QVZ 6, W0FMZ 5, W0NWX 5, K0MST 4.

KANSAS—SCM, C. Leland Chewy, W0ALA—SEC: K0BXP, PAMs: K0EFL, W0BOR, RMs: W0GGG, W0PFG, V.H.F. PAMs: K0VHP, W0HAJ. New appointments: W0TWJ as EC for Zone 15; W0AKA as OBS. December net reports as follows:

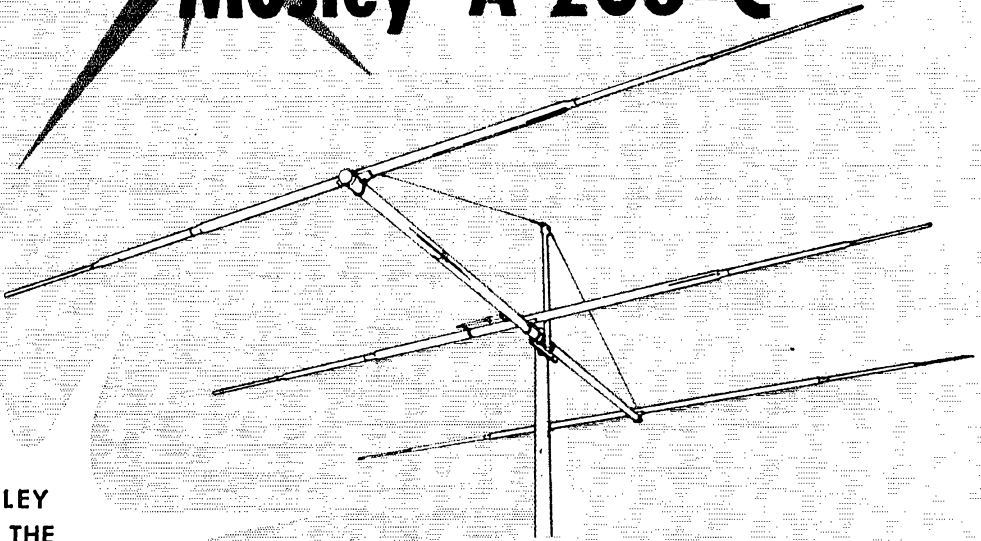
Net	Freq.	Time	Days	Sessions	QTC	QNI	Inc.
KPN	3920	1245Z	M-W-F	16	53	274	17.1
KPN	3920	1400Z	Sun.				
QKS	3610	0030Z	T-T-S-Su				
HBN	7280	1800Z	Daily	21	508	328	

There has been lots of activity reported up Salina way lately. The CKRC paper, *INK*, is a dandy and one the membership can be proud of. Thought some of you would be interested in hearing that ex-W0HAW, now WA6ORJ, is the daddy of a new baby daughter. The Wichita Tech-Ni-Chat Club is our newest affiliated club. Congratulations. It is the intention of your SCM to reactivate the Kansas Side Band Net on Mon., Wed, and Fri, at 2345Z and on Sun. at 1300Z. This net will work in conjunction with KPN and QKS. Hope we can have it going by next report. Traffic: K0YTA 322, W0BYV 262, K0BXP 108, K0WYT 62, W0IFR 49, K0ZHO 38, K0LHF 42, W0ALA 31, W0YVW 24, W0PSD 19, W0BMW 14, K0CII 14, K0VET 14, K0YQC 14, WA0BRK 12, W0FDJ 12, K0EAB 10, K0YGR 10, K0PIE 9, K0EFL 7, W0WFD 5, W0ERQ 2.

MISSOURI—SCM, Alfred E. Schwaneke, W0TPK—Although this is being written in January, it will appear in March, at which time I will have been SCM for one year. I want to thank you who have helped with your ideas, reports and news that you have sent in so regularly. Right now the low-frequency traffic nets are having trouble with long skip. V.H.F. nets could cover the state under all conditions. These nets need connections into the NTS and coordination as part of the ARFSC. I have asked K0TGU and K0ONK to see if they can help organize a statewide v.h.f. traffic system to distribute long-haul traffic. Any v.h.f. net manager is invited to join in this job. Your help is needed. The Mo. QSO Party will be held Apr. 25-27. The Mo. Picnic will be held at Jeff. City on June 7. Appointments renewed: K0TCB EC; K0JPL as OPS and QI; K0FPC as OES, Officers of the NW St. Louis ARC (K0AXU) are K0JPL, pres.; K0ECK, vice-pres.; W0CED, treas.; K0LQA, secy. The Lee's Summit ARC officers are K0TCB, pres.; WA0CSO, vice-pres.; K0AHC, treas.; K0AGX, secy.; K0TGU, act. mgr. W0YHT reports the Boot-Heel AREC Net has 15 regular members. W0GQR reports 32 check-ins for the

(Continued on page 120)

NEW.....for 20 meter operation Mosley A-203-C



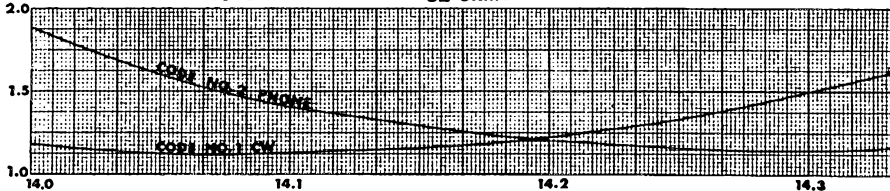
MOSLEY
HAS THE
OUTSTANDING
THREE ELEMENT
ARRAY FOR
TWENTY
METER DX
OPERATION.

The new clean-line A-203-C will give you that DX punch that will over-ride QRM. The A-203-C is a three element twenty meter beam using swaged tubing elements to give this antenna rugged durability. The antenna has a special new type element design that virtually eliminates element flutter and boom vibration. A-203-C is a wide spaced, gamma matched, full size beam that every ham needs for the tough competition enforced by the present conditions on the DX bands. This antenna will equal the performance of many four to six element beams without the headaches of large size and heavy weight necessary for these big beams.

- GAIN (Up to 8 db.) (F/B 24 db.)
- HANDLES MAXIMUM LEGAL POWER
- BOOM LENGTH 24 ft.
- MAXIMUM ELEMENT LENGTH 37 ft.
- TURNING RADIUS 22 ft.
- WIND LOAD (80 mph wind)—140 lbs.
- ASSEMBLED WEIGHT 40 lbs.
- SHIPPING WEIGHT 49½ lbs.

SWR curves for A-203-C

52 ohms



MOSLEY ELECTRONICS INC. 4610 N. LINDBERGH BLVD. - BRIDGETON MO. 63044

LOW-LOSS, RUGGED, FLEXIBLE

COAXIAL CABLE



Heavy non-contaminating vinyl outer jacket protects the pure, bright copper braid, low-loss nitrogen foam dielectric and heavy copper center conductors. Excellent flexibility even under sub-freezing environmental conditions. ONLY .83 Db loss Per 100 Ft. at 30 Mc.

Feet	Price
50	\$ 8.00
75	11.60
100	15.00
125	18.00
150	21.00
200	27.00
300	39.00
400	50.00
500	60.00
1000 (2 - 500 Ft. Reels)	100.00

Enclose check or money order—shipping and insurance charges prepaid by us.

COMMUNICATIONS EQPT. CO.

518 State St. La Crosse, Wis.

Please send me _____ Ft. of Low-Loss Nitrogen Foam, RG-8/U Coaxial Cable at \$ _____.

I have enclosed check money order

NAME _____

ADDRESS _____

CITY _____ STATE _____

Dist. 1 AREC Net in Dec. K0AYB, K0FPC, K0ONK and W0KIK made the BPL, WN0HXZ is new on 2 meters in the K.C. area. WA0EXC is a new Gen. Class licensee in Webster Groves. Only c.w. net reported this time: MON, 26 sessions, QNI 168, QTC 245; SAIN, 5 sessions, QNI 35, QTC 08. MON needs more members on 3580 kc. Mon.-Sat. at 0100 GMT. Traffic: K0ONK 7337, K0FPC 711, W0AYB 570, K0TGU 477, W0KIK 198, W0MKJ 156, W0YJ 144, K0BWE 141, W0U0D 130, W0TPK 112, W0HTO 74, K0LQH 60, W0AIM 40, WA0DJG 38, K0VPH 36, WA0DGT 30, W0RTO 28, WA0CVV 26, W0YHT 19, W0DEO 10, W0GQR 8, W0GBJ 5, K0WOP 4, K0IHY 3, K0VIQ 3, K0JPL 2, WA0CHD 1.

NEBRASKA—SCM, Frank Allen, W0GGP—SEC: K0TSU. Endorsement: K0OUL as OES. Net reports: Morning Phone Net, W0BRH reporting, QNI 436, QTC 89; Nebraska Noon Net, W0EGG NCS, W0FJG secy., QNI 1175, QTC 324, 100 per cent check-in, K0JRH; Nebraska AREC Net, W0IRZ, QNI 77, QTC 8, Nebraska Storm Net, K0JXN reporting QNI 757, QTC 19; Western Nebraska Phone Net, W0NIK NCS, QNI 611, QTC 102, 100 per cent check-ins, WA0AES, W4LEE/0, W0NIK. The 1963 year-end report showed the net in 314 sessions recorded 6833 QNI and 561 QTC. H.f. band conditions have been very bad for the morning nets, but NCS are doing a good job to maintain nets. All clubs are urged to list their summer activities, hamfests and get-togethers with the SCM for listing in the column as soon as possible. Traffic: W0FIG 258, W0YU 173, K0RRL 87, K0ZEO 53, W0VEA 43, WA0AES 42, W0EGQ 42, K0JFN 38, W0FBY 35, W0CCD 31, WA0CFB 31, W0NIK 29, WA0DFS 25, WA0CIE 24, K0GAT 23, W0BKW 22, W0MAO 17, W0GGP 16, K0KJP 15, W4LEE/0 14, WA0CPS 14, K0OVV 14, K0YZP 14, W0VJ 12, WA0BOK 11, W0YFR 11, K0HVN 10, W0HTA 10, W0NOW 10, W0FTW 8, K0JXN 8, W0BOQ 7, WA0CEZ 6, K0HNT 6, WA0CML 4, K0SCN 4, K0VTC 4, K0VTD 3, W0AHB 2, WA0AVR 2, WA0AKG 1, K0DVI 1.

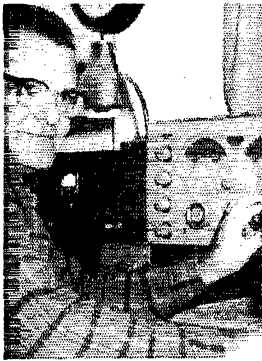
NEW ENGLAND DIVISION

CONNECTICUT—SCM, Robert J. O'Neil, W1FHP—SEC: W1EKJ, RM: K1GGG, PAM: W1YBH, V.H.F. PAM: W1FHP. The latter appointment is open for a new v.h.f. station operator. Send names and addresses to the SCM, address page 6 QST. Net meetings: CN, 3640 kc. at 1845; CPN, Mon. through Sat. 3880 kc. 1745, Sun. 1000; Conn. Emergency Coordinators Net, 0900 on 3880 kc. AREC members also are invited to attend the session. New officers of the North Haven ARC are K1NBZ, pres.; K1UYZ, vice-pres. The Torrington CQRC's new officers are K1JXB, pres.; K1KEA, vice-pres.; K1YGS, secy.; W1E00, treas.; K1UAH, station and 2-year trustee; K1CFW and K1WIQ, 1-year trustees. BPL certificates went to K1WKJ, K1WKK and K1DQC. OES appointment went to K1VML. A new ORS is K1ZND. Endorsements: K1PQS and W1CTI as ORSs; W1FYG as EC; K1QPN as OBS and OPS. Officers of the AREC of Norwalk are K1V60, pres.; W1NEF, vice-pres.; W1A1LB, secy.-treas.; K1CYW, chief engineer. CN traffic: 31 sessions, 476 messages with average attendance of 11.5 stations, high QNI K1WKK, W1RFJ and W1A1LZ. CPN activity: 30 sessions, 303 messages with average attendance of 16 stations. Leaders were K1NTR, K1AQE, W1LUH, K1DGG, K1LFW, K1OJZ and K1SRF. The early time has helped the traffic situation. The net has lost a very ardent member to Silent Keys, W1DAV, who was well known to all members of CPN and CN for his help with phone calls and traffic handling to the Hartford area. Note: Please send your activities reports in soon after the first of the month so the column can go to press on time, please. Traffic: (Dec.) K1DQC 1020, K1WKK 582, K1WKJ 550, K1YTX 200, W1EFW 286, W1NJM 279, K1JAD 202, W1A1LZ 146, K1DGG 138, K1NTR 127, K1GGG 118, W1OBR 105, K1PQS 91, W1CTI 75, W1AW 73, K1ZND 56, K1SRF 49, W1YBH 37, W1MPW 35, W1FHP 33, W1ECH 32, W1BDI 30, K1AQE 28, K1OJZ 23, K1MBA 21, W1QV 12, W1CUB 11, W1ADW 8, W1CSM 18, W1BWN 17, W1GFA 7, W1RRE 7. (Nov.) W1AW 162.

MAINE—SCM, Arthur J. Brymer, W1AHM—SEC: K1DYG, PAM: K1ADY, RM: K1MZB. Traffic nets: Phone Seagull Net, 3940 kc. 1700-1800 EST daily except Sunday; Pinetree Net, 3596 kc. 1900 daily Mon. through Fri., First Regional Net, 3605 kc. 1815-1930 daily; Maine State CD Net, Sun. at 1100 EST on 3993 kc. and Wed. at 1900 EST on 3530 kc., W1BYK as NCS; The AREC Net Sun. at 0900 EST on 3940 kc., K1DYG as NCS. Two new OOS are W4VEY/1 and K1LHE. K1ADY now has her WAS, K0KPU/1 and his XYL, K0YXX/1, now are residing in the Portland area. He is with the Air Force. K1TEV now has a new Drake 2B, K1AXO, K1ACT, K1AEZ and W1QY all have new NCX-3s. WILDG

(Continued on page 122)

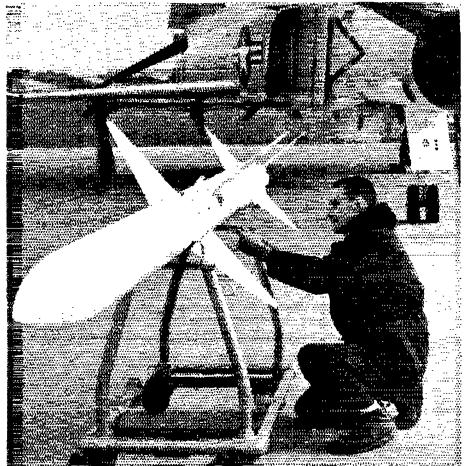
FIELD ENGINEERING WITH A FUTURE



The man in charge of this efficient station is Ray Remington, WISBP. Ray works his rig with the dedication and enthusiasm that has helped him to become an important and respected executive at Raytheon. It was only a little more than 10 years ago that Ray, a ham with Navy electronics experience and ambition to get ahead, answered a Raytheon field engineering ad in QST.



Today Ray Remington is Programs Manager, Field Engineering, of Raytheon's Electronic Services Operation. After joining Raytheon's Field Engineering organization, Ray rose to assume overall responsibility for the complete test program during the design and development stages of the B-58 Hustler Search Radar Program. Since then, he has assumed ever more challenging positions until he now directs a field engineering program with world-wide responsibilities.



At Raytheon, field engineers are playing an increasingly important role in the installation, maintenance and operation of complex, sophisticated electronic systems. In space, on the ground, under the seas, in every environment probed by electronics, Raytheon engineers are finding and meeting new challenges. The opportunities for qualified people are many and rewarding.

Perhaps you can qualify for a Raytheon field engineering future. Requirements include an E.E. or its equivalent in practical experience in guided missiles, fire control, radar, sonar or communications equipment.

Among Raytheon benefits: attractive starting salary with regular merit reviews; life and hospitalization insurance; retirement plan; educational and relocation assistance.

For complete details, write Mr. R. E. Guittarr, Electronic Services Operation, Raytheon Company, Equipment Division, Northwest Industrial Park, Burlington, Mass.

RAYTHEON

An equal opportunity employer.

VERY HIGH PERFORMANCE COMMUNICATION ANTENNAS

BEAMS High Forward Gain



Rugged, lightweight, and real performers. Booms 1" aluminum tubing, elements 1/2" aluminum rod pre-assembled on booms. Reddi Match for direct 52 ohm feed. Add on stacking kits available for dual and quad arrays.

Model A144-11—11 element, 2 meter, boom 12'	\$12.75
Model A144-7—7 element, 2 meter, boom 8'	8.85
Model A220-11—11 element, 1 1/2 meter, boom 8.5'	9.95
Model A430-11—11 element, 3/4 meter, boom 5'	7.75

6 METER BEAMS: Full size, wide spaced, booms 1 1/2" and 1 1/8" diameter, elements 3/4" diameter aluminum tubing. Reddi Match for direct 52 ohm feed 1:1 SWR.

Model A50-3—5 element, 6 meter, boom 6'	\$13.95
Model A50-5—5 element, 6 meter, boom 12'	19.50
Model A50-6—6 element, 6 meter, boom 20'	32.50
Model A50-10—10 element, 6 meter, boom 24'	49.50

COLINEARS Broad Band Coverage

Ideal all around VHF antennas featuring lightweight, mechanical balance, high power gain, major front lobe, low SWR, low angle of radiation, and large capture area.



Model CL-114—7 meter, 16 element colinear	\$16.00
Model CL-216—1 1/2 meter, 16 element colinear	12.85
Model CL-416—3/4 meter, 16 element colinear	9.85
Model CL-M5—Universal matching stub matches 300 ohm 16 element antennas to 200, 52, or 72 ohm feed lines	4.75

Add on stacking kits available for 32, 64, and 128 element arrays.

TWIST Another CushCraft Ist!

For Tracking Oscar III



For satellite tracking, back scatter, or point to point communications. The Twist provides either vertical or horizontal and left or right circular polarization. Ideal as a combination point to point or base to frequency mobile antenna. Reddi Match driven elements for direct 52 ohm feed. Cut 10 frequency within 130 to 150 Mc. range.

Model No. A144-20T Single 20 element TWIST	\$24.95
--	---------

Dual and Quad arrays available.

BIG WHEELS & HALOS 360° Coverage



The amazing Big Wheel is a horizontally polarized, broad-band, omnidirectional gain antenna. It provides direct 52 ohm coaxial feed.



Model No. ABW-144 Single 2 meter Big Wheel	\$10.95
Model No. ABW-220 Single 1 1/2 meter Big Wheel	9.95
Model No. ABW-430 Single 3/4 meter Big Wheel	8.95
2 Boy stacking Kits available	3.95
4 Boy stacking Kits available	11.75

MOBILE HALOS: Aluminum construction, machined hardware. Reddi Match for 52 or 72 ohm direct feed. 2 meter. Dual halo two bands one 52 ohm feed line.

Model AM-2M—2 meter, with mast	\$8.70
Model AM-22—2 meter, stacked Complete	14.95
Model AM-6M—6 meter, with mast	12.50
Model AM-26—6 and 2 dual halo, with mast	17.45

NEW ZIPPER PORTABLE BEAMS

6 & 2 Meters

with wing nut construction for sturdy swing out portability, and ZIP assembly.

Combination ZIPPER with 5 elements on 2 meters, 3 elements on 6 meters Model No. A26-ZP	\$15.95
---	---------

6 Meter 3 element ZIPPER Model No. A50-ZP	\$10.95
---	---------

SEE YOUR DISTRIBUTOR OR WRITE FOR FREE CATALOG. BUY CUSH CRAFT FOR MORE SOLID VALUE & PERFORMANCE!



621 HAYWARD ST.

MANCHESTER N. H.

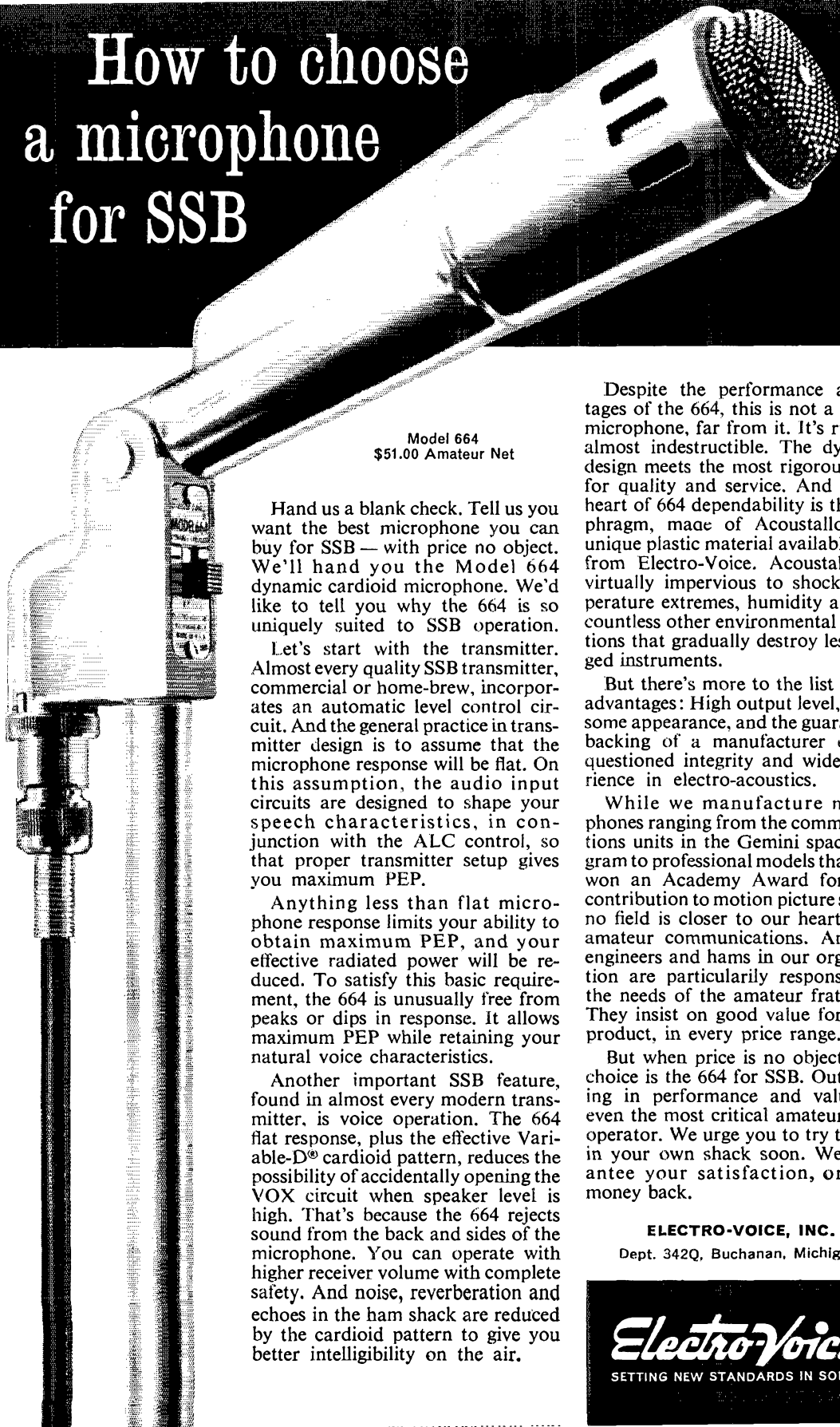
now is operating a Viking 2 and has a weekly sked with W4NPG (FCC) in Washington, D.C. KINFL has a new Communicator III with a linear and two big wheels in phase at 50' and is a member of the AREC 2-Meter Net. A belated report from K1UXZ tells of quite a few new states worked in the November SS. After the SS he blew out a power transformer in his transmitter. He is now on 147.33 Mc. with a Heathkit transmitter and a five-element beam. Thirty-two new hams are reported in the state, one of them, K1AL, is an Amateur Extra. Traffic: K1GUP 228. K1MDM 16, K1VEQ 12.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from these ECs: W1s DBY, KQJ, AAU, STX, K1s PNB, QLG, AQL. Sorry to report the following silent keys: W1s, W1HL, W1APY, W1OJD, W1DPO. W4-FNT/1 is in Andover. W1QP says he got married again. The "U-9 Radio Club held a Christmas QSO at W1-TYP's QTH. W1VAH built the "Bugless Bug." W1KQJ, RO and EC for Quincy, says they received their RACES license. K1ZHS built a homebrew keyer and is on 15.80 c.w. K1PPP reports the Central N.E. Net held 26 sessions with 500 QNTs. How about some of our nets funneling some traffic into this net? W1NF says 1X is good on 80-meter c.w. K1VCL and K1VBD are on 2 and 6. W1UC is in the hospital. W1AOG was also but is home and feeling better. The QRA now has the call W1EKT in memory of Everett Whitney and a scroll was presented to his daughter, Mrs. Richard Cotter, by W1MDH commemorating the occasion. W1EED is trustee and K1KAN is RO for Wakefield. The club has a space at Police HQ. Officers of the FMRARA are W1HKG, pres.; W1EYZ, vice pres.; W1VRK, secy-treas. This group is working hard on the convention to be held May 9 and 10 at Swampscott. Heard on 2: W1CTR and W1-AQN/1, Soughton. The Townsend ARC has its club station W1ABGM on 80-10. K1YSJ is General Class. W1SVI is in the hospital. W1PEX and K1ESG made the RPT. W4TFL/1, Chelmsford, has a new 8 wavelength long wire and says DX in N.E. is P.B. W1MRQ is going after DXCC. K1CAMS is going to Florida. Welcome to W1JYH, Westwood, who moved here from Western Mass. and is an ORSOPS. K1CCL has his shack fixed up and ready for the winter. K1VLB is in the Navy and at Pensacola, Fla., and gets on at W4ECY. The EM2MN held 21 sessions. 217 QNTs. 249 traffic. K1YKT, 13, is on 80 meters with a DX-80, NC-155 and inverted "V". K1VOK still is working crazy hours. New appointments: K1VGM as OBS, W4TFL/1 as OO. K1VPJ has a new 6-meter five-element beam. Our Eastern Mass. Novice Net held 8 sessions, 23 QNTs, traffic 4, but K1PNB says conditions were bad. The Framingham Club held a Christmas Party at the Woodwards. W1BYB spoke at the Wellesley ARS on Air Force MARS. W1DWY is now Sector R.O. The North Shore RA held a meeting and swapped gifts. W1KYT won a Clegg 99er for 6. K1VZX has the Worked All N.E. Award. K1JLP has a Gonset G-76. W1IBE, Rockport EC, says he has some new RACES equipment. He also is N.C. for the N.E. Weather Net on Thurs. The net is on 3900 kc. daily from 5:30 to 6:45 A.M. The 6-Meter Crossland Net held 18 sessions, 420 QNTs, traffic 90. W1RXJ is heard on 75 meters. The Mobilers had "Operation Santa Claus" on Christmas Eve on 6; W1KKB was his headquarters. W1AACQ, Saugus, is in the 6-Meter Net. The Yankee Radio Club held a meeting and had a "Penny Auction." The club has a new meeting place, Elks Lodge, on North St., Salem. W1HLP is mobile on 2. The Danvers Emergency Net has code practice at 8 P.M. on 10 meters. W1HIL has a Clegg 99er on 6. K1ESG has an RME-6900 receiver. Appointments endorsed: W1ZSS as OPS, W1HNW Nahant, W1IBE Rockport, K1PNB Townsend as ECs. Traffic: (Dec.) W1PEX 2544, K1ESG 513, W1LES 402, K1YKT 394, W1EMG 301, W1DOM 244, K1PNR 152, W1AOG 150, W1OPF 137, K1GKA 113, W1ZSS 87, K1ZQU 80, W1BIE 64, W1SVI 44, K1LCC 40, K1BGK 33, W1FJJ 30, K1CMS 17, K1OWK 12, K1VOK 10, W4TFL/1 9, K1FJM 7, K1VGM 3, W1MRQ 2, K1ZHS 2. (Nov.) W1ZSS 52, K1YKT 34. (Oct.) K1YKT 46.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: W1BYH/K1APR. C.W. RM: K1IJV. PAM: K1RYT. Mass. Phone Net meets on 3842 kc. Mon. through Fri. at 5:30 P.M. and still is in need of members. Please contact K1RYT. RM K1IJV sends the following for W1MN (3560 kc. daily except Sun, at 7 P.M.): Stations active in their order of activity are K1IJV, W1BVR, K1ZRN, W1DWA, K1SSH, K1ZVJ, K1LBB, K1WQQ, K1YMS, W1AJX, K1YST, W1AMI, W1LLN, W1WIP, W1BKG, W1DZV/1, K1PES, W1ZPB, K1CPG, W1DWW. Not bad for a c.w. net, eh? W1ZPB reports that the club station at Mt. Hermon School is being reactivated. W1AZW is recuperating after a stay in the hospital. W1JDB is on 75-meter s.s.b. K1ZHL worked England on 80-meter c.w. W1CWE was a new

(Continued on page 124)

How to choose a microphone for SSB



Model 664
\$51.00 Amateur Net

Hand us a blank check. Tell us you want the best microphone you can buy for SSB — with price no object. We'll hand you the Model 664 dynamic cardioid microphone. We'd like to tell you why the 664 is so uniquely suited to SSB operation.

Let's start with the transmitter. Almost every quality SSB transmitter, commercial or home-brew, incorporates an automatic level control circuit. And the general practice in transmitter design is to assume that the microphone response will be flat. On this assumption, the audio input circuits are designed to shape your speech characteristics, in conjunction with the ALC control, so that proper transmitter setup gives you maximum PEP.

Anything less than flat microphone response limits your ability to obtain maximum PEP, and your effective radiated power will be reduced. To satisfy this basic requirement, the 664 is unusually free from peaks or dips in response. It allows maximum PEP while retaining your natural voice characteristics.

Another important SSB feature, found in almost every modern transmitter, is voice operation. The 664 flat response, plus the effective Variable-D[®] cardioid pattern, reduces the possibility of accidentally opening the VOX circuit when speaker level is high. That's because the 664 rejects sound from the back and sides of the microphone. You can operate with higher receiver volume with complete safety. And noise, reverberation and echoes in the ham shack are reduced by the cardioid pattern to give you better intelligibility on the air.

Despite the performance advantages of the 664, this is not a fragile microphone, far from it. It's rugged, almost indestructible. The dynamic design meets the most rigorous tests for quality and service. And at the heart of 664 dependability is the diaphragm, made of Acoustalloy[®]; a unique plastic material available only from Electro-Voice. Acoustalloy is virtually impervious to shock, temperature extremes, humidity and the countless other environmental conditions that gradually destroy less rugged instruments.

But there's more to the list of 664 advantages: High output level, handsome appearance, and the guaranteed backing of a manufacturer of unquestioned integrity and wide experience in electro-acoustics.

While we manufacture microphones ranging from the communications units in the Gemini space program to professional models that have won an Academy Award for their contribution to motion picture sound, no field is closer to our hearts than amateur communications. And the engineers and hams in our organization are particularly responsive to the needs of the amateur fraternity. They insist on good value for every product, in every price range.

But when price is no object, their choice is the 664 for SSB. Outstanding in performance and value for even the most critical amateur radio operator. We urge you to try the 664 in your own shack soon. We guarantee your satisfaction, or your money back.

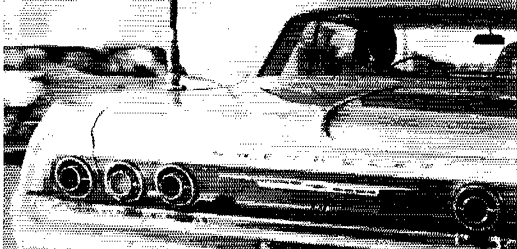
ELECTRO-VOICE, INC.

Dept. 342Q, Buchanan, Michigan

ElectroVoice[®]
SETTING NEW STANDARDS IN SOUND

Webster band-spanner.

14 year winner



BAND-SPANNER multi-band mobile antenna...

improved continually over the years to take full advantage of space-age materials and methods...yet the basic, thoroughly-proved design remains unchanged...still the finest...a fourteen year winner!

6-band coverage, 80-40-20-15-11-10 meters (plus MARS) ...beautifully streamlined, sturdy, mechanically without equal...handsome and unobtrusive on any car... handles substantial power...enduring, rustproof and corrosion resistant...all fiberglass column.

Allows exact antenna resonance anywhere within phone or CW portions of 80-40-20-15-10 meter bands (and all 27mc C-B channels). Tunes simply by moving stainless steel top whip, in or out, plunger fashion. The inductor is wound directly on the fiberglass column which is slotted to allow a portion or each coil turn to be exposed internally. Positive!

Attractive dark blue fiberglass column with lighter blue epoxy protective coating on loading inductor. Chrome plated brass hardware, stainless steel whip.

THREE BANDSPANNER MODELS	Regular: A-61, 63" telescoped, 117" overall 27.50
	Short: A-62, 60" telescoped, (illustrated) 93" overall .....27.50
	Commercial: A-69, Covers 2-18 mcs. 117" overall .....28.80



317 ROEBLING ROAD,
SO. SAN FRANCISCO, CALIF.

Export: AD AURIEMA, INC. 85 Broad St. New York 4, N.Y.

electronic keyer. The XYLS of K1WZS and K1RYT now have their own calls. WAIBDN and WNIBED, respectively. K1FQS has a new Seneca on 6 and 2. W1GUI is teaching a course in electronics at Leominster High School. K1DPP is adding a 500-watt final to his s.s.b. rig. W1JTL and W1KVM are on 6-meter RTTY. W1IDS has a Thunderbolt. K1BBV has a new tri-band beam. W1YXN has retired and is planning on much more time for hamming. K1MKA has a new v.f.o. on his 6-meter rig. Pitch Cheney, the OM of W1YWT, put on a magic show at the Christmas Party of the Hampden County Radio Club. That, together with donations of egg-nog, ice and decorations from local merchants made up a long-to-be-remembered evening. Traffic: (Dec.) K1RYT 527. K1ZBN 515. K1JVV 126. W1BVR 101. K1LBB 37. W1DWA 11. W1ZPB 2. (Nov.) K1RYT 357.

NEW HAMPSHIRE—SCM, Albert F. Haworth. W1YHI—Certificate endorsements: W1SWX, W1PYM and K1NBN as OOs. Attention is called to the New England States Emergency Net which meets Sun. at 0900 on 3870 kc. N.H. should be well represented. Congratulations on the fine Frequency Measuring Test reports from W1SWX and W1QHS. The Nashua Mike & Key Club held its 25th Annual Meeting and Supper with W1JVV as the featured speaker. The committee is congratulated on an FB job. New officers are W1RCC, pres.; W1CPW, vice-pres.; K1AEG, treas.; W1EKO, secy.; W1SWX, act. mgr. The club was active during the past year in all contests. W1TA has been secured as a club station call. The Nashua and Concord Clubs will sponsor the N.H. QSO Party this year. W1TA will operate the 1st and 3rd Mon. on 3555 kc., 29.2 Mc. and 50.520 Mc. All are invited to work the station and Hillsborough County members of the AREC should make note of this operation. The Manchester Radio Club, W1HPM, was active during the V.H.F. Contest.

RHODE ISLAND—SCM, John E. Johnson. K1AAV—SEC: W1YNE, RM: W1BTV, PAM: W1TXL, New appointments: K1GRC as EC. Endorsements: W1LUO and K1RFM as ECs. R1SPN report: 31 sessions, 611 QML, 285 traffic. This was a new record for traffic for the R1SPN. The NCRC Club of Newport elected K1PTV, pres.; W1WLG, vice-pres.; W1AIG, secy.; K1VPK, treas.; W1JFF, corr. secy. The W1AQ Club of Rumford elected K1AMG, pres.; K1AGA, vice-pres.; K1LXQ, treas.; W1WAC, secy. W1UYT became the first club member to receive his Extra Class license. W1R1 Certificate No. 37 was issued to K1VPX and No. 38 was issued to VPTCX. K1PAM is building a code wheel. W1BTV has a new cliff dweller antenna for 80 meters. W1YNE received a new Q multiplier for Christmas. New Novice tickets were received by the following WNs: AZS, BAB, BAX, BAY, AYD, AXA, AZB, AZC, AZD, BCW, BDR, BEU, BFF, BFH, BFI, BFT, and BFW. Extra Class tickets were received by W1JUE, W1MH and W1PKW. Tech. Class tickets were issued to W1AIs: BAF, BAQ, AYD, AYW, BCH, BDM, JXG and K1PRY. Traffic: W1TXL 1398. K1TPK 267. W1BTV 236. K1VEY 63. W1YNE 63. K1YVC 59. K1UZA 48. K1NJT 41. K1SXY 22. K1RRK 21. K1VPK 13.

VERMONT—SCM, E. Reginald Murray. K1MPN—The Green Mt. Net meets on 3855 kc. at 2230Z daily; the Vt. Fone Net on 3855 kc. at 1400Z Sun. Congratulations to new General K1FPB and to new Conditionals K1FIX, K1FIY, K1FTA and K1PDJ. W1QNM is on the sick list and taking it easy. We regret to report K1BUE as a Silent Key. K1EQI advises us he is back on 6 meters and ready for any skeds. W1BD is back in our fair state and is a most welcome addition. Listen for the boys on 28.6 Mc. Sun. at 7 p.m. Hope you all had fun in the Vt. QSO Party. We try to check in to the Green Mt. Net at the end and beginning of each month to get your traffic reports—so pass them along. The Vermont Fone Net, under the capable net control of W1UCL, had 191 stations check in during December. Traffic: K1BQB 138. W1VFPZ 125. K1MPN 18. K1AUE 6. K1SLU 6.

NORTHWESTERN DIVISION

IDAHO—SCM, Raymond V. Evans. K7HLR—W7GGV is the new president of YL CHC Chapter 4. She also received a 5-year membership certificate from the YLRL. W7GGV and K7CXP received Public Service Awards for their work during the flood of Feb., '62. The Pocatello Club elected new officers Jan. 11. Skip conditions are making things rough for the FARM Net. The Gem NTS Net still is making out OK on most sessions. RTTY activity is picking up with K7DMZ, K7MNZ, W7JMH, K7HDW and others plugging the green keys. Soon to be on are W7ORB, K7CLK, K7HLR and possibly others. Keep us informed, we may be able to work up some traffic skeds and general get-togethers on

(Continued on page 126)

To the occasional distress of his associates, your correspondent has a deep and abiding interest in boats. And with a foot of snow on the ground, with the family sailboat safely under a tarp in the back yard, thoughts tend toward last year's sailing experiences instead of the springtime scraping and painting due about the time this page appears.

LAST July I cruised from Port Washington, L. I., to Penobscot Bay in Maine with Jerry Sevinann aboard his sloop *Jar II*. Our ultimate destination was W2BA's summer QTH in Isleboro, Maine, and Jerry and I decided to bring along an NCX-3 and work the boys on 75 from the boat. The *Jar* is equipped with a 25 hp auxiliary with an alternator mounted to charge two husky 12 volt marine batteries, so power was no problem. To make things even easier, the permanent backstay (a guy wire running from the top of the mast to the very stern of the boat) was already broken with egg insulators at each end for use as an antenna with the ship-to-shore radio. In the few hours before departure, a large air-wound coil was placed in the compartment under the transom to base-load the backstay, a ground wire was run down to one of the keel bolts, the NCX-D DC supply was hooked up to the batteries, and the NCX-3 found a temporary home in the upper starboard berth. All the gear had been neatly stowed away, when the waterproof fibreglas transit case used to cart the NCX-3 and accessories around the country for demonstrations loomed up like a piano crate on the dock. That transit case never did make a good shipmate. We did consider towing it like a dinghy, but finally found room for it in one of the hanging lockers. A quick check on 75 disclosed that everything worked good like an NCX-3 should and we were off.

WE sailed all that first night, and morning found us in the middle of Long Island Sound off New Haven. After breakfast we brought the NCX-3 up in the cockpit and joined the "Skivvy Net" on 3999. A good stiff breeze had the *Jar* rail-down, and the novelty of sun, spray, and ham radio resulted in one of the most enjoyable QSO's I've ever had. It's hard to beat marine mobile for signal punch, and reports were usually equivalent to those obtained by fixed stations. The third night out Russ Pierce, W1AWD, literally talked us into the harbor at Marion, Mass. A combination of heavy following seas, total unfamiliarity with the harbor, and a disturbing absence of lighted aids to navigation resulted in a ticklish navigational problem which Russ's intimate knowledge of the area and Jerry's seamanship alleviated. Then a stop in Gloucester, one in Portland, Maine, with Charley Brown, W1HZE, a rendezvous in Casco Bay with W1ZZE/M, Boothbay, and finally Islesboro.

THE NCX-3 was frequently used during the cruise for relaying messages, since the pile-up waiting for the Boston marine operator was usually worse than 20 meters during a DX contest. We learned a number of things about shipboard mobile operation, and if you've got a yen to try it here are some hints . . .

YOU can't beat a transceiver. There just isn't room on anything but a 60 footer for a separate transmitter and receiver . . . In a sailboat, the permanent backstay is a natural for your antenna, and the keel makes a perfect ground. I understand from W1CFE (who is installing a rig in his new Ariel next summer) that a fibreglassed keel is O.K. because there is sufficient capacitance to ground through the fibreglas covering . . . In a sailboat, all standing rigging except the backstay should be at ground potential for lightning protection, and also for reduction of stray effects on the insulated backstay antenna . . . Power-boat types don't have a built-in antenna farm, but a marine top-loaded whip, electrically shortened, does an amazing job . . . Take full advantage of the marvelous receiving conditions out on the water — In a sailboat you can shut off the auxiliary and still travel while you run the rig, but an ignition shielding kit is usually mandatory on a power boat. If at all possible, run power and antenna cables out to the cockpit as well as to the cabin if you want to enjoy marine mobiling to the limit . . . And bring along a plastic bag to protect the rig from spray if necessary . . . The NCX-3 I had aboard the *Jar* is next to me as I write this and there is no trace of corrosion, but the heavy plating and anodized aluminum panel construction are responsible. Finally, pick up a good book on marine radio installation — practically all of the dope applies to amateur gear.

IF you own a boat, now is the time to start planning for the installation of your NCX-3 — you'll enjoy it.

MIKE FERBER, W1GKX

P.S. See you at the Sideband Dinner March 24.



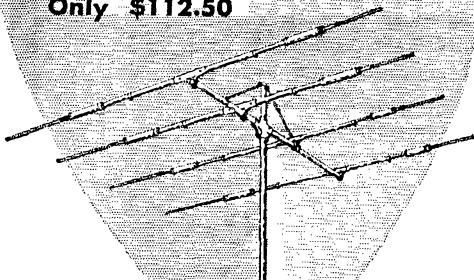
National Radio Company, Inc.

FOUR WORKING ELEMENTS FOR—

A POWERFUL FOUR ELEMENT PUNCH

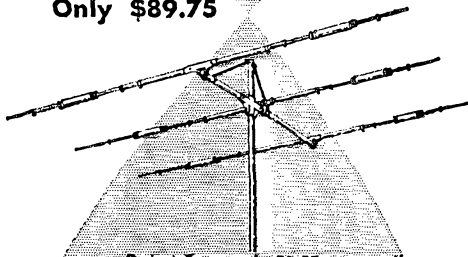
- ★ Extra Heavy Duty Commercial Quality Construction
- ★ Handles Maximum Legal Power

**MODEL TB 1000-4 Cash Price,
Only \$112.50**



Budget Terms only \$10.50 per month

**MODEL TB 1000 Cash Price,
Only \$89.75**



Budget Terms only \$8.35 per month

- ★ **FAMOUS HORNET QUALITY CONSTRUCTION.**
 - Special Cast Aluminum Fittings
 - Heavy-wall 6061-T6 Aluminum Elements
- ★ **2 Element Rotary Performance**
 - Excellent Forward Gain & F/B ratio
- ★ **LOW COST — Don't Pay More**
 - Have Hornet Quality for Less

MAIL YOUR ORDER TODAY — 10 DAYS FREE TRIAL

**HORNET ANTENNA PRODUCTS CO.
P. O. BOX 808, DUNCAN, OKLA.**

Please rush the HORNET Antenna indicated below for a 10-day Trial. If Not Satisfied, I agree to return the antenna prepaid within 10 days without obligation.

TB 1000-4 • I will pay Cash within 10 days \$10.50 within 10 days and \$10.50 per month for 11 months.

TB 1000 • I will pay Cash within 10 days \$8.35 within 10 days and \$8.35 per month for 11 months.

Please rush the antenna Model # _____

I Prefer Shipment to be c.o.d., 25% is included.

Payment in Full is Inclosed.

All Prices f.o.b. Factory

NAME _____ Call Letters _____

Address _____

City _____ State _____

ABSOLUTELY NO RISK ON YOUR PART

RTTY, Com Net: 31 sessions, 56 traffic, FARM Net: 19 sessions, 471 QNI, 36 traffic, Traffic: W7EAMT 133, K7-CXG 33, K7HLR 24, W7GGV 11, K7OAB 6.

MONTANA—SCM, Walter R. Marten, W7KUH—Asst. SCM/L.F. PAM: Dr. Marvin F. Hash, W7YHS, SEC: K7AEZ, V.H.F. PAM: W7YTN, RM: W7FIS, OBSs: W7NPV, K7OGF, K7ICI, OPSs: K7SVR, K7UPH, K7PWY, K7PKV, W7NPV, K7NDV, OFEs: W7NPV, W7TYN, K7OEG, W7NML, W7CJN, W7EGN, ORSs: W7LBK, W7EWR, K7EWZ, W7KGJ, W7COH, K7CTI, W7FIS, K7NHV. Endorsement: K7NHV as ORS. New officers of the Laurel Radio Club: W7QJG, pres.; W7LBK, vice-pres.; K7MOW, secy.; W7SMY, program chairman. W7LNU is recuperating after a serious operation. K7OZY received a new vertical for Christmas. K7RJE moved to So. Dak. W7CDW is back with his old call. W7DOV is revamping the modulator of his rig. K7PFL made his own bug. K7GVJ joined the 6-meter gang. K7NDV has gone s.s.b. W7NML is rebuilding his final with a PL-175A for a kw. K7TZZ moved to Great Falls. W7OIO is recuperating from a heart attack. K7EWZ reports conditions slightly improved on KN7. K7NHV reports the Mont. C.W. Net will be shut down until spring because of long-skip conditions. The new call of the Sacrifice Cliff Amateur Radio Club is K7ZYH; trustee is K7OGF. K7PWY checks into three nets. K7UPH handles traffic on the Mont. S.S.B. Net. W7EWR received his QRP 50 award. Two-meter stations on every evening at 6:30 in Missoula are K7CVK, K7IMZ, K7MGL, W7NEG, W7PIZ and W7COH. W7IOJ is working on a 2-meter rig. K7DCH and K7DCT have moved 55 miles northwest of Kalispell. W7CJN has 150 watts on 6 meters using a VXO with switchable crystals giving continuous coverage from 50.00 to 50.600 Mc. W7OIO and W7CJN have nightly QSOs on 6 and 2 meters. The Big Sky Radio Club holds code and theory classes Tue. at 7 P.M. at the Great Falls High School. Instructors are W4WNY, W7PGZ, K7EGJ and K8GLS. Traffic: K7EWZ 381, K7UPH 54, K7PGN 28, W7LBK 26, W7QJG 18, K7PWY 16, K7JBH 5, K7ELW 4, K7MYH 3, K7JAT 2, K7MOW 2, KN7-WRH 2, W7FIS 1, W7SMY 1.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7WKP, RM: W7ZFH. Endorsements: W7WKP as SEC, K7CJC as EC, K7AXF as ORS. K7EZP reports the Portland AREC group put over a great program for the kids at Dorenbecker Hospital and the Shrine Childrens Hospital on Dec. 14 and 21. The program was arranged by K7NXX and the hospital staff. K7CJJ and W7GWT acted as Santa Claus at remote stations and W7TMA and K7SLI served as moderators and contacted each child with 2-meter portables. The FCC granted special permission to use the name of North Pole for the base stations. K7CMV finally has his tower up after long planning and is now looking for 20-meter DX. K7CPV has a new NCX-3. K7DVK has added a 30L1 linear and will be active on all bands. W7ZFH reports QSN sessions 20, attendance 116, traffic 96. BRAT awards to W7VH, W7ZFH and K7IWD. Summary of activity for the 1963 shows QSN sessions 251, attendance 1082, total traffic handled on net 788. Regular traffic reports monthly by 8 regulars and others of 11; the total traffic handled by them on c.w. and voice was 11,812. We wish to thank all who have contributed to this station activity report section. Traffic: K7IWD 436, W7ZFH 173, K7KBK 35, K7SHC 33, W7MAO 17, W7DEM 13, W7KTG 4, K7EZP 2.

WASHINGTON—SCM, Robert B. Thurston, W7PGY—Asst. SCM/SEC: Everett E. Young, W7HMQ, RM: W7AIB, PAM: W7LFA. Here are the times and frequencies of the major nets in the Washington section as near as the SCM can find out: WSN meets at 1015 PST on 3535 kc, WARTS at 1730 PST on 3970 kc, NSN at 1900 PST on 3700 kc, and the Noon Time Net (NTN) at 1130 PST on 3970 kc. The first two are affiliated with the National Traffic System (NTS). The NSN had 31 sessions, 302 QNIs, 108 QTCs in December. K7TTV moved from Forks to Las Vegas, Nev., and K7UDG moved from Warden to Reno. K7CFH will change his OBS schedule to conform with his school schedule. K7CTP has the KW-S/Line. K7JRE is the new Net Manager of the Washington State Net (WSN). W5-YFS/7 is secy.-treas. of the WARTS Net and does an excellent job each month in printing the *Parasite*. New officers of the West Seattle Amateur Radio Club are K7JBZ, pres.; W7TWU, vice-pres.; W7TCD, secy.; W7BQB, treas.; K7PHU, sgt. at arms; K7MRV, delegate at large. Ex-KN7TCO is working on his General Class. K7KBA is operating from his new ham shack. W7AMC and his XYL celebrated their golden wedding anniversary. W7AIB says skip conditions are horrible on WSN. K7JRE is on 160 meters with 20 watts to a 6L6. He is sporting a new piece of wall paper which says Amateur Extra Class and he is only 17 years old!

(Continued on page 128)



Clegg VENUS - SSB Transceiver For 6 Meters

The Clegg Venus is a high quality, compact, attractively styled SSB receiver and transmitter that puts you on 50 mc single sideband without all the fuss, bother and expense associated with adapting low frequency SSB exciters, crystal controlled converters, relays, linear amplifiers, etc.

Employing all the latest circuit techniques, the Venus, in one small package, provides a combination of advanced operating features and conveniences heretofore unavailable in rigs at any price. Some of the outstanding features of the VENUS include a nuvistORIZED high sensitivity, low-noise front end; crystal lattice filter in both receive and transmit positions; ± 1.5 kc receiver offset tuning; broad band circuits throughout providing maximum simplicity and ease of tune-up; and a separate front panel control for smooth injection of carrier for excellent quality AM and adjustable CW output.

ELECTRICAL SPECIFICATIONS

TRANSMIT: Frequency Range: 49,975 to 50,475 KC, standard (other ranges available on special order). Power Ratings: 85 watts PEP input — all modes (AM, SSB, and CW.) SSB Performance: (9 MC lattice filter). Unwanted sideband down more than 50 db at 1000 cycles. Carrier suppression greater than 56 db. Distortion products down more than 30 db at full ratings. Frequency Stability; Less than 500 cycle warmup drift after first five minutes. Less than 100 cycles/hour drift after warmup.

RECEIVE: Frequency Range: Same as TRANSMIT. Frequency Stability; Same as TRANSMIT. Sensitivity: .25 μ V for 6 db S/N on AM. .1 μ V for 6 db S/N on SSB. Selectivity: 2.7 KC at 6 db, less than 6 KC at 50 db. Spurious Responses: Images and IF leak through down more than 60 db. Overload Characteristics: Less than 5% cross modulation results from any two signals separated by more than 20 KC if stronger signal is less than 2 MV across 50 ohm input. AVC Characteristics: Less than 10 db change in AF output for input change from 1 μ V to 400 μ V (52 db). Fast attack, panel selectable release times of .15 or 1.2 seconds. AF Power Output to Speaker: More than 2 watts at 3.2 ohms. Physical: 15" wide x 7" high x 10 1/2" deep. Weight approximately 22 lbs.

Interested in HF? See the Squires-Sanders SS-1R at your nearest distributor.

VENUS 6 TRANSCEIVER — Amateur Net Price \$495.00
115 V. A.C. 60 CPS Power Supply — Amateur Net Price \$110.00

See your Distributor or write for information.

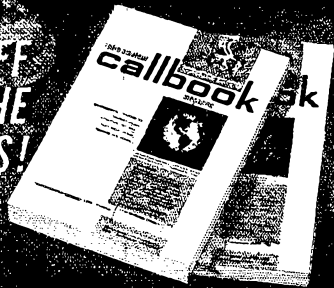


LABORATORIES
 Division of Squires-Sanders, Inc.

RT. 53, MT. TABOR, N. J.
 TELEPHONE 627-6800

NEW callbook

HOT OFF THE PRESS!



Over 60% of listings changed in only a year!

PLUS THESE EXTRA FEATURES:

- Great Circle Bearings
- "Q" and "Z" Signals
- Great Circle Charts
- World Time Chart
- Prefixes by Countries
- Int'l. Postal Rates

United States Listings... \$5.00
DX Listings..... 3.00

ORDER THESE USEFUL AMATEUR RADIO AIDS TODAY!



Radio Amateur DX Guide—62 pages of vital data; 291 Great Circle Bearings for 22 major U.S. cities; Prefix Map, Time Conversion Table, DX Log, plus other features postpaid \$2.00



World Prefix Map—Full color, 29" x 42" shows prefixes on each country . . . DX zones, time zones, cities, cross referenced tables postpaid \$1.00



World Atlas—Only Atlas compiled for amateurs. Polar projection, six continents, prefixes on each country . . . full color, 16 pages postpaid \$1.00

WRITE FOR FREE BROCHURE!

RADIO AMATEUR callbook INC.
 Dept. A, 4844 W. Fullerton Ave.
 Chicago, Ill. 60639

See your favorite dealer or order direct (add 25¢ for mailing)

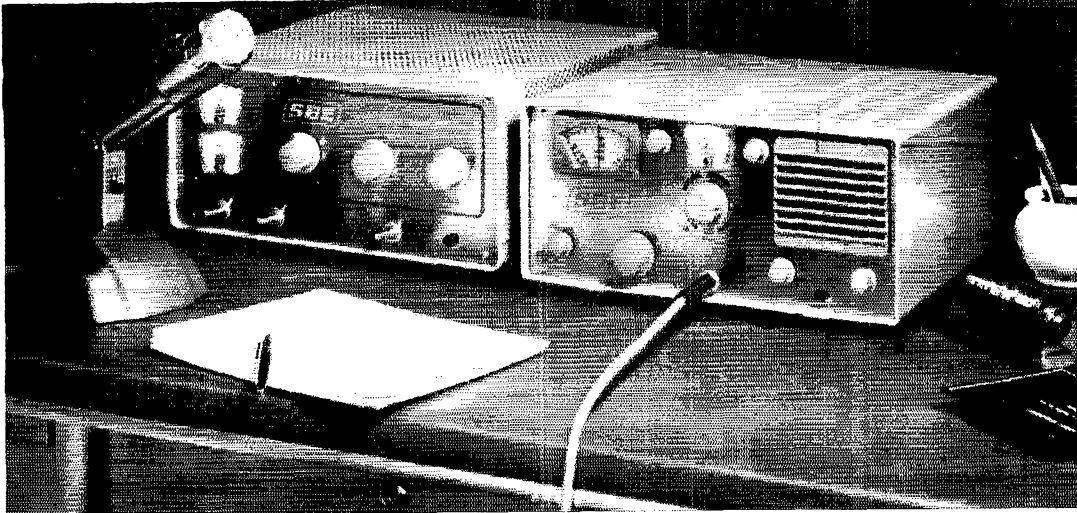
K7RSD reports traffic is going to pot because of band conditions, low power, school work, and a job at Seattle Radio Supply. K7IEY is working on v.h.f. gear for 6 meters. New officers of the North Seattle Amateur Radio Club are K1LET, pres.; K7UWY, vice-pres.; K7REY, secy.-treas.; K7PBU, sgt. at arms; W7PGY, W7CO, W7OEX, W7VX, K7LLR, K7JRF, trustees. The ESN moved net time to 1630 PST on 3920 kc. and is looking for more check-ins and traffic. K7RSM has a new homespun v.f.o. K7PVO is building a v.f.o. for his DX-60. K7QOM is constructing a 910-keyer. K7SKF, Phyllis, is the new proxy of the RARC, Inc., of Richland. W7YC is going to North Dakota. K7ZRF has a tri-band beam and tower. W7AQO has remote switching for verticals. The Richland Amateur Radio Club will hold its annual QSO Party, promoting their Atom Smasher Award, from 1500 GMT Feb. 29 to 0100 GMT March 2; all modes on 80 through 10. Traffic: (Dec.) W7BA 2096, W7DZX 1470, K7CTP 1225, K7JHA 680, W7APS 303, W7OEB 124, W7AMC 69, W7AIB 49, W7BTB 42, K7SRI 38, K7JRE 23, K7RSD 15, W7EVW 7. (Nov.) K7JHA 164.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: vacant, RM: KH6EWD. PAM: K3DIO/KH6NAA. V.H.F. PAM: vacant, ECs: vacant, ORSs: KH6EWD, KH6EOP. OOs: KH6BZF, KH6BG, KH6KS. OPSs: KH6ATS, KH6BG. OBSs: KH6EWD, KH6ATS. OESS: KH6BAS. K6QKL/KH6. Our congratulations to new appointees K3DIO as PAM/OPS, KH6BG as OPS/OO, KH6ATS as OBS/OPS, K6QKL/KH6 as OES and KH6EWD as temporary OBS. Contact your SCM for details on appointments. Look for Official Bulletins at 1130 HST on 7225 or 7250 kc. from ATS each Sat. KH6IN was in Honolulu for business/pleasure. Aloha to KH6EOP, who has left for electronics school at Memphis, Tenn. KH6ATS, KH6BIH and KH6CPW want joiners for the daily Friendly Net, 7290 kc, 2000 GMT. KH6AOL played Santa over the air to many island youngsters. Welcome to Oahu, K8KWB/KH6. Seen at the last AFCEA meeting were KH6s, DXB, EWD, CXX, BZF, CI, IR, BB and VG. KH6CUP has a new store in Hilo. The Emergency ARC is looking for members interested in emergency traffic and situations. Contact KH6GG, KH6AFM or KH6CUP for details. We were deeply sorrowed at the passing of KH6PD and KH6ECT's wife. Clubs in Hawaii are requested to send in reports of member activities for inclusion in this column. Address the notes to the SCM and get them in his hands as soon after the first of the month as possible. Traffic: (Dec.) KH6EWD 34, KH6EOP 25, KH6ATS 2, KH6BG 1, KH6BZF 1. (Nov.) KH6BGS 50.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7JU. K7ICW is getting set up for the 160-meter contest. Welcome home, W7VYC, K7GQD and K7PPE each have new TR-3s. K7RQU may be heard almost every Sun. afternoon running the club station, K7UGE. W7JU may be heard on 2 meters almost every Sun. morning working the Southern California stations. K7SFN made the BPL. He is moving to Reno. W7HQS is moving his main station into a new shack. W7TKK has a new 2-meter beam. The Mon. and Thurs.-night 2-meter Over the Hill Net is going full blast on 145.8 Mc. W4CJD/7 is back in Tonopah. K7USU and family have moved into a new QTH and have a FB 2-meter signal. KN7ZPU has a T-150A. Traffic: W4CJD/7 9, W7JU 7, W7PBV 5.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W8ZRJ—Asst. SCM, Edward T. Turner, W8NVO. SEC: WA6HVN. RM: K6KCB. V.H.F. PAM: WA6RRH. The Santa Clara Valley Section Net reports 14 sessions, 47 check-ins, traffic 17. The Northern California Net has been experiencing poor conditions because of the low of the sunspot cycle, but manages to clear most of the traffic so far. W6RSY reports December was the best month yet. W6JXK is trying for a RACES license but is finding it a slow business. Ralph is active on Navy MARS. W6AIT is active on NCN. W6RPF made the BPL by picking up traffic at work and clearing it to Midwest and East stations. K6DYX is now on FAX on 146.7 mc. W6DEF is putting a new rig on the air and reports that W6YX is active in the CD Net. W6PLS is active on phone. W6AUC is on the Sketo Net and is handling OO activity. The Palo Alto Amateur Radio Assn. enjoyed the P.T and T. Science Exhibit Trailer for its December meeting. W6ASH is working 40 and claims WAC in 3 hours. K6MTX is building a scope kit and again is building a new terminal unit. Jim is active at W6W. Red Cross station, working on the new RTTY setup. W6VZE assisted a W7 module in getting help on the highway in East Bay. K6HEP is working on an APX-6 and soon will be working 1200 Mc. Randal is looking for contacts in the San Jose or Berkeley areas. W6HC is finding TCC conditions weak (Continued on page 130)



SBE

powerful, peak performance pair

SB-33/SB1-LA... diminutive duo... four-band (80-40-20-15) SSB transceiver/exciter and high power linear amplifier. Bright, state-of-the-art version of a full thumping kilowatt... entirely self contained, including all power supplies... in two tiny cabinets! The only "extras" needed are microphone... antenna... two lineal feet of mounting space... and a strong desire for a clean-cut big signal. And when you look at the photograph above, (the 664 dynamic does look big in comparison to the linear amplifier behind it) consider that the SB-33 transceiver on the right also includes an outstanding receiver capable of solid-copy reception of the DX that is bound to be stirred up by the KW signal from your powerful pair.

SB-33
TRANSCEIVER

389.50

SB1-LA LINEAR
AMPLIFIER

279.50

Aside from the use of advanced solid-state circuitry and techniques, there are at least 37 other good reasons why SB-33 can be so small and still deliver in such a convincing manner—18 transistors, 18 diodes and 1 zener diode! (The heavy-duty work is done by two rugged PL-500 beam tetrodes and a 12DQ7 driver). The SB1-LA linear uses 6—6JE6's for 1000 watts P.E.P. on 80-40-20 and 750 watts P.E.P. on 15, achieves its small size in part by careful design and by the use of an all-solid-state voltage-multiplying power supply.

See these best buys at your SBE distributor—compare them fully with anything else available, feature-wise, price-wise. (Remembering that SB-33 has 4-bands—panel selectable sidebands—Collins Mechanical Filter—built-in 117V AC power supply and loudspeaker, is 5½"H, 11¾"W, 10¼"D, weighs 15 pounds.

Please send full information on SB1-LA Linear and SB-33 Transceiver.

NAME _____

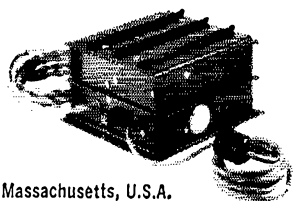
NUMBER STREET _____

CITY _____ ZONE STATE _____

SBE SIDEBAND ENGINEERS
317 Roebling Rd. So. San Francisco, Calif.

An operation of Webster Manufacturing

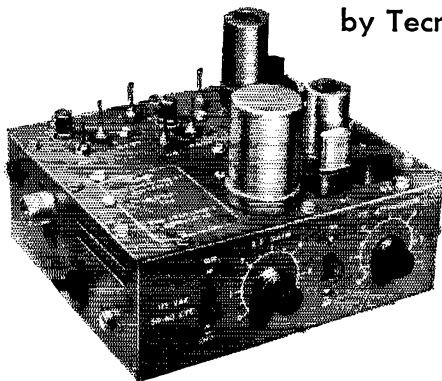
NEW Model SB2-DCP
DC to AC INVERTER
for SB-33 (only)
Quiet... entirely
solid-state.



Export sales: Raytheon Company, International Sales & Services, Lexington 73, Massachusetts, U.S.A.

THE CRITERION

by Tecraft



...is engineered to give **YOU** complete control over **ALL** signals—weak or strong, narrow or broad. This converter is designed to perform as an **integrated part** of your receiver system. **There is no other converter on the market like it today.**

+ ANY I.F. The 6-meter (50-54 Mc.) model accommodates any i.f. range from 6 to 30.5 Mc. The two meter (144-148 Mc.) and 1 1/4 meter (220-225 Mc.) models will drive any i.f. range from 6 to 50 Mc. Provision for 2 crystals per converter.

+ MAXIMUM SENSITIVITY. Lowest practical noise figure (under 3 db for 50 or 144 Mc.) assured by use of premium Nuvistors. Tube complement: 6DS1, 6CW4, 12AT7, 6J6.

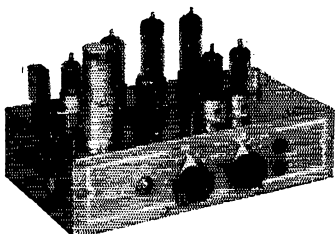
+ MAXIMUM GAIN. 1 μ V input produces 20 db thermal noise quieting. 1/10 μ V input produces 6 db signal-plus-noise to noise ratio. Wide open circuit gain, 30 db.

+ BUILT-IN, power supply solid state rectifiers.
50-54 Mc.; 144-148 Mc.; 220-225 Mc.

\$54.95 ea.

TECRAFT VHF TRANSMITTERS

For Mobile And Fixed Stations



Complete with
Crystal & Tubes
Amateur Net

\$65.95

Model TR 20/21 (10-15 meter band) 6AU6 Osc. 5763 buf/dblr. 6360 Power Amplifier. 20-25 watts input. **Model TR 20/50** (6 meter band) 6AU6 Osc. 5763 buf/dblr. 6360 Power Amplifier. 20-25 watts input. **Model TR 20/144** (2 meter band or CAP) 6AU6 Osc. 5763 buf/dblr 5763 buf/mult.-6360 Final Amplifier. 20 watts input. **Model TR 20/220** (1 1/4 meter band) 6AU6 Osc. 5763 buf/-mult.-6360 buf/mult.-6360 Power Amplifier. 20 watts input.

Matching A.C. Power Supply

SEE IT AT YOUR DEALER, OR WRITE

THE EQUIPMENT CRAFTERS

Box 84

Phone 201-288-9020

S. Hackensack, N. J.

\$39.95

because of the low sun-spot activity. WA6HRS sends in a fine bulletin schedule report and says that he will make several trips to KX6-Laud this year. Hil will be active with a "peanut whistle" on 2 meters this year. WA6GFY, Lockheed RC, now has a DXCC certificate. New officers of the South County Amateur Radio Society are K6JJU, pres.; W6SAW, vice-pres.; WA6VGR, secy.; WB6CAB, treas.; W6CTH, K6M1PN, W6VQV, WA6HAI and K6OEF, board members. Your SCM, SEC and Division Director enjoyed a fine meeting at the Santa Cruz Amateur Radio Club. Subjects discussed were ARRL organization and incentive licensing. The Monterey Bay Radio Club once again hosted the SCM, SEC and Division Director. W6HC presented a talk and slides on the new Hq. building. W6ZRJ's code practice schedule is as follows: Mon. Wed. and Fri. at 6 p.m. local time on 3580 kc., 10 w.p.m., bulletins. Wed. at 6:30 p.m. local time on 3635 kc., 20 w.p.m. bulletins. W6ZRJ also sends bulletins on 3875 a.m. and/or s.s.b. at 8 p.m. local time Wed. Traffic: (Dec.) W6RSY 1740, W6JXX 1321, K6GGZ 448, W6AIT 218, W6RFF 200, K6DYX 165, W6DEF 90, W6PLS 84, W6ZRJ 51, W6AUC 45, W6ASH 38, W6YBV 30, WA6HYN 28, K6VQK 21, W6OTI 17, K6MTX 11, W6VZE 8, (Nov.) WA6HYN 41, W6ASH 12, (Oct.) W6UW 350, K6RJE 284.

EAST BAY—SCM, Richard Wilson, K6LRN—SEC: WB6JGA, ex-W4FOR/6. As of Jan. 10 I am your new SCM. My address is 3519 Skylark Dr., Concord, Calif. 94520. W6OJW has sent all the files and has been a great help in getting started. He says to thank everyone for the support given him in his 8 years as SCM. Bill reports QRL 12-8 a.m. shift, but found time to get the 100 award sticker on the CHC certificate and made VLCC. New officers of the MDARC for 1964 are WA6FBS, pres.; K6LRN, vice-pres.; WA6MIE, secy.; WA6ANE, treas.; W6KTF, W6LGW and WA6FMZ, board members. The Silverado ARS reports its 1964 officers are WB6RNR, pres.; WA6MXA, vice-pres.; WA6OGB, secy.; K6RZR, treas.; WA6OGC, sgt. at arms. The Oakland Radio Club reports the passing of W6YI on Christmas day. Some slightly belated congratulations due: Al and Lil (WA6JCS) Mendocna on a son born Sept. 25, Dan (WA6RSG) and Linda Metcalf on a son born in November and Mr. & Mrs. Ed Shoemaker on a son born Nov. 12. WB6JGA is QNI NCN, RN6 and PAN with antenna on top of a fence 4 feet above ground. OBS WA6MJP reports his countries total 132 and his dad, WA6MAR, has DXCC. OBS WA6VAT lost his quad, but managed to double last year's SS score. Congrats to WB6DFZ and WB6BSD, now General Class. WA6FBS is an active OBS in Concord. Listen for him on 3750 kc. Tue., Wed. and Sat. OBS WA6UQM got 85K in the SS, much improved from last year. KH6HAA, ex-W4FAA is now WB6JIW and is located in Dixon. Thanks to WA6MIE for the use of his typewriter and help at 2 a.m. to get this report. Traffic: (Dec.) W4FOR/6 353, WA6MIE 15, WA6FBS 8, (Nov.) W4FOR/6 264, K6GK 140.

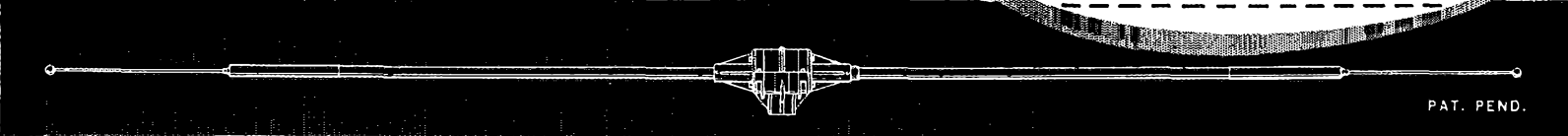
SAN FRANCISCO—SCM, C. Arthur Messineo, W6UDL/K6CWP—SEC: W6KZF. The San Francisco Radio Club and Marin Radio Club, along with several others, all enjoyed very pleasant Christmas dinners and gatherings. The above mentioned clubs also have changed their meeting nights and locations. Information is available from the secretaries. W6CTH leaves for an extended trip to the Orient. He will meet JA3BQH and JA3DDG, two prominent KING DX Clubber's, a meeting arranged by WA6IVM, who will take the same trip to Japan during July, flying there to accompany his XYL, who had preceded him, back home. More information will be coming on the International Friendship Award from Japan. The data for the San Francisco Award will appear shortly in the magazines. WA6VIO sends code practice groups Tue., Wed. and Thurs. nights from 7 to 10 on 50.310 Mc. WA6VLX and WA6HZO aided in the paper drive in San Bruno and also demonstrated ham radio to Cub Scout groups. Marin RC's summer radio class resulted in 9 new Novice licensees. Work is progressing very satisfactorily on the 2-meter repeater atop Mt. Tamalpais. WA6IVN has a new transmitter, modulator and really long wire—about 500 or 600 feet, he says. BAYLARC's new officers are Elaine, K6SZT, pres.; Dorothy, WA6OGK, vice-pres.; Pat, WB6BSA, secy.; Vera, WA6PKP, treas.; Elsie, WA6QQC, Estelle, WA6ALK, and Doris, WB6ADM, directors. The club enjoyed a very pleasant Christmas Party and meeting hosted by WA6ALK and ably assisted by Diane McShane, the XYL of WA6VLX. Did you know that W6GQA has one of the longest histories of having participated in an FMT without missing a single quarter! W6YKS and the gang up Eureka way continue their FB v.h.f. work. Plans are shaping up nicely for the Greater Bay Area Hamfest to be held in October. Come on and loosen up with those traffic reports. Not much was received this month but we sure do appreciate those that do get here on time. Traffic: W6UDL 15, W6YKS 15, WA6OTE 8, WA6IVM 3.

(Continued on page 132)

**FIRST
and ONLY..**

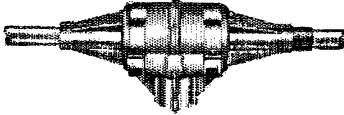
remotely tuned ROTATABLE DIPOLE!
**DESIGNED SPECIALLY FOR
 40 AND 75 METERS IN
 LIMITED ANTENNA SPACE**

**NEW-TRONICS
 CLIFF-DWELLER™**



PAT. PEND.

ELECTRICAL FEATURES



Housing for motors and gear trains with mounting yoke



Resonance and band switching control

- Antenna resonance finger tip controlled from transmitter location in shack.
- VSWR: 1.1 to 1 or less across entire band
- Feed-point variable to compensate for antenna environment
- No traps . . . no baluns . . . no matching devices of any kind
- Feed direct with any length 52 ohm cable
- Power handling capacity — maximum legal limit

The CLIFF-DWELLER is another New-Tronics first. Here's a tuneable dipole ideal for hams who live in apartments or in homes on small lots. The CLIFF DWELLER will give you unbelievable performance even in limited space.

MECHANICAL FEATURES

- Approx. lengths
 28'-6" — 26' 7.0-7.3 mc
 30'-6" — 26' 3.5-4.0 mc
 31'-4" — 26' Two-Bander
- Self supporting, accepts 1 1/4" threaded pipe for mounting in standard rotators
- Maximum turning radius approx. 15'-8"
- Sturdy aluminum die cast housing for motors and gear trains which drive end sections of dipole
- Heat treated aircraft type, 1 1/4" heavy wall aluminum tubing
- Completely waterproofed resonators and housings

MODEL NO.	FREQ. MC	WEIGHT	NET PRICE
CD 40	7.0-7.3	Under 20 lbs.	\$ 92.50
CD 75	3.5-4.0	Under 20 lbs.	99.50
CD 40-75	Two Bander	Under 20 lbs.	129.50

See the CLIFF-DWELLER and other fine NEW-TRONICS products at your distributor or write us for descriptive literature, Dept. Q.

NEW-TRONICS CORPORATION

3455 VEGA AVENUE • CLEVELAND 13, OHIO

\$59.95
amateur net



Introducing the TR-44, a high-performance rotor system for the Amateur on a budget who's ready to upgrade his antenna installation.

The TR-44 approaches the accuracy and ruggedness of the famous Cornell-Dubilier HAM-M but is designed specifically for intermediate loads.

Check these features:

- Control box contains the HAM-M meter.
- Dimensionally identical to TV rotor types AR-22, TR-2 and TR-4. The TR-44 even fits the same bolt holes!
- End of rotation electrical motor cut-off.
- No mechanical clanking, no electrical pulse noise.
- Increased rotational torque...up to twice as much as TV rotors!
- 48-ball bearing movement.
- New idiot-proof brake system.

If you are now getting marginal results using a TV rotor, the TR-44 is for you! It will give you the increased torque, braking and accuracy that are needed for large VHF arrays and small HF combination antennas. For technical information, contact Bill Ashby K2TKN or your local CDE Distributor.



CDE makes a complete line of the world's finest rotors: the HAM-M; the new TR-44; heavy-duty automatic TV; heavy-duty manual TV; standard-duty automatic TV; standard-duty manual TV; and the industry's only wireless remote control rotor system! Cornell-Dubilier Electronics, Div. of Federal Pacific Electric Co., 118 East Jones St., Fuquay Springs, N. C.

CDE CORNELL-DUBILIER

SACRAMENTO VALLEY—SCM, George R. Hudson, W6BTY—Asst. SCM/SEC: Mary Ann Eastman, WA6HYU, ORSS: W6WLL, W6AEP, OE88: W6PIV, K6HEZ, OPS: W6MIW, W6WGO, OOs: K6HHD, W6ZJW, W6WLL, K6ER, K6HEZ, W6TFH, W6GDO, WA8NRH, ORSS: K6ORT, K6YZU, ECs: W6LSW, W6JTO. The Sacramento Amateur Radio Club elected K6QIF, pres.; WN6DZP, vice-pres.; WB6DQO, secy.; WA6YZD, treas. WA6KFN, sgt. at arms. The SARC Net operates Tue. at 2100 on 145.85 Mc. RAMS's new officers are W6CXD, pres.; W6QHP, vice-pres.; K6HHD, secy.; W6DFO, treas. K7BFM, Carson City, Nev., is interested in developing an emergency net in the Reno-Carson-Tahoe area. The Golden Empire ARC's officers are WA6FWM, pres.; W9WNL/6, vice-pres.; WB6DLW, secy.-treas. W6CKV, for GEARS, says: WA6WIL, of Red Bluff, has moved to Sacramento; WB6DOS has joined the 1920-kc. gang with 5 watts and is currently modifying a DX-20 for 160-meter operation, K6PJN was heard on 1920 kc. while home from college on vacation, W6CGJ promised to regale the club with a glowing account of his vacation in Hawaii. W6ZNU's gaily decorated tower proved a conversation piece at Christmas time, WA6QYD and his new wife were in town briefly, WA6FWM claims his 10-watt signal (using a 1920, kc. mobile in his Sprite) is bigger than his car; WA6QCY still is remodeling his shack, WA6SCJ is building a receiver for 160 meters, WN6CVB is "waiting out" the results of his Conditional Class exam, K6BYS' all-band vertical for WA6WJZ went up without a hitch and is working FB, WA6YVW says his new "Southern Accent" is due to over-exposure to southern DX on 21 Mc., the deep south Antarctica and the Falkland Island, Brian is putting up a 15-meter antenna between two pine trees, WA6SES is brewing a new s.s.b. rig, OQ W6ZJW says band conditions are improving at his QTH, SCM W6BTY was warmly received at recent Volo Amateur Radio Club and McClellan Amateur Radio Society meetings, K1CAU/6 is operating in NCTN at 1830 on 3905 kc., SJVN at 1800 on 3915 kc. and McAnn 7 at 1330 on 7250 kc. Traffic: K1CAU/6 30.

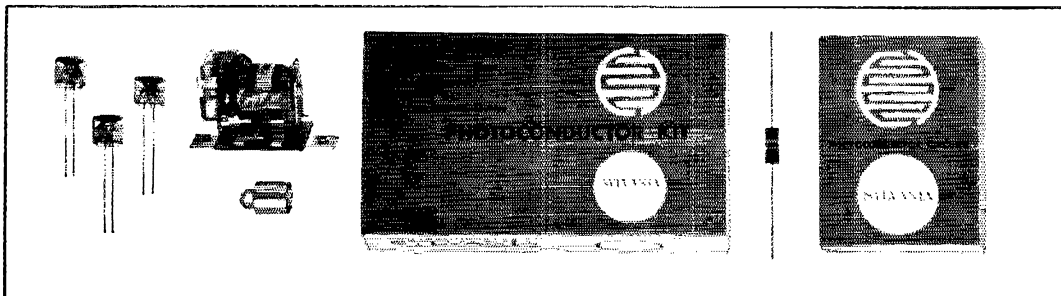
SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—WA6VML is going s.s.b. with an SB-10 and a DX-100, WN6IQB is on 80 meters with an AT-1, W6DIY has done an outstanding job in teaching theory and code to students at the Turlock High School and enabling them to obtain their amateur licenses, Congratulations, W6DIY, W6HVW is putting together a "rock crusher" with a pair of 250TLs in the final, W6PJN is heard on 75-meter s.s.b., W6HKV has a TA-33 and a TR-44 rotor and is going to chase some elusive DX, W6RRN is a detective on the Stockton Police force, W6QFR had his car broken into and stripped of all radio gear and camera equipment while visiting in Stockton, W6ARC is on 20-meter s.s.b. The Tulare County NET is gradually shifting to s.s.b. on 75, WA6EDQ and WA6RLW are both on 2-meter s.s.b. and are working out very well up and down the state, WB6AGN has an NCX-3, W6OHT is good at solving audio problems, WA6BXD had his radio gear stolen, which brings up a good point, Make sure your insurance policy covers the theft of your amateur radio equipment, W6OQE is the editor of the Tulare County Amateur Radio Club QRM, W6IFC has an NCX-3, WA6VPN finally installed full breakin, The Tulare County Net is on 145.62-Mc. f.m. The Fresno Amateur Radio Club has purchased a 22-ft. trailer to convert into a communications trailer for any need, Traffic: W6ADB 232, WA6VPN 58, W6ARE 12.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, K4QFV/W4YZH—Asst. SCM: Robert B. Corns, W4FDV, SEC: W4MFK, RMs: WA4FJF, K4CDZ, WA4ANH, PAM: K4ODX, V.H.F. PAM: K4MHS. The N.C. LO Net is off to a good start with most of the LOs checking in regularly. It meets Sun. at 2130Z on or near 3925 kc. WA4EYA has increased his power to 400 watts for his OBS transmissions, W4EJP is to be out of the state for several months and will be missed on NCN, WA4FJM says he can now go on any band 160 through 2 meters, phone or c.w. at the flip of a switch, WA4QJA is building a scope and has added a low-pass filter to station equipment, W4OAB is returning to college for a couple of more degrees, and has turned his station over to his XYL, who recently got her ticket, WA4LKL, C.D. Director for Craven County, is organizing a 10-meter C.D. net, K4YCL is with NCN again after being out of the state for several months, Welcome back, Kim, Congratulations to WA4PDS, who has brand-new A-1 Operator and EAN certificates on the wall, WA4JCS, K4QIF, K4GPL, K4MHS, WA4DYN and WA4QJA are all constructing u.h.f./v.h.f. equipment, WQPPA/4 made the BPL in December, A very comprehensive report was received from WA4DLF, who has added a new HQ-170C to his station. Net traffic: NCN (early) 420, (late) 159;

(Continued on page 134)

Fun with photoconductors



No self-respecting Ham ever uses manual control when he can do the same job with banks of tubes and relays. It's a way of impressing visitors. And it's fun.

To add to the fascination of doing simple things the clever way—and in many cases, the best way—we've brought out a Photoconductor Kit containing all the basic components required for a wide variety of measurement and control circuits activated by light.

As you more than likely know, a photoconductor is a resistor whose ohmic value changes with light intensity. In total darkness, the resistance can be as high as 2 megs, and as low as 10 ohms under optimum light intensity. It's 1,000

times more sensitive than the photovoltaic cell and up to 1,000,000 times more sensitive than ordinary photoemissive types. And, because the photoconductor will dissipate as much as 300 milliwatts, it can be used to operate a relay directly.

The basic relay control cir-

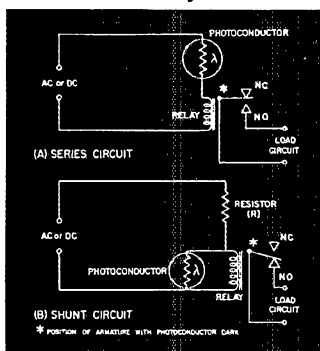


Fig. 1

uits are shown in Fig. 1. In circuit A, the relay opens when the photoconductor face is stimulated by a proper light source. In circuit B, the relay remains energized in the absence of light on the photoconductor.

You could take it from there. But we've included a 52-page circuits booklet in the kit that casts a lot of light on the number and variety of control and measurement schemes you can cook up... such as a transmitter tuning indicator, a noiseless volume control, and an AF automatic gain control.

The Sylvania PCK-10 Photoconductor Kit is now available from your Electronics Distributor*...so why not start inventing something?

73,
Bob Lynch
K2RMN

SYLVANIA
SUBSIDIARY OF
GENERAL TELEPHONE & ELECTRONICS

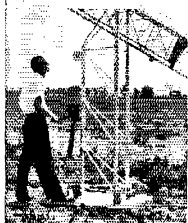


*Or send \$9.95 (plus 50 cents handling charge) to Dept. PCK-10, Sylvania Electric Products Inc., 1025 Westminister Drive, Williamsport, Pa., and we'll send the kit postpaid.

ROHN sets the standard

for
**CRANK-UP
TOWERS**

Why settle
for less
than the best?



K7ASK

TWO CATEGORIES TO CHOOSE FROM

Standard Duty Guyed in
Heights of 37 - 54 - 88 - 105
and 122 feet

Heavy Duty Self Supporting
and Guyed in Heights of
37 - 54 feet (SS)
71 - 88 feet (guyed)

ROHN has these 6 IMPORTANT POINTS:

Ease of Operation—roller guides between sections assure easy, safe, friction-free raising and lowering. **Strength**—welded tubular steel sections overlap 3 feet at maximum height for extra sturdiness and strength. **Unique ROHN raising procedure raises all sections together**—uniformly with an equal section overlap at all heights! **Versatility**—designed to support the largest antennae with complete safety and assurance at any height desired! **Simple Installation**—install it yourself—use either flat base or special tilting base (illustrated above) depending on your needs. **Rated and Tested**—entire line engineered so you can get exactly the right size and properly rated tower for your antenna. The ROHN line of towers is complete. **Zinc Galvanized**—hot dipped galvanizing a standard—not an extra—with all ROHN towers! Prices start at less than \$100.

SEND FOR ROHN TOWER HANDBOOK

—\$1.25 Value

—ONLY \$100 postpaid (special to readers of this magazine). Nearest source of supply sent on request. Representatives world-wide to serve you. Write today to:



ROHN Manufacturing Co.

P. O. Box 2000

Peoria, Illinois

"World's Largest EXCLUSIVE Manufacturer of Towers; designers, engineers, and installers of complete communication tower systems."

CCEN 165; THEN 36. Traffic: (Dec.) WOFPA/4 503, WA4PDS 454, W4LWZ 328, K4CDZ 140, W4EVN 112, W4BAW 84, K4YYJ 82, WA4ANH 70, WA4FJM 70, W4EJP 67, K4QFV 65, W4FDV 38, K4MPE 23, K4YCL 22, W4COJ 18, WA4EIS 14, K4QDO 10, W4VJSJ 10, W4EJQ 5, WA4EYA 1. (Nov.) W4PCN 79, W4FDV 10.

SOUTH CAROLINA—SCM, Lee F. Worthington, K4HDX—SEC: W4BCZ, RM: K4LND, S.S.B. PAM: K4JOQ. Nets: C.W. 0000Z and 0300Z, 3795 kc.; A.A.L. 0000Z, 3930 kc.; S.S.B., 0000Z, 3915 kc. It is with great pleasure that we welcome the Low Country ARC of North Charleston to the growing list of ARRL affiliated clubs. We wish every success to this newly-organized club. The C.W. Net welcomes a new addition to Area One—WA4JHD. Bill, at Piedmont, S.C. WA4LPX is back on SCN doing a fine job. (Competing with LPV?) W4JA, OO#1, reports a new all-band transmitter nearing completion with a newly-designed v.f.o. Looks like the Aiken ARC took the honors in the S.C. Radio Council competition. Under its rules of total score divided by number of transmitters, the Aiken Club scored 1053 points, with Spartanburg making 1416, Low Country 1242, Blue Ridge 1187 and N. Augusta-Belvedere 912. This is a good showing for the state's ARRL affiliated clubs and should improve next year as the competition increases. Net traffic: C.W. 78, Traffic: K4LND 263, K4OCU 67, WA4LPV 30, W4PED 24, WA4JHD 19, WA4LPX 13, W4NTO 13, W4JA 6.

VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM and SEC: H. J. Hopkins, W4SHJ, PAM: W4JMA, RMs: K4MXP, W4ZAU, W4SHJ, W4QDY. There is new interest and activity in ARPSC in Va. with an EC Net meeting once a month on 3850 kc. (usually on Sun.) The Fairtax Co. ARPSC 10-Meter net meets daily at 2000 local time for traffic in and out of this area. W4JXD says that the Va. EC Net did much to spark the morale of that EC! W4BGP (OO, OPS and EC) is working toward expansion to RTTY. A meeting called by the SCM was held at the home of W4JMA to clear up the sideband situation. Much progress was made and W4JMA was appointed as PAM for s.s.b. as well as OPS. W4DKP, who has done an outstanding job on VSRN along with the new PAM, also is a new OPS. W4MXU, net rep., likes the new VSRN and hopes for better liaison with all the Va. nets. W4AGWD, a VSRN mainstay, has a new jr operator. W4TBX who has been trying to function as the VSRN mgr., has run into rough sludding in finding time to do the job. WA4KBU made the jump to s.s.b. Long skip is wreaking its toll on our traffic nets and there has been a number of suggestions to make use of 160 meters. Perhaps by the time this gets in to print we will be using 160, at least as an alternate frequency. New stations appearing in our nets are invited to join these nets on a regular basis. The Dec. Va. QSO Party was an outstanding success and much credit is due the Roanoke Radio Club for a well-planned event. The group which is providing contact with our rare counties also deserves much credit. Traffic: (Dec.) W4DLA 825, WA4KBU 513, WA4FCS 447, W4DVT 412, WA4EUL 384, W4PFC 335, W4SHJ 321, W4RHA 234, W4MXU 231, W4JMA 195, W4GVQ 148, W4LK 122, W4OOL 110, W4LNC 109, W4AGWD 89, K4ITV 88, W8BAG/4 83, W4DKP 81, K4FSS 58, WA4SHD 52, W4ZAU 50, K4SDS 44, W4NVX 34, WA4PSC 27, W4TE 23, W4BGP 20, W4OKN 18, W4JUJ 16, WA4KVR 15, W4ZMT 15, K4LMB 14, K4Yzt 13, W4KX 12, W4JXD 10, W4BYZ 6, WA4HQW 5, WA4JRY 5, W4KFC 4, K4LTK 4, W4OWV 4, K4HP 3, W4PTR 3, WA4BVE 2, K4SGQ 1. (Nov.) W4GVQ 30, W4BZE 15, W4JUJ 9, W4TBX 8, W4OID 2.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA, RM: K8HID, PAM: K8EPI. West Virginia nets meet on 3570, 3890 and 3905 kc. W8DGE made the BPL for the second consecutive month. W8SSA moved into a new home and plans more on-the-air activity. K8EPI reports 19 sessions of the W. Va. Phone Net, with 332 stations and 64 messages. WA8CPY made the A-I Operator Club. WA8PIC picks up traffic on WYPO, WVN, 8RN and EAN and still keeps up with school work. W8DUV, secy. of the Tri-State Radio Club of Huntington, reports a new constitution and by-laws adopted and affiliation with the League. W8DUW is quite active on v.h.f. nets in the Huntington area. W8NCD and W8DGE gave mobile contacts from Lincoln, Putnam and Mason Counties. Long skip has been playing havoc with net operation. K8QYG and K8VQG are running low power on 160 meters. The Grafton Radio Club's call, incorrect in January QST, should be W8EP. Regional activity continues high on 2 meters, with a statewide net still in the planning stage. Traffic: W8DGE 203, WA8PIC 183, W8CKX 53, WA8CPY 35, W8HZA 17, W8IRN 9, W8DUV 6, W8JMI 5.

(Continued on page 136)



SS-1R

Cross Modulation and Overload Performance

IS ONE OF THE MOST IMPORTANT CHARACTERISTICS of a communications receiver—particularly one used on the crowded HF bands—yet most equipment specifications quietly neglect this factor and many receivers (even some expensive ones) behave just miserably in the presence of strong local signals nearby on the band. Not so with the SS-1R—its superb freedom from cross modulation and overload is an outstanding feature and a result of the completely new balanced mixer (7360) front end *with no r. f. stage*. The SS-1R performance in this characteristic (see specification below) means, from a practical point of view, that the key clicks and the splatter from the strong locals will disappear in all but the most impossible situations—when that kilowatt neighbor blasts in on almost the same frequency.

The SS-1R offers many other performance advantages over other receivers, such as direct *digital* frequency readout (no more mental arithmetic); exceptional frequency stability and accuracy; *Auto-calibration* of amateur bands with WWV; crystal bandpass filters with unusually sharp skirt selectivity; and the excellent sensitivity of the unique low noise front end mixers. *Motor Tuning* control gets you from one end of the band to the other without the tedium of knob cranking. There are *different* accessories also: the SS-IS Noise Silencer for *elimination* of most impulse noise and the SS-IRS matching speaker. The SS-1T transceive transmitter and the S-1V Video Bands scanner will be announced soon to complete the SS station.

SPECIFICATION PROFILE

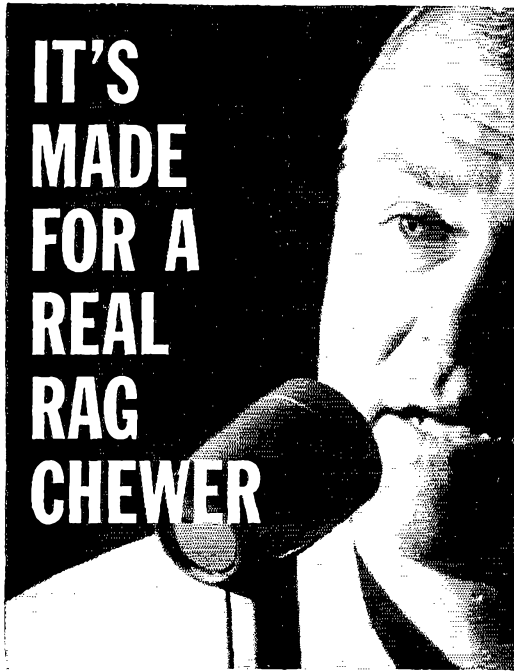
- **Frequency Coverage:** 80 through 10 M (eight 500 kc. segments). Fixed tuned WWV at 10.0 and 15.0 MC; 5.0-5.5 MC auxiliary (WWV 5.0 MC). Two general coverage 500 kc segments
- **Selectivity:** 5 kc./2.5 kc./0.35 kc.
- **Stability:** Less than 500 cps warmup drift (typically in less than 5 min.); less than 100 cps thereafter including low to high line variation
- **Sensitivity:** $\frac{1}{2}$ μ v, or better, for 10 db S/N on 10 M with 5 kc. bandwidth
- **I.F. and Image Rejection:** Greater than 60 db
- **Cross Modulation:** Example: Receiving a 10 μ v signal with 2.5 kc. selectivity, an unwanted 0.1 volt signal 20 kc. away produces negligible cross modulation
- **Internal Spurious:** None at stated sensitivity
- **AGC:** Attack—1 ms., Slow release—1.0 sec., Fast release—0.1 sec.
- **ANL:** I.F. type; operates on AM, SSB, and CW
- **Size:** 7 $\frac{3}{4}$ " H x 16 $\frac{1}{4}$ " W x 13" D, 25 lb.

The SS-1R, SS-IRS and SS-IS are available—ask your distributor for information or write

Squires-Sanders, Inc.

475 WATCHUNG AVENUE, WATCHUNG, N.J. • 755-0222

**IT'S
MADE
FOR A
REAL
RAG
CHEWER**



At last! A quality microphone designed *specifically* for the ham. Features galore that hams have asked for. Tops in voice punch, intelligibility. Unique convenience features to minimize operator fatigue. Great for AM & FM, unsurpassed for SSB. • "Shaped" response—cuts off sharply above 3000, below 300 cps with rising characteristic to curve; gets message through with top audio punch! • Push-to-talk bar-switch with optional locking feature to control relay and mike muting circuits. • Separate slide-switch gives choice of press-to-talk or VOX operation. • Exclusive adjustable height stand. • Rugged Shure Controlled Magnetic element (U.S. Patent 2,454,425). • Field replaceable cartridge and cable. • ARMO-DUR case and stand—can't rust, peel, crack, or dent. Write for data sheets!

SHURE BROTHERS, INC.
222 Hartrey Ave., Evanston, Illinois
Manufactured Under U.S. Patent 2,454,425; other patents pending

ADJUSTABLE HEIGHT

ALL NEW
SHURE

444

HAM MICROPHONE

only \$25.50 amateur net

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, K0-TTR—What has happened to the spirit of 1976 among the amateur groups? We have an SEC in Colorado who works very hard on the AREC. The AREC is a very important function for ham radio; in fact, the day may come when it will be the salvation of the hobby, and appointment as EC for a district is a very important link in this organization. The duties are not hard, but very important to your community in any emergency. *Think of that.* Net activities are increasing with winter. I hear this on the air, but not by reports. I would like to have my mail box swamped with reports each month. Well, she did it—K0ZSQ made the BPL with a total of 576. K0BCX made it with a total of 864. W0HXB is a great help to all of us. Let's all get behind each other and make 1984 a great year for ham radio. Traffic: K0BCX 864, K0ZSQ 576, W0HRS 438, K0FDH 371, W0HXB 279, W0HNN 232, W0EYX 36, W0SIN 34, W0CBI 27, K0TTR 4.

UTAH—SCM, Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson, W7OCX; SEC: K7BLR; W7-OCX has earned a BPL certificate for December traffic. The Beehive Utah Net (BUN) had its best month for traffic. W7EHX was back in town for the holidays. W7-POU is working on another WAS. This time W7POU is the first Utah contact for each of the stations worked. K7VRT finally made the BUN roll with his 9 watts. W7-VTJ was active during the holidays. K7SDF blew up the transmitter power supply on Christmas Day but is back on the air once again. W7ZC transmits Official Bulletins at 1900Z on 7003 kc. and at 1915Z on 7240 kc. Mon., Tue. and Wed. The SCM encourages all stations to report activities every month. Report forms will be sent on request. Traffic: W7OCX 290, W7LQE 81, W7VTJ 37, W7-QWH 29, K7SDF 25, K7VRT 8.

NEW MEXICO—SCM, Carl W. Franz, W5ZHN—SEC: K5QIN, V.H.F. PAM: W5FPB, 10-Mtr. PAM: W5WZK. Many thanks to W5CRF and W5QNT for their work on TWN. W5ZHN has rebuilt his antenna system. With the changes in licensing procedures W5ZHN no longer maintains stocks of license examination material or applications. There are now six RTTY stations on in Albuquerque. W5WZK had antenna troubles. The Yale ARC soon will be starting new classes for the visually handicapped. Those interested should get in touch with the Albuquerque Training Center at 2200 Yale, S.E. The Lion's Club-sponsored Eye Bank is now represented in fifty cities in the state. Stations are needed to support this effort in Sante Fe, Carlsbad, Roswell, Farmington, Hobbs, Clovis, Grants, Gallup and in all towns having an active Lions Club, s.s.b. and/or c.w. operations is preferred. Eye Bank facilities are located at Lovelace Clinic in Albuquerque and once a network has been established the net frequency will be monitored. What do you say, fellers? Traffic: W5UBW 52, W5ZHN 15.

WYOMING—SCM, Lial D. Branson, W7AMU—The Pony Express Net meets Sun. at 0830 MST on 3920 kc. The YO Net is a c.w. net on Mon., Wed. and Fri. at 1830 MST on 3610 kc. The TWN Net is a daily net at 2000 MST on 3570 kc. SCM W7AMU is in the hospital for surgery. Traffic: W7RHH 31.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William C. Crafts, K4KJD—SEC: W4NML, RM: W4USM, PAMS: K4BTO, K4NSU, K4-WHW. The Huntsville Club won the SEC Cup. The Huntsville Club is sponsoring an award for high Alabama score in the V.H.F. SS. The new Limestone Amateur Radio Club's officers are K4KJD, pres.; K4VLL, vice-pres.; W4GKN, secy.-treas. W44EXA and W4-NML made the BPL. W44AVM is a TCC member. W44-EXA is new liaison captain of the AENP. W4YRM is a new NM AENH. W44SCX is a new ham in Foley. W4-NET is on RTTY. New equipment. W4YRM, W44DYI and W44NWI. HE-45s: K4WOP, grid-dip meter; K4-BSK, rotor and tower; W4EHP and W44FAU. NCX-3s: W44GNG an HW-12; K4FZQ an HA-1 keyer; W44ZA, a 70-ft. tower and eight-element 6-meter beam; K4IWI, a new bug; K44JF an HX-30; K44NB a new sluck. December net reports:

Net	Freq.	Time GMT	Days	Ses-sions	Ave. Tfc.	Ave. QNI
AENB	3375	0100	Daily	30	9.6	7.8
AENM	3965	0030	Daily	31	8	47.2
AENO	50.55	0115	M.W.F.	14	4.5	27.1
AENP	3955	1230	Mon.-Sat.	24	3.7	12
AENP	3955	0000	Daily	34	3	21.2
AENT	3970	2230	Daily	31	3.322	13.71

Traffic: (Dec.) W44EXA 801, W4NML 214, K4WOP 140.
(Continued on page 158)

AMECO*Leader in Compact, Quality Ham Gear*

Improve your receiver's sensitivity and noise figure with an

ALL BAND NUVISTOR PREAMP

- All Bands—6 thru 160 meters
 - Two Nuvistors in cascode
- only \$24.95 wired & tested

The NEW AMECO Model PCL

Adding the new Ameco All Band Preamp ahead of your receiver will allow you to really pull the weak signals out of the mud. Model PCL is a tuned RF amplifier covering 6 meters thru 160 meters. It uses two Nuvistors in cascode and gives noise figures of 1.5 to 3.4 db., depending upon the band used. The weak signal performance of all receivers (regardless of price) will be improved. Image and spurious rejection will also be improved. Overall gain of preamp is in excess of 20 db.

Panel contains bandswitch, tuning capacitor and a three-position switch which puts the unit into "Off" position, "Standby" or "On," and transfers the antenna directly to the receiver or through the Preamp. 3" high, 5" wide, 3" deep. wired and tested \$24.95

AMECO EQUIPMENT CORP.

178 HERRICKS RD., MINEOLA, L. I., N. Y.

Affiliated with American Electronics Co. and Ameco Publishing Corp.

NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE

Model CN

Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired. (specify IF.) \$49.95. Model CN-50K, CN-144K or CN-220K in kit form. (specify IF.) \$34.95

TRANSISTORIZED MOBILE CONVERTERS. CRYSTAL CONTROLLED

Model CHT

Model CHT will convert any single frequency or band between 108 and 174 Mc. down to the broadcast band or any other IF output. Has a 1/2 microvolt sensitivity.

Complete with one crystal \$35.95
Model CLT same as above except that it receives any frequency or band between 2 and 54 Mc.
Complete with one crystal ... \$35.95

COMPACT 6 THRU 80 METER TRANSMITTER

Model TX-86

Handles 90 watts phone and CW on 6 thru 80 meters. Final 6146 operates straight thru on all bands. Size — only 5" x 7" — ideal mobile or fixed. Can take crystal or VFO. Model TX-86 Kit \$89.95 — Wired Model TX-86W. \$119.95. Model PS-3 Wired \$44.95. Model W612A Mobile Supply wired \$54.95.



CB-6

CB-6K — 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc. \$19.95
CB 6W — wired & tested \$27.50
CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd rf amp./mix. 6J6 osc. \$23.95
CB-2W — wired and tested. \$33.95
Model PS-1 — Matching Power Supply — plugs directly into CB-6, CE-2 and CN units. PS-1K — Kit ... \$10.50
PS-1W — Wired \$11.50

EASY TO UNDERSTAND AMECO BOOKS

Amateur Radio Theory Course \$3.95
Amateur License Guide50
Radio Operators' Lic. Guide, EL 1-275
EL 3 1.75 EL 4 1.25
Amateur Log Book50
Radio Electronics Made Simple 1.95

CODE PRACTICE MATERIAL

Ameco has the most complete line of code records, code practice oscillators and keys. Code courses range from start to 18 W.P.M. and are on 33, 45, or 78 r.p.m. records. Model CPS oscillator has a 4" speaker and can be converted to a CW monitor.

Write for details on code courses and other ham gear.

Dept. Q3

Ameco equipment at all leading ham distributors.

AMECO EQUIPMENT CORP.

178 HERRICKS RD., MINEOLA, L. I., N. Y.

Affiliated with American Electronics Co. and Ameco Publishing Corp.



THE WALTER ASHE RADIO COMPANY, 1123 PINE STREET, ST. LOUIS 1, MISSOURI.

DON'T RETURN THIS COUPON

WALTER ASHE RADIO COMPANY
Dept. Q-3-64
1123 Pine Street, St. Louis 1, Missouri

Ok—Wake me up! I am interested in _____

What is the Ashe "Surprise" allowance on _____

Name _____

Address _____

City _____ Zone _____ State _____

Send New Catalog
 Send Reconditioned Bulletin

Want to lie awake at night? That's what happens to the people who write for our trade in quote before they are ready to go.

Don't let our quotes disturb your sleep! Don't clip the coupon unless you can stand the best trade in offer in the business.

PLEASANT DREAMS!

(Quotes confined to gear made since 1945)

Anxious? Call us at Chestnut 1-1125

WALTER ASHE RADIO CO.

1123 Pine St. Dept. Q-3-64 St. Louis 1, Missouri

K4BSK 107, K4AOZ 103, K4WHW 64, K4NUW 63, W4-USM 53, K4GXS 37, K4FZQ 23, K4HJM 23, W4AMGI 16, K4ANB 15, K4WWP 12, K4BTO 9, W4ALDC 8, K4JDA 6, K4RIL 5, W4YRM 5, W4KCC 4, W4AMRQ 2, K4PBY 2, W4ACWI 1, K4FTC 1. (Nov.) W4AVM 392, W4USM 43, W4AMRQ 2.

EASTERN FLORIDA—SCM, Guernsey Curran, W4GJI—SEC: W4IYT. No doubt that HARC is very pleased that W4BNE has been awarded the second Certificate of Merit issued by the Governor and the State CD Director for outstanding communications service. W4-GPD is the new president of the Florida Side-handers Assn. Other officers are W4IHDH, secy.; W4BNE and W4PUW, vice-pres.; W4JQ, treas.; W4OVE, net mgr. for the emergency net. W4JQ was elected net mgr. of the EAST Net. We are looking forward to an increase in RTTY activity. Operation by continuous wave has always been the backbone of fundamental radio and RTTY uses the mode to put legible intelligence on paper. This is an art that must receive advanced attention in this fast-moving era for it cannot be denied that it enhances the "service," as we are designated today. From now on you will be hearing from the RTTY net in this section with W4RWL, secy. of the RTTY Association, as the RM. If you can get by the Civil Defense EOC of Palm Beach County at the PBA in West Palm Beach be sure to drop in. This is a complete shelter ready to house 50 key government and defense personnel for weeks under attack. In the communications room there is available a capability of s.s.b., RTTY and c.w. on all amateur bands and MARS from two KWM2-3081 positions with various gear to operate 6 and 2 meters, Florida Highway Patrol and Intercity frequencies as well as the NAWAS system. A farm of nine antennae is set up and there also is the capability of direct broadcast by wire to an a.m. broadcast station as well as interior broadcast and TV facilities. Do not forget the Orlando Hamfest in April at the Robert Meyer this year. Traffic: (Dec.) W4-TRS 400, W4IXI 303, W4AKB 254, W4URX 205, W4-COR 194, W4DFU 192, W4AGBM 173, K4SJH 145, K4BY 131, K4FQP 131, W4FVP 124, W4SDR 124, W4LEK 117, W4LBM 90, W4VWL 86, K4VNG 77, K4DAX 62, K4QAP 53, W4EHW 49, W4FVT 49, W4-SMK 47, W4YT 45, W4KDL 45, W4KSC 42, W4OGX 30, K4MZR 26, W4NSH 22, W4PJW 14, W4FVD 11, W4QVJ 11, K4MPT 5. (Nov.) W4MIN 402, W4AGBM 316, W4ANBE 25.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE, RM: W4BVE, Panama City: The PCARC 2-meter transmitter hunt was won by W4GWA, W4FLI/FJF operated portable in Alabama during the holidays. W4IMC is now ORS and OPS. K4VY led the S.E. Division in the Oct. CD Party. WN4NLD and WN4POX joined the 2-meter gang. W4ANBT has the certificate bug. The WFPN handled Weather Bureau traffic during emergency sessions. Ft. Walton: W4ZGS now is using the vacation trailer as a ham shack. K5IUN and K7ORS joined the local 6-meter group using n.l.m. New EARS officers are K4-LXV, pres.; W4GBM, vice-pres.; W4RKH, secy.-treas.; W4APVN, act. mgr.; K1CTG, editor. EARS members worked with Elin MARS to provide a ham radio exhibit and handle Christmas traffic. Tallahassee: K4YPI moved to a new QTH in town ideal for v.h.f. WN4OPT is doing fine with an Eico 723 rig. K4DAD arranged a tour of the FSU Computer Center for the TARC. V.h.f. enthusiast W4JQX has been transferred. W4DCN is now in France. W4OYR, inactive for many years, dusted off the 807 rig for 80 and 40 meters. The SET report, prepared by W4MLE and W4IYT, is must reading for all public-service-minded hams. Write for your copy. Perry: W4ZWY is now Taylor County EC. Madison: AREC members had a nice Christmas party at W4VMA's QTH. Traffic: (Dec.) K4VY 538, W4BVE 280, W4FMC 220, K4SMB 104, W4FLI 96, W4ZWD 17. (Nov.) W4BVE 161.

GEORGIA—SCM, James A. Giglio, W4LG—SEC: W4YE, PAMs: W4FYH, K4PKK and W4RZL, RM: W4DDY. GSN meets Mon. through Sun. on 3595 kc. at 1900 EST and 2200 EST; GCEN at 1800 EST Tue. and Thurs. and at 0800 EST Sun. on 3995 kc.; the Coosa Valley Emer. Net each Sun. at 1330 EST on 3950 kc.; the Georgia Cracker Mobile Net each Sun. on 3995 kc. at 1330 EST; the 4RDN Net on 7115 kc. at 10 a.m. daily; the Kennehochie ARC Net on 28,680 Mc. at 2130 daily. K4BAI/4 continues to achieve high scores in CD Parties, both phone and c.w. K2BOU/4 is operating from Emory University using his NCX-3 transceiver. K3CFR, from Bethesda, Md., is operating portable from Atlanta on 80-40-20 c.w. and s.s.b. and 6-meter a.m. A father-and-son team, K4SHB and W4AMW1, are active from Elberton. SEC: W4YE is on active Marine Corps duty. New officers of the Amateur Radio
(Continued on page 140)

SSB COMMUNICATIONS



A COMPLETE 1KW FIXED CHANNEL STATION!

Shown above is the R F Communications Model SB-6F, 125 Watt SSB Transceiver driving the Model RF-101, 1KW Linear Amplifier. The system provides 6 crystal controlled channels over the frequency range of 1.6 to 16Mc for Government, commercial and military applications. Power output is a full 1KW, p.e.p., using two 3-400 Z triodes in grounded grid. Kilowatt antenna coupler available.

Contact us for details



R F COMMUNICATIONS, INC.

1680 University Ave. • Rochester 10, New York
AREA CODE 716, CH 4-5830 • CABLE: RFCOM • ROCHESTER, N. Y.

Overseas Distributor Inquiries Invited



The
**ORIGINAL
"HALO"
ANTENNA**

Since 1956 one of the best performing 6-meter mobile antennas

- ▶ Horizontally polarized
- ▶ Minimizes flutter and noise
- ▶ Adjusts to your frequency in 6 meter band
- ▶ Feeds with 50-ohm cable
- ▶ Fits standard mounts
- ▶ Ruggedly constructed
- ▶ Weighs under 2 lbs.

Model S-1 antenna, 5' adjustable mast and bumper hitch.....	\$16.95
Model S-2 antenna only.....	11.95
New Matching Transformer, Model MT-1	4.95

AT YOUR DISTRIBUTOR

HI-PAR PRODUCTS CO. • Fitchburg, Mass.

N. Y. MIDTOWN HEADQUARTERS

for world famous *hallicrafters*

SR • 150 Amateur Band Fixed/Mobile Transceiver

P-150 AC Power Supply
\$99.50

P-150 DC Power Supply
\$109.50

... provides, with unvarying dependability, a range of operating features never available at this price ...

\$650.00



Enjoy the ultimate in proven engineering reliability. HALLICRAFTERS' (maximum flexibility) SR-150 is the most advanced, most outstanding example of HALLICRAFTERS' ability to build the world's best value in professional quality sound equipment.

ALL HALLICRAFTERS in stock for immediate delivery. Complete audio demo dept. Depend on us.

EVERYONE
eventually goes to

1 Door
East of
Lexington
Ave.

GRAND CENTRAL
Radio Inc.

Hrs.:
8:30 to 6
Sat. Incl

124 East 44th Street, N.Y.C. • MU 2-3869

Club of Augusta are W4DDY, pres.; K1CFO/4, vice-pres.; WA4MHN, secy.-treas. K4WVY is interested in traffic, girls, football and school, in that order. The Kennehochie Amateur Radio Club meets the 2nd and 4th Mon. New officers are W4KTS, pres.; W4NT, vice-pres.; W4GPA, secy.; W4UGP, treas. The Greater Atlanta V.H.F. Society refuses to be snowbound: the members operated in 6 inches of the white stuff from Brasstown Bald. The Tifton Amateur Radio Club now meets in new quarters in the old depot building the 1st and 3rd Thurs. K4CPU is working on a speech compressor and a VOX for his Swan. Traffic: K4MCL 344, W4DDY 334, K4WVY 299, K4FRM 148, W4HWY 60, K4BAI 30, W4GPA 20, W4ALLI 20, W4YE 16, W4-HSN 7, K4BVD 1.

CANAL ZONE—SCM, Thomas B. DeMeis, KZ5TD — Present officers of the CZARA are KZ5PR, pres.; KZ5WE, vice-pres.; KZ5II, secy.; KZ5UR, treas.; KZ5JD, act. mgr. KZ5KR sold out his equipment and is temporarily QRT. KZ5JT is on the air with his HX-20. KZ5JC is using a new TR-4 transceiver. Cap. John Cottrell, KZ5CO, together with a group of U.S. Army physicians, subjected himself to contact with a moth that has been causing a severe rash condition in this area. The s.s.b. signals heard on the low end of 80 meters, approximately 3503 kc., are from a military net for the Central American area, one of the stations being in the Canal Zone. This is understood to be an alternate frequency used whenever contact to the net stations is impossible on the regular frequencies. Army MARS is setting up a trans-isthmian net near the 80-meter band, because of unsatisfactory conditions on the present Sun, morning net.

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, John A. McKowen, W6FNE—Asst. SCM: Richard H. Ingham, WA6DJB, SEC: K6-YCX, Asst. SEC: W1KUX/6, P.A.M.s: K6PZM, W6ORS, WA6TWS, R.M.s: WB6BBO, W6BHG, W6QAE. December was a banner month for traffic with eleven BPL awards and 13,392 points for a section total reported. K6EPT, W6GYH, W6WPF, WB6BBO, K6MDD, K6-IWV, W6QAE, WA6TWS, K6PZM, WA6WTK and W6-BHG were the high point stations and responsible for the major portion of the total. He prepared for the 1964 Southwestern Division Convention at Palm Springs set for Sept. 11 through 13. Contact W6FB, chairman, for details. New officers of the Los Angeles Council of Radio Clubs are K6HV, chairman; W6KGC, vice-chairman; K6HIT, secy.-treas. The Inglewood ARC installed K6HCY, pres.; WA6ZOT, vice-pres.; WA6JL, rec. secy. The Southern California V.H.F. Club's officers are WB6EUIU, pres.; W6SDZ, vice-pres.; WB6-BYL, secy.; WA6AJT, treas. The Tri County Club of Pomona has established a crystal bank for Novices in the section and could use some additional stock. Dig out your old Novice crystals and send them to WA6ITC or WA6ORJ, custodians. Hq. is making available forms for volunteer examiners. Form S-45 meets all FCC requirements. The 1964 Tournament of Roses was supported by amateur groups. The main problem was assisting the Traffic Committee in keeping the assembly area clear of cars for the boats. Approximately 75 amateurs from six different organizations participated. W6-ORG was chairman. Congrats to K6IWW on earning a RPL Medallion. W6IAH is now known as K6LJ. W6ORS is getting 220-Mc. RTTY going. K6CSR, OO, has moved to Los Gatos. Silent Keys reported are WA6ANZ and W6OUI. The section still needs qualified official Observers for the v.h.f. spectrum. SoCAL Six reported a record-breaking month for the net. Support your section nets. Southern California Net (SCN) 3600 kc. daily at 0300Z; So. Cal Six 50.4 Mc. 0245 and 2015 GMT daily. Traffic: (Dec.) K6EPT 2044, W6GYH 1745, W6-WPF 1563, WB6BBO 1021, K6MDD 946, K6IWW 863, W6QAE 692, WA6TWS 685, K6PZM 551, WA6WTK 549, W6ZJB 395, WA6ZID 371, WA6WTX 267, W6BHG 223, WA6WIZ 213, WB6EUIU 194, W6GZY 189, W6BPKD 175, WA6USU 161, WB6BH 101, VE2AQV/6 66, WA6KAW 62, K6LJ 58, W6GXI 53, W6IEK 53, W6BFX 50, W6USY 38, WA6CXB 31, WA6CKR 14, W6NKR 14, K6SIX 6, W6SRE 3, WA6UHM 3, K2PHF/6 2, W6IYK 2, W6LVQ 2, W6FR 1, (Nov.) W6WPF 749, WB6BBO 653, W6GYH 641, K6IWW 479, K6HIT 272, WA6WTK 245, W6QAE 226, WA6TWS 161, WA6ZID 152, W6BPKD 115, WB6EUIU 56, W6BHG 52, WB6AJT 49, K6PZM 49, W6BFX 47, W6TAM 44, W6BHH 40, WA6WIZ 37, W6USY 34, K6SIX 21, WA6USU 20, WA6KAW 19, WA6SQL 11, W6GZY 10, W6LVQ 9, W6CNI 8, W6B-BZX 5, WA6CXB 4, W6LVQ 4, WA6UHM 3, W6VUZ 3, W6AM 2, W6SRE 2, K2PHF/6 1.

ARIZONA—SCM, Kenneth P. Cole, W7QZH—Asst. SCM, E. A. "Pete" Marshall, Jr., K7AWI, SEC: K7-NIY, PAM: W7OIF, R.M.s: W7LND and W7FKK. The

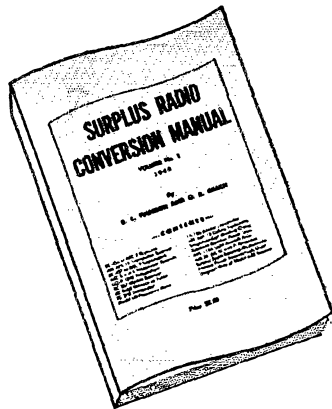
(Continued on page 142)

HOW TO CONVERT SURPLUS RADIO GEAR INTO AMATEUR AND C.B. EQUIPMENT

A wealth of conversion data in 3 volumes shows you how.

Data includes instructions, photos, and diagrams . . . covers the most commonly available surplus items. Each conversion shown yields a practical piece of equipment — proved by testing.

Items covered are listed below:



SURPLUS RADIO CONVERSION MANUALS—3 Volumes— \$3.00 ea. (foreign, \$3.50)

VOLUME I—BC-221 Freq. Meter; BC-342 Rcvr.; BC-312 Rcvr.; BC-348 Rcvr.; BC-412 Radar Oscilloscope; BC-645 Xmt./Rcvr.; BC-946 Rcvr.; SCR-274 (BC-453A Series) Rcvr.; SCR-274 (BC-457A Series) Xmt.s.; SCR-522 (BC-625, 624) Xmt./Rcvr.; TBY Xcvr.; PE-103A Dynamotor; BC-1068A/1161A Rcvr.; Electronics Surplus Index; Cross Index of A/N Vac. Tubes; Amateur Freq. Allocations; Television and FM Channels. Book #311

VOLUME II—BC-454 or ARC-5 Rcvrs.; AN/APS-13 Xmt./Rcvr.; BC-457 or ARC-5 Xmt.s.; ARC-5 V.H.F. Xmt./Rcvr.; GO-9/TBW Xmt.s.; BC-357 Marker Rcvr.; BC-946B Rcvr. as Tuner; BC-375 Xmt.; Model LM Freq. Meter; IA-12B Bendix Xmt.; AN/ART-13 (Collins) Xmt.; Simplified Coil-Winding Charts; Selenium-Rectifier Power Units; AVT-112A Light Aircraft Xmt.; AM-26/AIC to a Hi-Fi Ampl.; Surplus Beam Rotating Mechs.; ARB Rcvr. Diagram Only. Book #322

VOLUME III—APN-1; APN-4; ARC-4; ARC-5; ART-13; BC-191, 312, 342, 348, 375, 442, 453, 455, 456-459, 603, 624, 696, 1066, 1253; CBV-5200 Series; COL-43065; CRC-7; DM-34; DY-2; DY-8; FT-241A; LM Power Supply; MBF; MD-7/ARC-5; R-9/APN-4; R-28/ARC-5; RM-52-53; RT-19/ARC-4; RT-159; SCR-274N, 508, 522, 528, 538; T-15 to T-23/ARC-5; URC-4; WE-701-A. Schematics only; APA-10; APT-2; APT-5; ARR-2; ASB-5; BC-659; BC-1335A; CPR-46ACJ. Book #333

THE SURPLUS HANDBOOK (Receivers and Transceivers)— \$3.00* ea. (foreign \$3.50)

VOLUME I—Schematic Diagrams and large photographs only—APN-1; APS-13; ARB; ARC-4; ARC-5 (L.F.); ARC-5 (V.H.F.); ARN-5; ARR-2; ASB-7; BC-222, 312, 314, 342, 344, 348, 603, 611, 624, 652, 654, 659, 669, 683, 728, 745, 764, 779, 794, 923, 1000, 1004, 1066, 1206, 1306, 1335; BC-AR-231; CRC-7; DAK-3; GF-11; Mark II; MN-26; RAK-5; RAL-5; RAX-1; SCR-522 Super Pro; TBY; TCS; Resistor and Capacitor Color Codes; Cross Index of A/N V.T. and Commercial Tubes. Book #510

Every Electronic Tube in the World Listed — 3 Volumes \$8.00* ea. (foreign \$8.50)

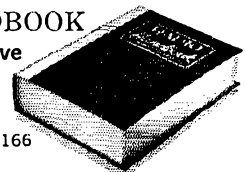
WORLD'S RADIO TUBES
(Brans' Radio Tubes Vade Mecum). World's most complete and authoritative book of v.t. characteristics. Book #471

WORLD'S EQUIVALENT TUBES
(Brans' Equivalent Tubes Vade Mecum) Over 43,900 comparisons and replacements. Book #493

WORLD'S TELEVISION TUBES
(Brans' Television Tubes Vade Mecum). Characteristics of all TV picture and cathode ray tubes . . . also special purpose electronic tubes. Book #482

16TH EDITION RADIO HANDBOOK

—the comprehensive
reference source



\$9.50* Book #166
(foreign \$10.50)

Gives simplified theory on practically every phase of radio. Tells how to design, build, and operate the latest standard types of radio transmitting and receiving equipment. More "How-To-Build" articles than any book in the field. All data is original, up-to-date, and complete . . . clearly indexed, between hard covers. 805 pages —all text.



RADIOTELEPHONE LICENSE MANUAL

\$5.75* Book #030
(foreign \$6.25)

Helps you prepare for all U.S.A. commercial radiotelephone operator's license exams. Provides complete study-guide questions and answers in a single volume. Helps you understand every subject needed to obtain an operator's license.

*Order from your favorite electronic parts distributor.

If he cannot supply, send us his name and your remittance, and we will supply.

EDITORS and ENGINEERS, Ltd.



Summerland 7 California 93067

Dealers: Electronic distributors, order from us. Bookstores, libraries, newsdealers order from Baker & Taylor, Hillside, N. J. Export (exc. Canada), order from H. M. Snyder Co., 440 Park Ave. So., N.Y. 16.



WORKED ALL STATES!?

NEW SIZE!

PLASTIC
PACKETS

for
WAS
Display



26 Cards Ea.
(One Set
(2 packets)
Will hold
the 50
States
D.C.
plus NYC
or your
own card

Proudly
Displays
Your
Complete
WAS
Collection
or
shows
what
you
lack.

Each extra wide header lists 26 states
alphabetically & denotes each card
location.

The complete WAS Set: **ONLY \$1.00**
Regular 20 card packets still only
3 for \$1 Ppd. or 10 for \$3.00 Ppd.

Dealer Inquiries Invited! — Order Now!
Now in Stock at Most Dealers or Direct From:

TEPABCO Dept. T-3
P.O. Box 198 Gallatin, Tenn. 37066

Copper State Net meets at 1930 MST Mon. through Fri. on 3880 kc.; the Grand Canyon Net Sun. at 0800 MST on 3880; the Tucson AREC Net Wed. at 1900 MST on 3880; the Cochise County AREC Net each Sun. at 1400 MST on 7260; the Tucson 2-Meter Net at 1000 MST on 145.35 Mc.; 6-meter activity in the Tucson area is increasing by leaps and bounds with numerous DX openings of considerable duration. A number of the boys are using s.s.b. A repeater station on Picacho Peak is in the talking and planning stage. Operation 52, a yearly function sponsored by the Old Pueblo Radio Club, successfully completed its mission. Congratulations are in order for K7RE, who organized the entire operation. K7VUB and VQI, both Tucson, are now communicating by TV. The Arizona Amateur Radio Club now meets every 1st and 3rd Thurs. at the Christown Auditorium, 19th Ave. and Bethany Home Road. Guest speaker at the first meeting held in this auditorium was Senator Barry Goldwater. Visitors are cordially invited. K7RUR has been an active amateur for the past 42 years. Traffic: K7UUF 131, K7VQI 40, K7RUR 11.

SAN DIEGO—SCM, Don Stansifer, W6LRU—The South Bay Amateur Radio Society's officers for 1964 are W6GBF, pres.; K6TFT, vice-pres.; WN6BIM, treas.; W6NSR, secy.; K6UMC, activities; WA6PDE, publicity. Am sorry to report the passing of WA6BGS, of El Cajon. The American Radio Club of El Cajon's officers for '64 are WA6ZAC, pres.; WA6MQT, vice-pres.; WN6HXU, secy.; WA6VIT, treas. ORS W6DGM, in Newport, has a new daughter born the week before Christmas. W6JVA, OO in San Diego, tapes ARRL Bulletins. His XYL is now a General, K6HUT. The Anaheim Amateur Radio Association's officers for '64 are K6GNZ, pres.; WA6THV, vice-pres.; WA6WPG and WA6PPN, secy.; WA6VQC, treas. This group now issues a Worked Orange County Award. If interested, contact WA6WPG or WA6YDX. W6MHY is now the EC for San Diego County. Three 15-year-old AREC members of the Newport Club, WA6RUS, WA6UPF and WA6WTD, handled over 200 messages for the Sea Explorers Rendezvous. Mobilers WA6SVG, WA6RQO and W6KNP also helped. A new OES in Balboa, Orange County, is WA6IVS. New officers of the San Diego Club are WA6OZL, pres.; W6ID, vice-pres.; W6DAX, secy.—treas. The club's January meeting was held at the home of W6LRU. Sixteen amateurs and 6 clubs sent their SCAM information for this column. If your club isn't mentioned, get after your secretary. This section had 24,054 pieces of traffic reported handled in December. Traffic: W6IAB 13,905, W6YDK 541, K4AKP/J 1734, K6BPI 1516, W6EOT 747, WA6BRG 642, K6GJM 290, WA6PDS 260, W6DGM 211, WA6ROF 138, K6IME 121, WA6BDW 36, WA6CDD 35, W6WRJ 8.

SANTA BARBARA—SCM, William C. Shelton, K6AAK—SEC: WA6OKN, RM: W7VST/6, WB6DPV, who reports for the first time, is on with a Heath HX-11 c.w. and phone and has two shifts of meetings in order to service the large membership that works the swing shift at VAFB. WB6GZE is ORL with college work but finds time for the CD Parties. W6GBE has applied for EC and WB6BMJ has applied for OO and OBS appointments. Fran is ex-SCAI and W8DMJ. The Pointsettia Club is very active with good programs on antennas and mobile transceivers. The Ventura Club now rotates its meeting places throughout the county to increase attendance. K6QBF has gone mobile. The mobile meeting frequency in this section is 3890 kc. Join us some time. K6DW has a new TA-33 beam. Traffic: W7VST/6 125, K6AAK 16, WB6DPV 7.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—The Arlington ARC held its Christmas Party at Underwoods Bar-B-Q Cafe Dec. 7, with an attendance of 85 hams and their families. The Ham of the Year Award went to WA5DPH and K5CZA. The Field Day Award, for most contacts, went to K5ZPA. K5MZW, Tarrant County EC, made a talk on the importance of the ham rendering a public service. With a membership of 31, this club has an average attendance of 25 at its monthly meetings. I think this is a record to be envied by any club. The Ft. Worth KC Club held its Christmas Party Dec. 19 at Vance Goodbys Cafe with 36 present. W5YUO won a prize and W5KVA won the contest for building a crystal set with junk box parts. On Sept. 18 W5GY was injured in a home accident and rushed to a Dallas hospital. His son, K5EXT, was following the ambulance and got lost in the traffic. A Dallas amateur aided him in getting the shortest route to the hospital but in the excitement he failed to get the identity of the assisting ham. Anyone knowing who this ham was, please get in touch with W5GY or W5BNG. WA5CMC

(Continued on page 144)

ALCOM ELECTRONICS

NEW IN CALIFORNIA

THE WEST'S NEWEST AND BEST ELECTRONICS EMPORIUM; EVERYTHING FROM — TO — FOR THE HAM AND THE EXPERIMENTER.

Grand Opening DX Contest!

\$100 Bonanza merchandise bonus for the ham who comes from farthest away to visit us during March, our grand opening month.

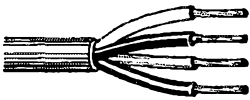
If you can't come, send in your name today. We'll put you on our active list for new and used equipment mailings.

2021 Middlefield Road, Mountain View, Calif.
(Phone 968-7388, area code 415)

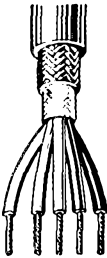
W6FYM W6GIZ W6CQI

Belden Wire and Cable for every ham application

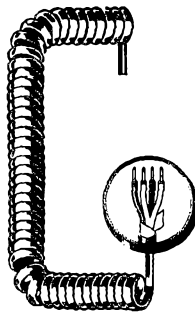
service rated—quality controlled
easy-to-use packaged lengths



Antenna Rotor Cables. Sturdy, flexible, plastic insulated cable for all Ham antenna rotor applications. Color coded for easier hook-up. Chrome, vinyl plastic jacket resists sun and aging.



Power Supply Cables. Provide dependable service as power supply cords, interconnecting cables on electronic equipment, remote control circuits, special press-to-talk microphone circuits, and other ham applications. Designed for long service life with excellent mechanical and electrical characteristics, and uniform quality. Special jacket offers maximum resistance to abrasion and ozone.



Coiled Microphone Cable. Provides low impedance for mobile microphone applications. Black neoprene jacket remains flexible at low temperatures. Available with or without shielded conductors.



Shielded Hook-up and Grid Wire. Provide most effective TVI suppression. Vinyl insulated with tinned copper braid shield. Available in wide range of capacities from 24 AWG to 12 AWG.



Ham Transmission Lines—75 Ohm Foam Core RG/U Type. Designed for lowest losses, longer service life, and maximum dependability. Cables are essentially flat with no peaks in attenuation to reduce signal on either high or low frequencies.



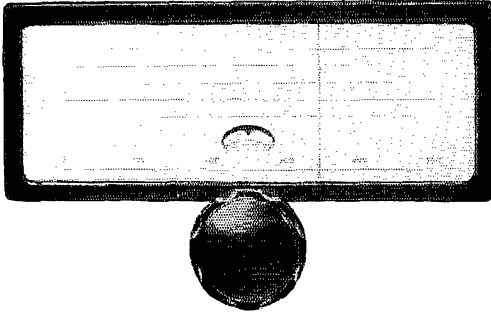
Ham Transmission Lines—Parallel Type. Made with brown virgin polyethylene for best weather resistance and lowest losses. Uniform quality control prevents standing waves and mismatches.

Magnet Wire • Lead Wire • Power Supply Cords • Cord Sets and Portable Cord • Aircraft Wires • Electrical Household Cords • Electronic Wires • Welding Cable • Automotive Wire and Cable



8-2-3

EDDYSTONE



GEARED SLOW MOTION DRIVE
For Amateur Radio & Communications
RECEIVERS & TRANSMITTERS

A high grade assembly, flywheel loaded, manufactured to fine tolerances, provides a smooth positive drive with a reduction ratio of 110:1. The vernier with its 100 divisions rotates 5 times for one pointer traverse, giving 500 divisions with positive reset readings. A cam adjustment on the vernier assures correct zero setting. A spring loaded jockey arm maintains tension of the pointer drive. Overall dimensions 9 3/4" x 5 3/4"

Manufactured by
Stratton & Co., Ltd. (Eddystone) PRICE \$21.50 NET
Birmingham, England Postpaid

Distributed by
BRITISH RADIO ELECTRONICS, LTD.
1742 Wisconsin Ave., N.W.
WASHINGTON 7, D. C.

FREE

GIANT NEW CATALOG

BURSTEIN-APPLEBEE CO.

Dept. QST, 1012 McGee St., Kansas City 6, Mo.

Rush me FREE 1964 B-A Catalog.

Name

Address

City State

SEND FOR IT TODAY

FREE

called a practice emergency drill at 3:50 P.M. Sun. afternoon and got five mobiles and two fixed stations on the air in 14 minutes. W5DTA, the new Tex C.W. Net Manager, needs more outlets for Texas traffic. W5MSG reports many contacts on 160 meters, some DX. Try it. Traffic: (Dec.) W5DTA 677, W5AF1 106, K5VWJ 42, W5LR 22, W5CF 16, K5PXV 8. (Nov.) W5ACK 60.

OKLAHOMA—SCM, Bill F. Lund, K5KTW—Asst. SCM, Cecil P. Andrews, W5MFX. SEC: K5DLP. W5-EHC (ex-W9EHC) worked his old friend, W9EOV, after a lapse of 30 years. Our Asst. SCM has a new Drake 2B receiver. K5INC received the 35-w.p.m. sticker to go on his Code Proficiency certificate; he now holds an Amateur Extra Class license. W51QO and W5ENF are new Generals in Blackwell. The ham population in Enid has been climbing rapidly because of transfers into Vance AFB and the school the Enid Club has been holding. If you are looking for a 2-meter contact try calling on 144.18 Mc. as that frequency is monitored in Enid and they have the power and antennas to get out. The new officers of the Enid Amateur Radio Club are W5QMJ, pres.; W5CHD, vice-pres.; K5QEE, secy.-treas. The Aeronautical Center Amateur Radio Club elected W5EUL, pres.; W5UZX vice-pres.; W5-EHC, secy.-treas.; W5WUF, asst. to the pres. I think that W5EHC has set some kind of record by holding office in the club for 18 years. The Bartlesville Radio Club has requested that the FCC issue the club the call W5NS in memory of Eli, who was a member of the Club. Traffic: (Dec.) W5PPE 758, K5IBZ 515, K5TEY 433, W5QMJ 421, W5MFX 94, K5VNJ 66, K5OCC 62, W5FEC 49, K5KTW 34, W5GMJ 21, W5VLW 21, W5PIL 19, K5DLP 18, K5MTC 15, K5JOA 8, K5CBA 5, W5-FLV 4, W5EHC 3. (Nov.) W5FEC 41, W5JXM 38, W5WDD 10.

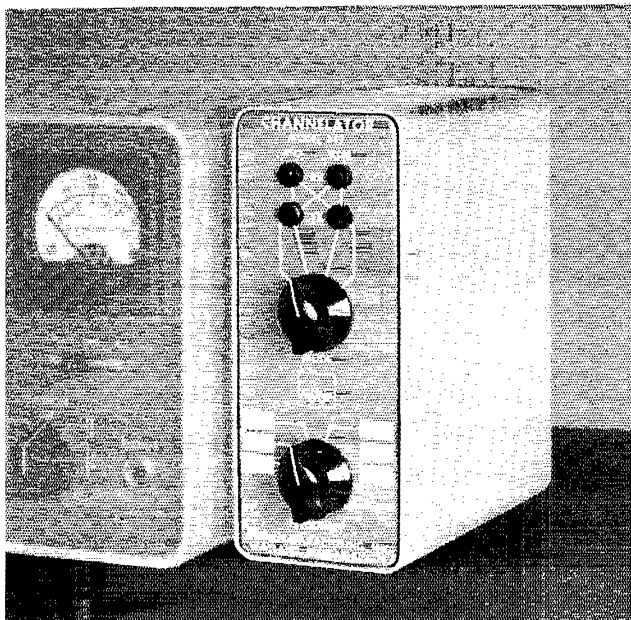
SOUTHERN TEXAS—SCM, Roy K. Eggleston, W5QEM—SEC: W5AIR. I have been in contact with our Director, W5QKF, and he informs me that it soon will be time for the Board Meeting. If you have any gripes or anything you would like for him to bring before the Board, write and let him know, or write me and I will pass it along to him. You know if we don't let him know our thinking, he doesn't know where we stand on issues. I wonder how many people know just how many Incentive Licensing Plans were filed with the FCC before the ARRL filed theirs. There were about seven of them filed before ARRL's, and you should read some of them. They would make the ARRL petition sound like a Sunday School picnic. W5BRZ has a new NCX-3 and is having an FB time with it. K5LJI has a new TR-3. W5WPC, at North Pole, Tex., did a wonderful job during the holidays, playing Santa Claus to the small fry over the radio. Reports are the kiddies really got a bang out of talking to Santa. K5MWH is working in Houston and attending the University of Houston. Keep up the good work, Mike. K5ANS has the cleanest room on the campus at Texas A&M University, as he won a vacuum cleaner. K5RVF has a new Drake 2A. Traffic: K5ANS 78, K5LQJ 38, W5ANV 31.

CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCM: A. E. W. Street, VE1EK. Deepest sympathy is extended to the relatives and friends of VE1WV, who has joined the ranks of Silent keys. The ARPC (AREC) is being reactivated. All interested amateurs are requested to participate. Meetings will be held Sun. on 3750 kc. at 1800 GMT. Congratulations to VE1OV, VE1BB, VE1BK, VO1FO and their XYLs on the arrival of new harmonics! New calls include VE1ACO, VE1-AHC, VE1AIF and VE1ALG. Incidentally, Joe, VE1-AHC, and June, VE1AIF, have found a way to beat the high cost of new station equipment. They decided to make it a ham partnership for life. Congratulations and best wishes! Newly-elected officers of the AVARC are: VE1AAZ, pres.; VE1XY, vice-pres.; VE1ADO, secy.-treas. Roumania has been removed from the list of banned countries. Please amend to read: Cambodia, Indonesia, Laos, Thailand, Viet Nam and Jordan. Ex-VE1YQ is now VO1CX. All roads lead to The Island (to the uninitiated, P.E.I.) for the '64 Hamfest. Stay tuned for further details! The ABARC has a new Apache transmitter, VE1ZS has been transferred to Newfoundland. Traffic: VE1DB 63, VE1YE 20.

ONTARIO—SCM, Richard W. Roberts, VE3NG—The following were successful in passing for their AA tickets: VE3AFK, VE3ENC, VE3FEP and VE3EUR. All are members of the York North ARC in Aurora. London members, elected the following: VE3EVO, pres.; VE3EWI, vice-pres.; VE3HPI, secy.; VE3FCB, treas.; VE3RXL, 2nd vice-pres, VE3BUW. Peterboro EC, reports an FB exercise with his crew on 6 meters recently. The

(Continued on page 146)

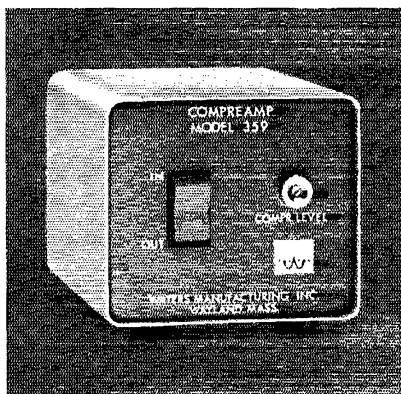


CHANNELATORtm Crystal Frequency Control

The CHANNELATOR resolves KWM2/2A transceiver tuning problems. Instantaneous switching to any of six pre-selected, exact crystal frequencies; covers complete PTO range. A built-in heterodyne frequency meter and "pullable" crystals permit exact frequency adjustment for NET or ROUND TABLE operations. You can operate normal PTO or "split channel." The Channelator installs in minutes — all cables and plugs are furnished, only cable to solder — no drilling; operates from any fixed or mobile KWM2/2A power supply. Model 349. **Price: \$79.95** Crystals, any frequency, USB or LSB: **\$6.00** each



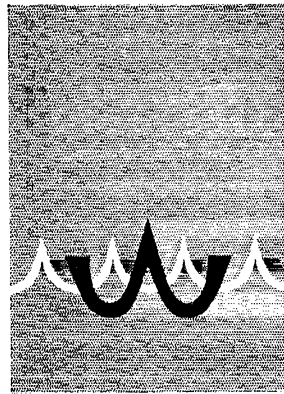
EVTtm Electronic Vernier Tuning gives you 20-to-1 tuning ratio reduction on your KWM2/2A. A stable, solid-state varactor tuning device, EVT attaches to your PTO *without* wiring changes. Precise, slow-rate tuning makes small frequency changes easy, especially when "mobiling" in traffic. Tuning range is ± 500 cycles from any PTO setting. Zener regulator maintains well-known Collins stability. EVT may be used with *any* power supply. Model 354 (mounts coaxially with "ON-OFF-NB-CAL" switch) **Price: \$23.95** Model 355 (mounts above "Band Selector" switch) **Price: \$21.95**



COMPREAMPtm Preamplifier/Limiter

Increases speech power output of a transmitter up to four times, limits over-modulation. Self-contained, battery powered, transistorized — it fits all types of transmitters without wiring changes. In-out switch, compression level adjustment.

Price: \$27.95, less battery

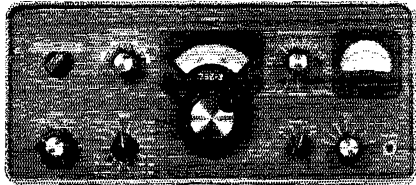


SEE YOU AT THE SSBARA DINNER, MARCH 24, STATLER-HILTON, NEW YORK

WATERS MANUFACTURING, INC., WAYLAND, MASSACHUSETTS

Other Waters Products: Coaxial Switches — Dummy Load/Wattmeter — "Little Dipper"tm (Transistorized Dip Oscillator)

SOUTHWEST'S MOST COMPLETE HAM STOCK



COLLINS
75S-3 RECEIVER

TIME PAYMENTS • TRADE-INS
IMMEDIATE DELIVERY

CALL OR WRITE { **RONNIE W5ATB**
BERT W5FU

Radio, Inc.

1000 S. MAIN • LUther 7-9124
TULSA 19, OKLAHOMA

ANTENNA TESTER 520A

- Read Forward Power and Reflected Power DIRECTLY IN WATTS—0-10, 0-100 and 0-1,000 watts ranges • Read antenna efficiency in SWR from 1:1 to 8:1, in per cent or in GOOD-POOR
- For 50 ohm coaxial lines • Inserts no error in coax up to 160 MC • Dual air coupler rated at 1,000 watts maximum



TRANSMITTER TESTER 510B

- Read both positive and negative modulation peaks from 0-120%—no scope needed
- Read RF output on 0-5 watts and 0-400 ma scales • Also serves as field strength and remote RF indicator • High impedance input for Handy Talkies
- Jack for headphone or scope



"10-2" SUPREME WITH THIS NEW TESTING TEAM

Here's a matched set that will help you quickly develop maximum sending and receiving performance from your equipment. Handsome professional set with components especially selected for dependability and accuracy. Easy to own, too—each under \$50. See them at your electronic dealer's—or send coupon below.



SECO ELECTRONICS, INC.
1225 S. Clover Drive, Minneapolis 20, Minn.

Please rush information on this matched testing team for my rig.

NAME _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

following were logged by VE3RUW; VE3DCJ, VE3-BRC, VE3DFD, VE3RKE, VE3DHY and VE3BLL. New ECs are VE3EXC for York North County and VE3DHI for Kingston. The Lakehead Club members were active with their mobile sets looking for lost hunters. (Found them, too). This club at Ft. Williams has a classy club paper. They will exchange with other clubs. The QTH is 101 Waterloo St. VE3NF has the 2-meter beam up on the 50-ft. level. VE3ATI will go maritime/mobile next summer. The Niagara Penn. RC elected VE3FOH, pres.; VE3DQk, vice-pres.; VE3-CWQ, secy.-treas. VE3 amateurs are working hard to present their request (via the RSO) to the Provincial Govt. for VE3 licence plates. Get those petitions back to Rowland soon. The Ottawa Valley Mobile ARC elected VE3CGP, pres.; VE3BJO, vice-pres.; VE3CGD, secy.-treas. VE3BHA has moved to Pembroke. VE3CEZ is back from the body shop. VE3AAIL, our SEC, visited the Windsor Club. VE3EBE will be in Ottawa until June then back to Toronto. I suggest that all our VE3 clubs and operators take a second look at 11 meters for AREC work. The C.B. boys are very keen to grab the rest of it for emergency purposes. Traffic: VE3BUR 182, VE3CYR 140, VE3AVE 121, VE3BZB 114, VE3DPO 109, VE3NG 87, VE3PGV 68, VE3GI 66, VE3CFR 50, VE3ETM 43, VE3CLK 41, VE3EHL 41, VE3DUU 32, VE3BTV 25, VE3AKQ 22, VE3CFI 14, VE3BLZ 13, VE3EBE 11, VE3CIL 8, VE3AAU 6, VE3NO 3, VE3-TT 1.

QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. SCM: Michel St. Hilaire, VE2BEZ, VE2AAU is now Asst. SEC and is helping to rebuild Provincial AREC. Assistance from all thinking VE2 amateurs is requested. For the survival of amateur radio we must adopt a less selfish attitude and offer our services when required. A fire emergency at Sainte Anne des Monts (near Quebec) was handled by VE2AAH (NCS) on 3780 kc., assisted by VE2AYO, VE2BGV, VE2AV, VE2AI and VE2NV. VE2FF reports that s.s.h. operation on 2 meters is catching on. VE2BR is off to the South with mobile. Despite exceptionally poor conditions on 80 meters the OQN has an enthusiastic following. VE2ANB, VE2ASK and VE2BCJ assisted during an emergency at La Tuque when sleet conditions interrupted regular communication channels. VE2BQA, VE2RQU and VE2BRS are on the air with VE2BQA looking for 2-meter skeds. VE2-HG changed his call to VE2GH (his initials). Résultats des élections de VE2DN; VE2ARS, prés.; VE2KE, vice-prés.; G. Tougas, SWL, secy.; VE2NP, trés.; VE2AID, VE2AIK, VE2AMG, dir. Recents changements de lettres d'appel: VE2BCZ à VE2JA, VE2ABQ à VE2PV, VE2BPJ à VE2GX, VE2BAIE à VE2OY, VE2BDV à VE2HV et VE2AKU à VE2YJ. Nouvelles stations club on ondas: VE2CRT Trois-Rivières, VE2-CSS Val Cartier, VE2CNI Ste Hyacinthe, VE2BEZ émet maintenant des Bulletins Officiels de l'ARRL en c.w., basse vitesse, et en français, sur 2545 kc. 0200 GMT Mardis, et 0200 GMT Dimanches. VE2AWR de retour sur l'air après une absence de près d'un an. VE2DG expérimente les réflexions lunaires sur 1296 Mc. Traffic: VE2DR 153, VE2ALH 80, VE2UN 78, VE2BB 46, VE2AGQ 29, VE2AAU 28, VE2BMS 23, VE2SD 23, VE2BG 18, VE2JD 18, VE2EC 15, VE2RT 13.

ALBERTA—SCM, Harry Harrold, VE8TG—SEC: VE6FS, PAM; VE6PV, RM; VE6AEN, ECs: VE6FK, VE6SS, VE6ABS, VE6AJY, VE6AFJ, VE6PZ, OPSs: VE6CA, VE6PV, VE6HM, VE6SS, VE6BA, OO's: VE6-HM, VE6NX, VE6PL, OBSs: VE6HAI, VE6AKV, ORS: VE6BR, OFSs: VE6DB, VE6HO, VE6AKV. At this time I would like to thank all the faithful appointees who sent in their monthly reports for the past year. I hope that the others can help out more in '64. We know that most of the time the bands have been a washout, and that is when we need more listeners for relaying. Our PAM is having a rough time these days as his XYL, VE6VJ, is under the weather and will be for sometime to come. VE6PV will need help with APN, so dig in, fellows, and help out when you can. To you backward ECs, please get your monthly reports to the SEC. Had a very nice visit from two of the boys from the north-land, VE8CD and VE8MO. Many thanks to VE6PV, VE6FS, VE6FK, VE6SS and VE6AFJ for their efforts in the past year. The Northland reports that the bands are very spotty these days and that sometimes it takes days before any traffic can be gotten out. VE8CW is coming out for a three-week holiday. Traffic: VE6HM 220, VE4VX 16, VE6TG 11, VE8CW 9, VE6FK 7, VE8NC 2, VE8CE 1.

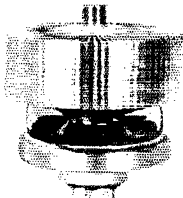
BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—Nanaimo ARC's code class has produced new amateurs, the newest being VE7AHS, the XYL of VE7ABR. Also a TV interview is included. VE7AIK is in Hawaii. VE7LP, the Lonesome Polecat, still is digging good DX out of 20. VE7BIW was busy at Christmas time with

(Continued on page 148)

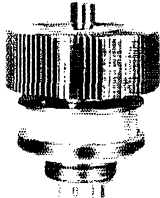
Choose from these

HIGH-EFFICIENCY PENTA TUBES

for your new rig or for replacement use



PL-8295/172



PL-8432



PL-175A



PL-177WA

BEAM PENTODES

Excellent linearity, low distortion, high efficiency in Class AB, SSB service.

Tube Type	Plate Diss., W.	Plate V., Max.	Plate I., Max.	Screen Volts, Max.
PL-175A	400	4000	350	800
PL-177WA	75	2000	175	600
*PL-8295/172	1000	3000	1000	600
*PL-8295A (ceramic)	1000	3000	1000	600
*PL-8432 (ceramic)	1000	3000	1000	600
PL-4E27A	125	4000	200	750

* Special sockets, chimneys available

GROUNDING-GRID TRIODES

High- μ power triodes designed especially for grounded-grid rf amplifier applications.

Tube Type	Plate Diss., W.	Plate V., Max.	Plate I., Max.	μ
PL-6569	250	4000	300	45
PL-6580	400	4000	350	45

POWER TETRODES

Popular power tubes, built for reliable performance, long life, high efficiency.

Tube Type	Plate Diss., W.	Plate V., Max.	Plate I., Max.	Screen Volts, Max.
°PL-6775	400	4000	350	800
PL-8165/4-65A	65	2000	150	600
PL-8166/4-1000A	1000	6000	700	1000
*PL-4D21 (4-125A)	125	3000	225	600
†PL-4D21A	175	3000	225	600
PL-5D22 (4-250A)	250	4000	350	800
PL-4-400A	400	4000	350	800

° Ruggedized version of 4-400A

† Ruggedized version of 4D21 (4-125A)



PENTA LABORATORIES, INC.

312 N. NOPAL STREET • SANTA BARBARA, CALIFORNIA

Export Agents: Frazar & Hansen Ltd., San Francisco 11, Calif.



MODEL 850A
\$35.00



PI NETWORK COILS

MODEL 851
\$16.50



MODEL 852
\$39.50

Now—Pi-Network inductors specially tailored for your needs. Here are highly-efficient, super compact tank coils incorporating the unique feature of integral band switching.

Model 850A and Model 852, now complement the famous B&W Model 851. All are designed for single or parallel tube operation on 80, 40, 20, 15, 11 or 10 meters, with top efficiency in Class "C" or linear operation. Windings give ample current carrying capacity with optimum "Q" over the entire operating range.

See these superior B&W inductors at your dealers now, or write B&W direct for detailed information.

BARKER & WILLIAMSON, Inc.

Radio Communication Equipment Since 1932

BRISTOL, PENNSYLVANIA • Stillwell 8-5581

SSB-AM -CW

75% of Your
Pwr is wasted

FOR MOBILE OPERATION—Buy a Transceiver.
FOR FIXED STATION USE—Buy a separate TX & RX for the better performance they provide.

We have major brands Transceivers, 1X, RX, Antennas, Rotators, Towers, etc., at lowest available prices.

OVERSEAS AMATEURS
especially invited to write W9ADN

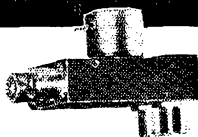
ORGANS & ELECTRONICS

Box 117

Lockport, Ill.

DOW-KEY

DK2-60B NEW COAXIAL TRANSFER SWITCH



A DPDT unit internally connected in the de-energized position, ideal for switching in and out a power amplifier between an exciter and an antenna.

1 kw power rating to 500 mc;
VSWR 1.15:1 to 500 mc; Isolation
60 db @ 1mc; All standard AC and
DC coil voltages available.

See your dealer for catalog sheet or write:

DK2-60B with
UHF Connectors

\$19.00

DK2-60B-2C with
UHF connector and
DPDT auxiliary
contact.....\$20.95
(BNC, TNC, N and C
slightly higher)

DOW KEY CO., Thief River Falls, Minn.

traffic from VE8-Land. The Vancouver ARC held its annual Boxing Day transmitter hunt with a good turnout of cars. VE7XW and VE7AQW were the rabbits, but it took only twenty minutes for VE7QK to find them. From the East Kootenay ARC report it looks like VE7CR and VE7BKR are the only active ones there. VE7ALU is working hard to build up the Lillooet District AREC for help from those up there. Bill, who held VE7AFH, is back in Nanaimo after many years in VE8-Land. VE7BHH is now receiving bookings for the Quarter Century Wireless Assn. Party and Dinner to be held July 11, 1964 in Vancouver. VE7AMW is very active on 160 and 2 meters. VE7VA is improving and soon will be back on the air from Duncan at the same old stand. Can anyone tell me if there are any active amateurs in the Alberles? Traffic: VE7BDJ 362, VE7BHH 123, VE7QQ 52, VE7BIW 12, VE7KZ 8, VE7DH 5.

SASKATCHEWAN—SCM, Med W. Mills. VE5QC—It is with sincere thanks that I greet all VE5s for the honor they have given me. I wish to thank VE5BL for the work done on behalf of the VE5 section. This section now has an SEC, Bill Parker, VE5CU, 1008 10th St., Saskatoon. Bill and I invite applications for EC appointment to be forwarded immediately. Also other offices and official station positions are open. All COs have been asked to report more often. Now that the winter hamfest in Saskatoon is over start making plans for the big one in Regina, July 1. There is a good chance Noel Eaton, VE3CJ, and President Herbert Hooyer, W8ZH, will be there. Now is license-plate request time for 1965 plates! VE5LM has been issued an OPS appointment and has two 813s percolating. VE5CX has a new HX-20. VE5HA has an HT-37. VE5QC is back on 20 with a new beam and a G-76. Get those reports in now, chaps and gals. VE5HQ has a new ITV machine. VE5VL has a new linear to go with the four-element beam. Traffic: VE5LAI 162, VE5HP 98, VE5HQ 11, VE5JU 5.

Love Them Dits . . . But, Ohhhhhh Them Dandy Dahs

(Continued from page 14)

I sa agn u must hve truble wid ur keyer becuiz bug OK . . . try keyer agn"

"W4GF de W6IV . . . EEEEEEEEEEEEE . . . (hmmmm) . . . W6ISQ QRX . . . (now listen real careful this time) . . . J/H-M/O-E/I-G/ . . . ZE . . . J/M-H/IS/O-W/ . . . (oh, well) . . . P P P . . . M/I-M . . . (maybe if I speeded up a little) . . . I/I-O/O-E/2-E/ . . . 8E . . . 1/8 . . . (ooops) . . . J/8 . . . J/7 . . . IS/O-E-M . . . (give 'im a coupla extras to think about in that one — haw!)"

"W6ISQ de W4GF . . . bug snds FB . . . keyer ng . . . suggest u need lil practice . . . off the air . . . keyers tricky . . . 73 . . . W6ISQ de W4GF."

"How about that . . . can't copy his own call and him tellin' me about my new keyer. Like I was tellin' ya, Charlie, these old fone fellas . . ."

"Sure, I know there's an extra one of them dandy dahs in there now and again . . . adds a little challenge, don't ya think?"

"Yeah, how about that, Charlie? From the way he was policin' things around here, you'd think he was with the FCC or somethin'." **QST**



Calling all genealogists: W5QCY is recruiting members for GETARID (Genealogy Exchange Through Amateur Radio and IBM Directory).

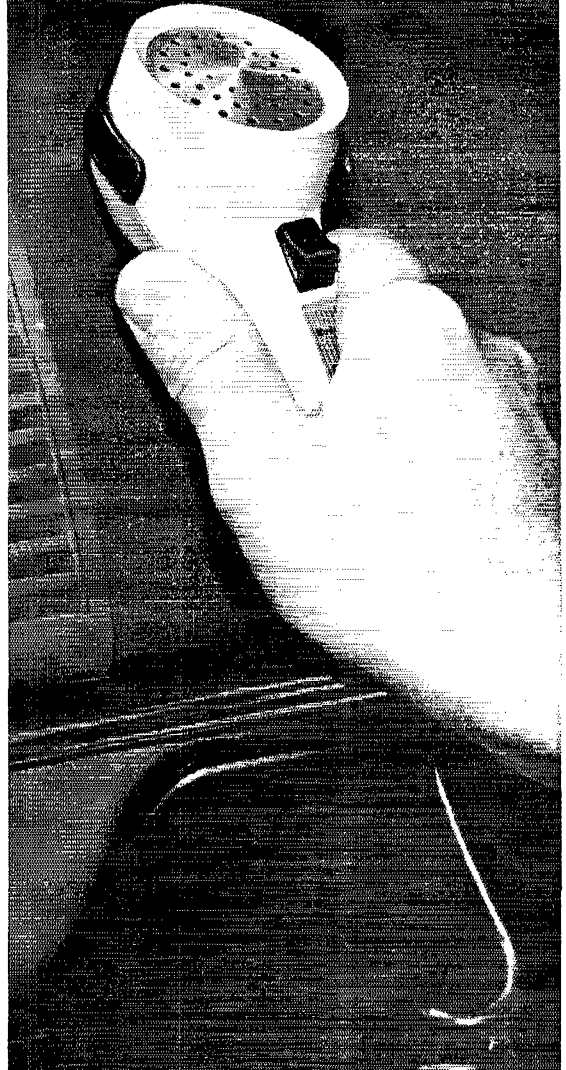
ASTATIC**HAS THE RIGHT
MIKE FOR YOUR NEEDS**

the
ASTATIC
CERAMIC OR DYNAMIC
MOBILE
MICROPHONES

*DESIGNED FOR THE
CITIZEN OR HAM
ON THE MOVE*

ASTATIC MODEL 511 CERAMIC and 513H DYNAMIC were human engineered to give flexibility of operation. SWITCH MAY BE OPERATED WITH EITHER HAND. When it comes to mounting to equipment or instrument panel, ASTATIC HAS THE ULTIMATE IN MOUNTING BRACKETS. Microphone may be mounted in ANY position. SNAP-IN action even allows mounting in INVERTED positions. These light weight microphones with greater talk power and rising response characteristic also make IDEAL SSB MIKES for IMPROVED CLARITY OF SPEECH.

Ask your distributor for complete literature or write us today.

**ASTATIC****ASTATIC CORPORATION**
CONNEAUT, OHIO 44030 • U. S. A.

In Canada: Canadian Astatic Ltd., Toronto, Ontario

Export Sales: Roburn Agencies, Inc., 431 Greenwich Street, New York 13, N. Y., U. S. A.

LEARN CODE

THE
MODERN
ATKO
WAY

ATKO
MINI-KEYER

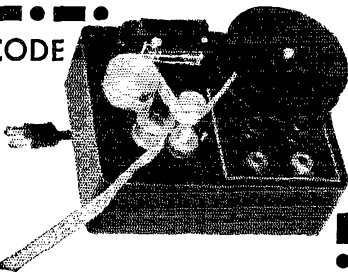
\$49.50

A new compact Code Trainer from ATKO, makers of the standard code trainers used by Navy, Coast Guard, Air Force and other governmental agencies.

- Uses Standard Wheatstone perforated tape, for perfect signals.
- Code speeds to 30 WPM.
- Will key your transmitter.
- Special Tapes CQs, VVs, etc., available at nominal cost.
- Built in oscillator, speaker, and Key jack for sending practice.
- Includes three reels of practice tape plus 11 page Instruction Book.
- Will drive 25 pairs of headphones.
- At 10 WPM tape runs full hour.
- Can be used to monitor your sending.
- Literature available.

AUTOMATIC TELEGRAPH KEYS CORPORATION

33 West 42nd Street New York, N. Y. 10036



Members are Saying

(Continued from page 57)

It is so important as a member of the American Radio Relay League and of the Radio Society of Great Britain that we support such a project as this which we hope in turn will naturally benefit us all. — *G8KS*

Wish this could be more, but college students are not the most affluent members of the amateur radio fraternity. And let's get the Southeastern Division out of the cellar! — *K4QPL*

This is a small contribution for your Building Fund and to let you know what a fine job you are doing for amateur radio. — *K1FZD*

Herewith please find my check for a second donation to the Building Fund. Hope that the matching fund is still in business, too! — *W4LU* (It is. — *Ed.*)

Enclosed you will find a money order. Perhaps as a point of interest to you, the money was raised at a club auction sale on items that were donated by members to be sold with the proceeds to be donated to your fund. — *Calgary (Alberta) Amateur Radio Association*

I have been very lax about two things: (1) my contribution to the Building Fund and (2) obtaining an Extra Class license. You have jarred me, fellas — here is my contribution and now I'm going after that license. — *K2IMV*

We Rocky Mountain hams should be able to do better than this! Please find enclosed my contribution to the Building Fund. — *K0HFI*

Happenings of the Month

(Continued from page 53)

LICENSE FIGURES

During 1963, FCC issued licenses to 32,610 individuals, as compared with 35,738 the previous year. Of these, 19,020 were for Novice privileges and 8,316 for Technicians (including 1755 who qualified for Novice licenses at the same time) as compared with 21,242, 8,105 and 1,867 a year earlier.

At year-end, there were 213,665 amateur operator licenses and 251,391 amateur station licenses in force, compared with 238,434 operators and 245,290 stations on December 31, 1962.

MEMBERSHIP FIGURES

A count of League membership taken as of the end of 1963 shows practically no change from the previous year. There are 86,146 Full Members compared with 86,300 a year earlier. The total League membership, including associates, still tops 100,000.

This leveling-off from previous growth may be attributed to three factors: a general slackening throughout the entire electronics industry, the smaller number of new amateurs in 1963 as detailed above, and those few who dropped League membership in protest against the incentive licensing proposal.

SUMMARY OF FCC CITATIONS

During the last six months of 1963, FCC issued official citations for 295 offenses as a result of on-the-air monitoring, as compared with 565 for the second half of 1962. Below we tabulate, by quarters, the

(Continued on page 158)

INDICATES TIME
AROUND THE WORLD



The International Time Indicator* now offers you these features:

- Local time in over 100 cities-countries at a glance
- In 1-12 hours A.M. and P.M. readings
- In 1-24 hours readings
- In International GMT readings
- Indicates daylight and darkness hours
- Shows International Date Line

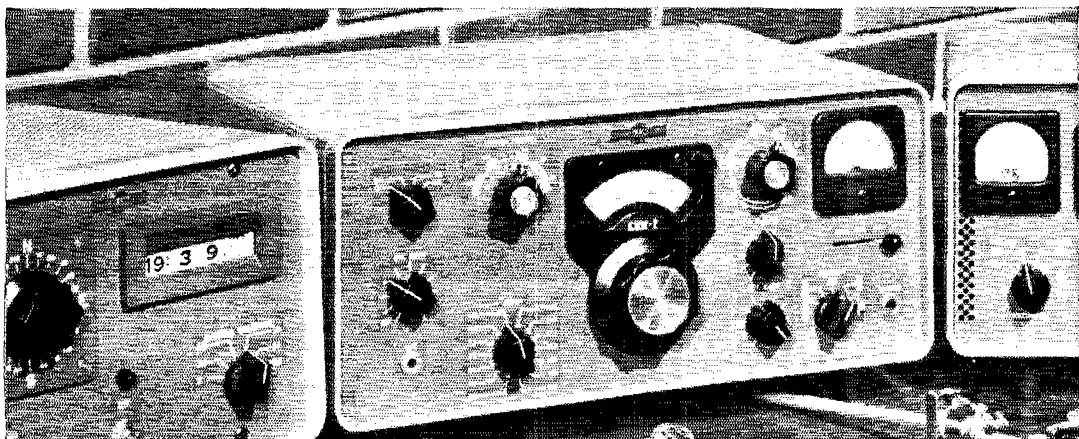
Synchronous self-starting 3-watt motor, 115-v, 60-cps, a-c... Deeply etched aluminum plate and dial... Housed in black plastic case 6½ x 5 x 2¼ inches... One year guarantee... A quality instrument designed for the amateur operator and short wave listener. *U.S. Patent No. 3115002

Send \$11.95 check or money order to

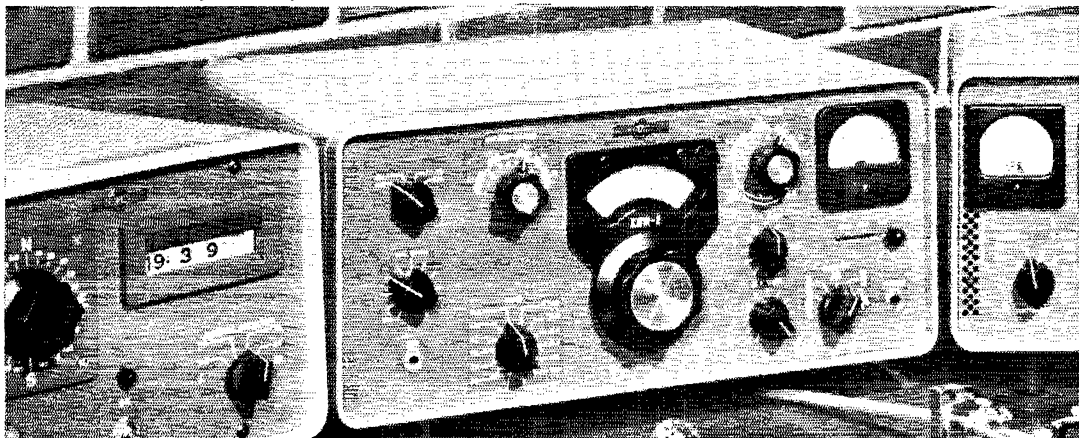


**INTERNATIONAL
TIME INDICATOR CO.**

P.O. BOX 165, ALBANY 1, N.Y., 12201.
Shipped postpaid in U.S.A.



Why is this Collins KWM-2 a Better Value



than this Collins KWM-2?

Because the ham who owns the top one is enjoying better performance, getting more satisfactory QSO's, a lot more solid pleasure from his investment.

How come? He got *his* Collins from Harrison . . . from men who are hams themselves, men qualified to give him full instructions in use and tune-up procedures. And they gave his transceiver an actual on-the-air check-out before his eyes. (Mail order purchasers: you get the same intensive check-out service, too, on request.) More . . . Harrison stands behind the manufacturer's guarantee with its own complete and modern facilities for servicing. And Harrison offers hams a full line of the latest accessories, plus top-flight professional advice in their selection.

When you see this label on equipment of *any* make, you know the ham who owns it got all these important extras. And Harrison's trade-in



deals are something special, too. Must be . . . because they've made us the biggest ham trade-in center in the nation!

Send in your order now for immediate delivery of your Collins KWM-2. With 19 most-wanted features that only Collins combines in a single unit, it's the very finest transceiver you can buy. It can be **YOURS FOR ONLY \$39 A MONTH***

Come in and see all the latest . . . at "HAM HEADQUARTERS, USA." Write for literature.

⁷³ *Bill Harrison* W2AVA

*Typical monthly payments for 24 months, after average trade-in allowance or down-payment. Terms to suit you!

REMEMBER . . . HARRISON GIVES YOU THE BEST DEAL IN EVERY WAY

HARRISON

Mail orders carefully and promptly filled.

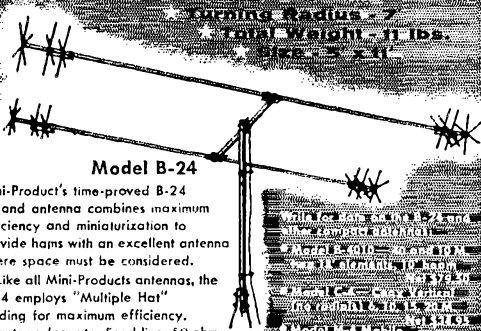
225 Greenwich Street • New York, N. Y. 10007 • BA 7-7922
[In Long Island: 144-24 Hillside Avenue, Jamaica • RE 9-41021]

Want High Efficiency and Small Size?

6 10 15 20 METERS

MINIATURIZED-4 BANDS

★ 400 WATT AM
Operating Radius - 7
Total Weight - 11 lbs.
Size - 5" x 11"



Model B-24

Mini-Products' time-proved B-24 4-band antenna combines maximum efficiency and miniaturization to provide hams with an excellent antenna where space must be considered.

Like all Mini-Products antennas, the B-24 employs "Multiple Hat" loading for maximum efficiency. TV rotor adequate; Feed line, 30 ohm coax; SWR 1.5:1.

Amateur Net

\$59.95



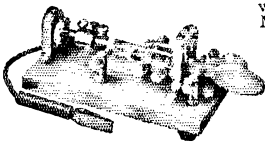
100 WEST 17TH STREET - PHILADELPHIA, PENNSYLVANIA

TELETYPEWRITER EQUIPMENT • COLLINS

51J-3 RECEIVERS .50-30.5 MC. R-390A .50-32 Mc. SP-600 Receivers, 540 Kc.-54 Mc. Teletype: #14, 15, 19, 26, 28; Kleinschmidt; Mod. K Teletype Receiving Converter, Boehme CW Keyers. Write to TOM, WIAFN, ALLTRONICS-HOWARD CO., Box 19, Boston, Mass. 02101 Richmond 2-0048.

ENJOY EASY, RESTFUL KEYING

With VIBROPLEX

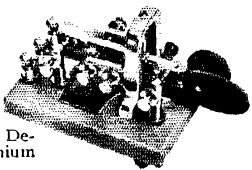


Sending becomes fun instead of work with the SEMI-AUTOMATIC Vibroplex. It actually does all the arm-tiring nerve wrecking work for you. Adjustable to any desired speed. Standard models have polished Chromium top parts and gray base. DeLuxe models also include Chromium Base and red finger and

thumb pieces. Five models to choose from, priced at \$17.95 to the 24K Gold Plated Base "Presentation" at \$33.95.

VIBRO-KEYER

Works perfectly with any Electronic Transmitting Unit. Weighs 2 3/4 lbs., with a base 3 1/2" by 4 3/4". Has Vibroplex's finely polished parts, red knob and finger, and thumb pieces. Standard model \$17.95; DeLuxe model includes Chromium Plated Base at only \$22.45.



Order today at your dealers or direct

THE VIBROPLEX CO., INC.
833 Broadway New York 3, N. Y.

FREE Folder

number of violations, definition and section of the rules which was violated:

No. of Citation	Rule Violated	Section No. (Old Series)
81	68	Frequencies and types of emission for use of amateur stations 12.111
13	21	Transmission of call signs 12.82
10	24	Purity and stability of emission 12.133
15	—	Answers to notice of violation 12.155
7	9	Sidebands confined within band 12.113
7	6	Classes and privileges of amateur operator licenses 12.23
7	—	Classification of emissions 12.232
—	5	Special requirements for non-portable stations 12.93
—	3	Notice of portable operation 12.91
—	3	Good engineering and good amateur practice 12.151
1	2	Broadcasting prohibited 12.103
—	4	Log keeping 12.136
—	2	Who may operate an amateur station 12.28
—	2	Types of emission 12.114
—	1	Requirements for portable and mobile operation 12.90
—	1	No remuneration for use of station 12.102
1	—	Transmission of music 12.104
—	1	Power supply to transmitter 12.132
—	1	Willful or malicious interference 12.160
142	153	

In addition, the Commission made seven inspections of amateur stations which resulted in the issuance of citations. At the seven stations, inspectors found five violations of Section 12.133, purity and stability of emission; four violations of Section 12.151, good engineering and good amateur practice; two of the log-keeping rules, 12.136 and two of the rules for temporary operation of nonportable stations, Section 12.93.

MINOR CHANGES IN /VE PROCEDURES

The Department of Transport, Canada, has decentralized its processing of applications from U.S. amateurs and other qualified services to operate in Canada under the reciprocal operating agreement. The Forms 41-2052 will be mailed by applicants to the office of the Regional Director of Air Services, DOT, nearest to the area of proposed operation. A list of regional directors will be sent to each U.S. licensee requesting the forms. The change goes into effect on April 1. Applications filed with Ottawa will still be processed, but visitors will be urged to conduct their correspondence with the regional office.

Minutes of Executive Committee Meeting No. 297

January 18, 1964

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Biscayne Terrace Hotel, Miami, Florida, at 10:40 A.M. January 18, 1964. Present: President Herbert Hoover, Jr., in the chair; First Vice-President W. M. Groves; Directors Charles G. Compton, Robert W. Denniston, Noel B. Eaton, and Morton B. Kahn; General Manager John Hinton; and Vice President F. E. Handy. General Counsel R. M. Booth, Jr., and Southeastern Division Vice-Director Charles Bolvin were also present.

(Continued on page 154)

"Call us for reliable, PERSONAL SERVICE"



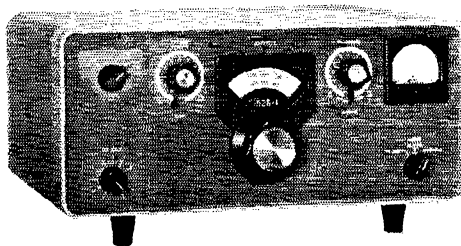
Bob Henry
WØARA
Butler, Mo.



Ted Henry
W6UOU
Los Angeles, Calif.



Walt Henry
W6NRV
Anaheim, Calif.



**CALL US ABOUT THE
62S-1 VHF CONVERTER**

World's Best Terms:

- 6% finance charge
- 10% down or trade-in down
- No finance charge if paid in 90 days
- Less red tape because we finance

**A-1 Reconditioned
Apparatus**

Nearly all makes and models. Big savings! 15 day trial—90 day warranty. 90 day full trade back on new apparatus. Write for bulletin.

62S-1 VHF Adapter.....	\$ 895.00
75S-3 Receiver.....	680.00
30L-1 Linear Amplifier.....	520.00
KWM-2 Transceiver	1,150.00
32S-3 Transmitter.....	750.00
516F-2 AC Power Supply.....	115.00
MP1 12V DC Power Supply.....	198.00
PM-2 Power Supply.....	150.00
30S-1 Linear Amplifier.....	1,556.00

Write, phone or visit either store today!

Inquiries and orders from military men and others outside USA wanted.

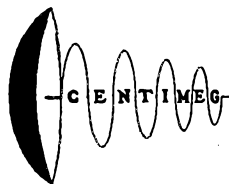
Henry Radio Stores

**BIG
TRADE-INS**

Butler 1, Missouri. ORchard 9-3127
11240 West Olympic, Los Angeles, Calif. GRanite 7-6701
931 North Euclid, Anaheim, Calif. PRespect 2-9200

"World's Largest Distributors of Short Wave Receivers"

432 Mc. CONVERTER



**NEW
IMPROVED!
!**

Low noise figure—8058
Nuvistor front end • High

image rejection—High Sensitivity • Xtal
controlled **\$89.50**

ALSO AVAILABLE:

432 Mc tripler amplifier
144 Mc converter
At comparable Prices

We are SPECIALISTS in

▶ VHF-UHF Mil standard equipment to 2300 Mc.

▶ R.F. and I.F. Amplifiers

▶ Converters

▶ Phase coherent tracking converters

▶ Xtal oscillator multiplier chains

All prices F.O.B. El Segundo
(California Residents add 4% sales tax)

Send For Free Brochures on
Our Complete Line of Equipment

CENTIMEG ELECTRONICS

312 E. Imperial Ave. El Segundo, Calif.
Tel: 213-772-1032

TRI-BAND-QUAD

\$1.50 Foreign airmail
50¢ extra

COMPLETE PLANS & BLUEPRINTS

- No Stubs
- High F to B
- Very Broad
- High Gain
- Low S. W. R.
- 30 Lbs. Max.

BARRINGTON SPECIALTIES, Box 154-Q, Barrington, R.I.

RADIO TELEGRAPH OPERATORS

Excellent opportunity for qualified
Radio Telegraph Operators for
permanent assignments to various
coastal stations in the United
States. Minimum requirements:—
2d Class FCC Telegraph license,
touch typist, good 'fist' essential.
Rotating shifts—liberal benefits—
paid weekly—Good Starting Salary.

Send Full Particulars to:
Mr. J. Cappellini

AMERICAN CABLE & RADIO CORP.

An ITT Associate
67 Broad Street, New York 4, N. Y.
• An Equal Opportunity Employer •

The General Manager and the General Counsel reported on a number of matters in the fields of membership, licensing, headquarters operation, regulatory developments, and difficulties in zoning regulations.

On motion of Mr. Denniston, unanimously VOTED that the General Counsel continue the League's opposition to FCC license-application filing fees, particularly in view of the fact that such fees would go into the general funds of the United States and not be earmarked to expand FCC operations. During the course of the above, Southeastern Division Director Thomas Moss joined the meeting.

The Committee was in recess for lunch from 12:15 to 12:40 P.M.

On motion of Mr. Compton, affiliation was unanimously GRANTED to the following societies:

Chicago Vocational Amateur Radio Club (H.S.)	Chicago, Ill.
Livermore Amateur Radio Klub	Livermore, Calif.
Loyola University Amateur Radio Club	New Orleans, La.
Gopher Amateur Radio Club	Minneapolis, Minn.
Hutchinson Amateur Radio Club	Hutchinson, Minn.
Nutley High School Amateur Radio Club	Nutley, New Jersey
Orchard City Amateur Radio Club	Kelowna, B. C., Canada
University of Manitoba Amateur Radio Society	Winnipeg 19, Manitoba, Canada

On motion of Mr. Denniston, unanimously VOTED to approve the holding of a West Virginia ARRL State Convention in Jackson Mills on July 4-5, 1964.

There being no further formal business, the Committee adjourned at 1:05 P.M.

(During the remainder of the afternoon, as well as the following two days, members of the Committee engaged in extensive discussions with representatives of amateur societies from Europe and Latin America looking toward the formation of a Region 11 Division of the International Amateur Radio Union.)

JOHN HUNTOON
Secretary

Resolve to Build Something

(Continued from page 49)

However, I would like to emphasize two things. First, have patience. Take all the time you need to do the best job you can do. Second, have pride in your work. Be hard to satisfy. Be sure the finished product is finished to the very best of your ability.

QST Article Contest

As a feature of the ARRL's 50th Anniversary Year, readers are invited to become writers, and submit entries for the monthly Article Contest.

The author of the article selected by QST's staff as the best each month for the remainder of 1964 will receive a \$25 U. S. Savings Bond. The first winning entry, by W8LORU, appears on this page.

Complete rules and some subject ideas appeared on page 49 of QST for February.

I don't know exactly what my 1964 project will be yet. But I do know one thing. When it is finished, I am going to cut that gold band from the cover of January QST. That band will be glued

(Continued on page 156)

TRIGGER

FOR
LIKE-NEW,
EXTRA-CLEAN
SELECTED EQUIPMENT



(Receivers and Other Gear Completely Realigned and Serviced)

• Two-Week Trial • 90-Day Guarantee • Trades Accepted

You Pay No More For Dependable, Like-New Equipment.

Trigger specializes in ham gear that's *attractive* in appearance and *dependable* in performance. All components that can contribute to malfunction are replaced—insuring trouble-free performance.

Listed below are but a few of the hundreds of items and accessories currently available. Come in for an "eyeball" (your eyes will be opened when you see the Trigger stock of beautifully reconditioned gear), or write or phone today.

51J4	\$895	S85	\$ 79	NC183D	\$177
75A4 late #	449	SX99	89	NC125	79
FILTER 500 cy.	39	SX42	149	NC109	99
FILTER 2.1 kc.	39	SX43	87	NC270	149
75A3	269	SX62A	229	RVA	44
KWM-1	299	S76	79	RJE4350A	127
MOBILE MOUNT	29	S118	69	RME DB23	29
AC SUPPLY	69	S108	87	GPR90	279
DC 516B1	119	S107	54	200V	489
KWM-2	775	S53A	47	GT6 AC SUPPLY	69
CM-2 case	69	S94	20	GSB101	169
P81-2	107	S95	37	HT 8 MTR	149
KWM-2 MOUNT	77	SX105	57	IIB 2 MTR	139
75B1	299	SR34 3way sup.	229	IV 6 MTR	179
75B3	537	SI34 AC	199	IV 6 MTR	219
32S1	399	SR150	499	Q350	239
312B4	139	DC SUPPLY	79	366B	79
AC SUPPLY	77	AC SUPPLY	79	377A & 3 way	144
SM2 MKK	99	MOBILE TRAY	24	CLEGG ZBUS	449
DRAKE TR-8	479	HT32	329	INTERCEPTOR	329
DRAKE 2A	179	HT33	179	CLEGG 99er	97
DRAKE 2B	199	HT37	319	POLYCOM 82B	259
MOSLEY CM-1	117	HT40	54	HEATH GR91	37
SWAN SW140	179	H44 KEYSER	32	TX-1 APACHE	159
SWAN SW240	239	INVADER 2000	749	HT10 linear	179
DC SUPPLY	69	VALLANT	269	DX100B	149
AC SUPPLY	29	VKING II	109	DX20	24
SX101A	249	VKING VFO	29	HW20 Pawnee	199
SX111	159	RANGER	149	HX20 SSB XMTR	177
SX100	199	HALLANGER	77	MR-1	77
SX117	299	6N2 XMTR	119	HE10 SWR	84
SX117 L.P. tuner	29	6N2 LINEAR	329	HEATH VOX	24
SX110	199	TR SWITCH	19	AC1 ant tuner	19
SX96	429	SWR BRIDGE & Ind.	24	OP-1 SCOPE	149
		HC10 ssb adapter	79	R100	69
		HQ105	119	KNIGHT VFO	29
		HQ140X	119	HW 5100	139
		HQ145	159	LA400C	147
		HQ145X	179	P&H 6-150	199
		HQ180C	329	PALCO 65XMTR	74
		SP600	279	PMR7	77
		HX50	289	AMECO 88W	69
		HX500	379	AMECO AC SUP	19
		HO600	239	JONES SWR & IND	24
		NC900	169	EICO 430 SCOPE	59

Another important TRIGGER service: WE BUY USED HAM GEAR FOR CASH!!! PROMPT SERVICE PROMPT CASH!

STORE HOURS

Weekdays 1:00-8:00 P.M.
Saturdays 9:00-3:00 P.M.

Or by Appointment After Hours

Phones:

Chicago Area TU 9-6429
Other Areas PR 1-8616

Business phones with QTH Extensions

TRIGGER Attn: W91VJ
7361 North Avenue Amount
River Forest, Illinois Enclosed
(suburban Chicago)

RUSH THE FOLLOWING:

* _____

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

*ORDER BLANK TO: (1) trade ur present gear, (2) order above units, (3) sell ur gear for cash.

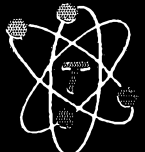
(ABC1234)



Foreign
Inquiries
Invited
Send postage and self-addressed envelope

A small deposit will hold the unit of your choice on Lay-Away!

(above prices F.O.B.)
Plenty of free parking



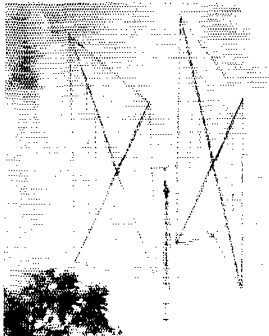
TRIGGER

Electronics

7361 NORTH AVENUE, RIVER FOREST, ILLINOIS

* CHOICE OF THE CHAMPS 10-15-20M QUADS

*PRE-CUT *PRE-TUNED *TRIBAND



\$59⁹⁵
Bamboo

\$99⁹⁵
Fiberglass

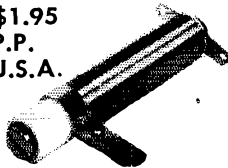
Quality workman-
ship and materials
at a price to
please all
amateurs.

- SINGLE FEED LINE
- Rotate with TV Rotor
- High F/B Ratio
- Very Low SWR
- High Gain
- Low angle of radiation
- Low Q Broadly Tuned
- Easy to Match
- Low Wind Resistance
- Rugged Construction

* See January 1964 QST page 75
"How DX King s Rate Antennas"
Write for Free Literature Dept. A

Skylane PRODUCTS 406 BON AIR DR.
TEMPLE TERRACE, FLA

\$1.95
P.P.
U.S.A.



COMPACT DESIGN
R. F. PLATE CHOKE
for exciters. Series or parallel
feed. 80 thru 10 M. Maximum
rating 1000 VDC @ 300 Ma.
3" x 1/2" stealite core.

AMATEUR PRODUCTS
Box 19156 Okla. City, Okla.

CONVERTER SALE

New model series 300 with 3 VHF transistors, crystal, and more than 30 high quality parts. Carefully assembled and tested. Measures only 3" x 2 1/4" x 2". Low noise and better than 1 microvolt sensitivity. Made in USA and guaranteed. Available in the following models for 12 volts DC:

Model	Input mc.	Output mc.	Price
300-A	26,965-27,255	1.0-1.29	\$8.75 ppd.
300-B	50-51	.6-1.6	\$8.75 ppd.
300-C	50-54	14-18	\$8.75 ppd.
300-D	144-148	50-51	\$10.75 ppd.
300-E	144-145	.6-1.6	\$10.75 ppd.
300-F	144-146	28-30	\$10.75 ppd.
300-G	14.0-14.35	1.0-1.35	\$8.75 ppd.
300-JT	5.0 (WVY)	1.0	\$8.75 ppd.
300-X	Choice of 1 input freq. and 1 output freq. between .6 mc and 100 mc.		\$14.75 ppd.

Supply limited at these low prices—order now.

Average time between receipt of order and shipment is two weeks—for faster service send postal money order.

All above converters are supplied with Motorola type connectors. For two 80-239 connectors instead, add 75c. N.Y.C. residents add 4% sales tax.

VANGUARD ELECTRONIC LABS Dept. S-3
190-48-99th Ave. Hollis 23, N. Y.

to the top right-hand corner of the panel. When that piece of equipment has been used as long as it is usable, I will lay it away. Perhaps in the 2014 ARRL Centennial some future ham will examine it. I like to imagine him saying, "You know, those hams back in 1964 did right neat work, considering the crude components they had to work with." QST

Correspondence from Members

(Continued from page 78)

8) Always get a DX station to rag-chew with you. After all, he doesn't want to QSO any one else.

Okay all of you wonderful *lids* who are so talented in abiding by this code, and whose walls are just cluttered with QSLs from all of the hundreds of DX stations you have worked, here is the code you have been asking for by using your DX-getting operating practices.

I hope everyone using this practice and those who are following correct procedures will further its usage, because after all, this is the latest thing in operating procedures and every one should get with it. This is quite apparent by listening to the lids at work on 20 meters. — David L. Hough, KØVMO, Glenwood, Minnesota

ROTTEN C.W.

☞ I would like to draw attention to many of our c.w. brethren, that there is far too much rotten sending these days. My chief complaint is the appalling lack of spacing that so many are guilty of. The rule book says there is a space between characters and words, the latter three times longer than the former, but many of our well-known DX men (and others) are producing their own rules, and the result is chaotic. To one gentleman, I suggested that he cease sending Chinese Morse, because I couldn't read it. It is so bad that now it is getting impossible to read the calls of some amateurs. K6 has become YH, W6 is now JH, and numbers and letters just run together in a meaningless jumble, especially is this so if a DX chaser is calling a rare one (like Gus) and trying to get his whole call sandwiched between others in the pile up. I do not know how Gus or anyone else ever gets their calls, because I can't! Have you notice, too, the number of amateurs who seem to keep a horse and keep giving his name? NAG here is John!

We have speech training, and an educated man is supposed to speak distinctly. Are we getting so illiterate in our code that we are becoming incomprehensible?

30 years ago I used to pride myself that I could read anything anyone could send at me, but now I bow my head in shame, I have to guess what many send today.

What code do they use? — H. A. M. Whyte, VE3BWY, Toronto, Canada

PAY YOUR MONEY, TAKE YOUR CHOICE

☞ It is dangerous to draw hard and fast conclusions from data derived from DX results obtained in the heat of combat. (See "How DX Kings Rate," January 1964, QST.) I have used about every form and style of rotary beam since 1945 (DX score to date: 280 countries), and have had the opportunity to judge the signals of W-DXers from several over-

(Continued on page 158)

by hams...
for hams...
Harvey is reliability

Harvey

VALUES OF THE MONTH

E-V HI-PERFORMANCE ECONOMY CERAMIC MICROPHONE

Gain 3-way benefit with Model 729. Improve performance quality and increase convenience with a modest investment. Cardioid pickup pattern improves voice quality by suppressing room reflections and reverberation. In critical VOX operation, unnecessary tripping of the control circuit is reduced. Your working distance from the mike can be increased, substantially greater loudspeaker volume may be used. Size and contoured shape make hand-held operation for long periods comfortable — or, if you prefer, let the microphone slip back, without groping or fumbling, into its slip-in desk stand. The stand is included at no extra cost. Ceramic generating element maintains high output level without deterioration for years.

ELECTRO-VOICE MODEL 729.....\$14.70

ELECTRO-VOICE DYNAMIC CARDIOID MIKE FOR SSB

An outstanding directional microphone for any application, Model 664 has unique advantages in SSB. Transmitter audio input circuits are designed to shape speech characteristics, in conjunction with automatic level control, on the assumption that microphone is flat. The truly flat response of the 664, free of peaks and dips, permits maximum PEP, maximum ERP, while retaining natural voice reproduction. The effective cardioid pattern reduces accidental opening of the VOX circuit when speaker level is high, permitting you to work at comfortable volume. Noise, reverb and echoes in the ham shack are kept down for better intelligibility. High output level. The rugged, almost indestructible dynamic is shown here on mike stand 419.

ELECTRO-VOICE MICROPHONE MODEL 664....\$51.00
MICROPHONE STAND MODEL 419..... 6.00

E-V "SECOND-OP" DX COMPUTER

One quick setting gives location of DX contact by continent, zone, and country; Great Circle bearings; time differential (including daylight saving variations); and postage rates. Set indicator to call-letter prefix on 10½" circular rule and all information automatically appears in windows. Wealth of additional data includes addresses for ARRL contacts in U.S. plus QSL bureaus throughout world.

"SECOND-OP" DX
OPERATING AID\$1.00

ROTRON WHISPER FAN

The fan that moves 60 cu. ft. of air per minute... while running so silently you have to look to see if it's running! Removes heat to save your rig, yet uses only 7 watts. Measures 4½" square by 1½" deep. Has run for years in computers and other commercial equipment without attention — lifetime lubricated. Operates on 110-120V. A.C. Amateur Net.....\$14.85

EXTRA-SENSITIVE HEAD PHONES BY SUPEREX

600 ohm impedance; extra-high sensitivity for weak signals and hard-to-read stations... reproduction is crisp, free of distortion... unequalled wearing comfort over long use. Amateur Headphone Model AP-S.

Amateur Net\$24.95

Don't forget to include postage and shipping charges! We refund excess.

WE SPEAK YOUR LANGUAGE — and have for 37 years. It means orders from every corner of the world are handled personally and your instructions, in any language, are followed. It means we speak the universal language of all radio amateurs. And that gives you such ham-to-ham extras as consultation on your problems, meeting specific requirements, and — at your request, with no charge — opening sealed cartons for complete equipment check-out.

Send check or money order including shipping charges. We return any excess.

Harvey

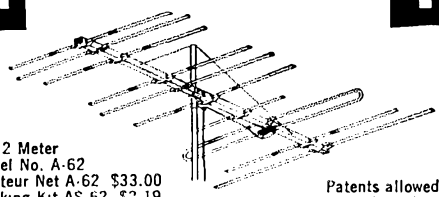
RADIO CO., INC.

OUR **37th** YEAR

103 West 43 St., New York 36, N. Y. (212) JUdson 2-1500



2 ANTENNAS IN 1



6 & 2 Meter
Model No. A-62
Amateur Net A-62 \$33.00
Stacking Kit AS-62 \$2.19

Patents allowed
and pending

**The Only Single Feed Line
6 and 2 METER
COMBINATION YAGI ANTENNA**

another first from **FINCO®**

ON 2 METERS

- 18 Elements
- 1 — Folded Dipole Plus
Special Phasing Stub
- 1 — 3 Element Colinear Reflector
- 4 — 3 Element Colinear Directors

ON 6 METERS

- Full 4 Elements
- 1 — Folded Dipole
- 1 — Reflector
- 2 — Directors

See your FINCO Distributor
or write for Catalog 20-226

THE FINNEY COMPANY
Dept. 21 Bedford, Ohio

MINIVERTER

- ★ Crystal Controlled Units Available from 2 to 150 Mc.
- ★ Input Either High Impedance (BC whip) or Low Impedance (Tuned whip)
- ★ All Units Transistorized



**CONVERTS ANY
AUTO RADIO
TO A SENSITIVE
SHORTWAVE
RECEIVER**

- ★ The following models are available with either high or low impedance inputs: (Please specify desired impedance when ordering)
- CV2 (160M); CV4 (80M); CV7 (40M-CHU); WVV each..... **\$12.95**
- CV14 (20M); CV21 (15M); CV29 (10M); CV30 (10M); CV50 (6M) each .. **\$24.95**
- MARS MODELS: 4 to 5 MC (BNC Connectors) 14 to 15 Mc output..... **\$17.95**
- 4 to 5 MC (BNC Connectors) 6.8 to 7.8 Mc output..... **\$17.95**
- CAP MODELS 4 to 5 MC (Auto Radio) .5 to 1.6 Mc output **\$17.95**
- FIRE, POLICE 30 to 50 MC (Any 1.0 MC segment) each... **\$27.95**
- MARINE 2-3 MC (Auto or Home Radio) each..... **\$17.95**
(Units Above 14.0 MC have tuned RF Stage)



- ★ Brochure Available Upon Request
- ★ Order Direct From

SCIENTIFIC ASSOCIATES CORPORATION
BOX 1027, MANCHESTER, CONNECTICUT

seas DX spots (PX, 3A2, HV, FP8 and others). Most of the "big guns" sound pretty much the same! Remember that a good DX operator can pull an S-6 signal out of an S-9 pile-up and further, that DX reports of signal strength have little meaning. The length of time you "fight" in a pile-up means little, too; that is a function of your DX skill in analyzing the operating techniques of the situation.

I would rate "DX-ability" about as follows, in a descending order of importance:

- 1) Operating skill
- 2) Location (including a low noise level)
- 3) Antenna height
- 4) Type of antenna

Therefore, before you rip down that antenna — just because Joe Blow across town got an S-unit better report than you did — relax! A good (not the best) beam in a good (not the best) location at a good (not the best) height will do wonders if you are a sharp operator! If you are looking for Utopia, move to a rare country. As Confucius says, "Rare call is worth 10 decibels in antenna." — *William Orr, W6SAI, Menlo Park, California*

INCENTIVE LICENSING

¶ I have just read with extreme interest, and no small amount of alarm, the text of the speech made by Ivan H. Loucks of the FCC, to the Quarter Century Wireless Association.

I have never been a member of ARRL. The reason is that I am not particularly interested in ham radio as ARRL knows it. I like ham radio to get on the air and yak when I feel like it (consistent with good operating practice — ARRL definition), or to try out a new piece of gear I have built. While such things as contests, nets, public service, etc., are fine, they are not to my particular interest in ham radio. To each his own, or, live and let live, is my attitude.

However, if the ARRL is endorsing the speech made by Loucks, then I am glad I have never joined. The subtlety employed by the FCC in this address is exceeded only by that of the serpent in the Garden of Eden.

I agree with your statement that "Its message is so important that it deserves careful consideration by every amateur." But, not to get busy on public service type hamming as the article states.

Ham radio was here before the FCC. As an amateur, why must I justify my existence on the radio frequency spectrum on the basis of how much public service I perform? Fellow hams, I can assure you of this, that if public service is our excuse for being, then we will lose out. Yes, there are much better mediums of emergency communications than we. Three of them are: the public safety radio services, military communications, and yes, believe it or not, citizens band. Possibly we need to make some changes in the FCC rules which describe the purpose of amateur radio.

Fellow hams, let's keep our hobby just that — a hobby. If we have to compete with commercial services for our right on the air, we will lose. If you believe that government is a creature of the people, to serve the people to the extent desired by the people (not the government), then join with us who would call for an investigation of the FCC and the reasons behind some of its rules and regulations. I, for one, love ham radio and would like to keep the hobby for years to come. — *W6MTU*

¶ Thousands, if not millions, of children in the U.S.A. would never go to school at all if the law did

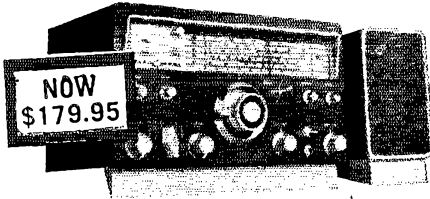
(Continued on page 160)



WRL Makes Quantity Purchase Of New National Receivers

\$20,000 Savings Offered By World Radio Laboratories

Council Bluffs, Ia. (HAM)—Leo I. Meyerson, WØGFQ, President of WRL quotes: "I have just purchased a stock of New National Receivers, at a hot price. This savings will be passed on to our customers." Leo also stressed, "We shall give top trade-in allowances despite the bargain prices on these receivers. For the past 28 years WRL

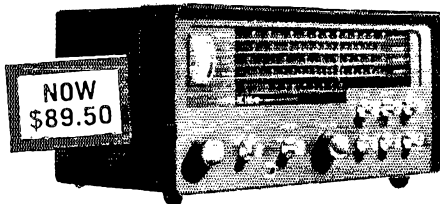


SAVE \$100.00 NC-270

A SAVINGS OF OVER 35% on the regular price of \$279.95 on the famous NC-270...a double conversion receiver, 6 to 80 meter ham band coverage and other features, including: selectable sideband; five selectivity positions—600 cy./5Kc.; both product and diode detectors; high order stability for SSB/AM/CW reception; 1 uv. sensitivity for 10DB SN ratio; built-in 100 Kc. calibrator, ANL; "S" meter; etc. Size 8 $\frac{3}{8}$ " x 15 $\frac{1}{8}$ " x 9". Approx. 28 LB. less speaker.

ORDER # XM227 (\$10.00 monthly on Charg-A-Plan) cash \$179.95

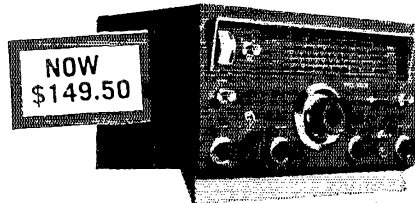
ALSO SUPER HI TRADE-IN ON THESE HOT LOW PRICES



SAVE \$30.45 NC-105

A SAVINGS OF OVER 25% on the regular price of \$119.95 on the NC-105, and offering continuous coverage over 550KC to 30 Mc. Includes: "S" meter; noise limiter; "Q" multiplier; built-in speaker; special hi-fi tuner output jack, etc. Size: 7 $\frac{1}{8}$ " x 13 $\frac{1}{2}$ " x 8 $\frac{1}{8}$ ". Approx. 25 LB.

ORDER # XM229 (\$5.00 monthly on Charg-A-Plan) cash \$89.50



SAVE \$50.45 NC-155

A SAVINGS OF OVER 25% on the regular price of \$199.95 on the NC-155, and offering the amateur an outstanding buy in a ham band receiver covering 6 to 80 meters. Superb SSB/AM/CW reception; selectable SB; five positions of selectivity from 600 cy. to 5 Kc.; "S" meter; 60:1 dial reduction; 1 uv for 10 DB SN sensitivity; ANL, and other outstanding features usually costing more than \$250.00. Size: 8 $\frac{3}{8}$ " x 15 $\frac{1}{2}$ " x 9". Approx. 25 LB. less speaker.

ORDER # XM228 (\$7.00 monthly on Charg-A-Plan) cash \$149.50

WRL

BUY FROM WRL

because YOU save up to \$100.00 per receiver YOU get extra-hi trade-in allowances YOU receive National's full year warranty YOU can buy on low monthly payments.

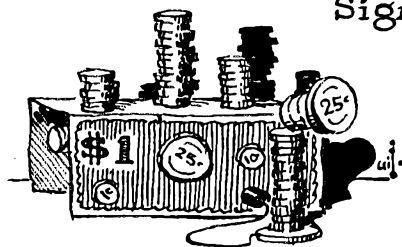
WORLD RADIO LABORATORIES, INC.
3415 WEST BROADWAY
COUNCIL BLUFFS, IOWA 51501
Phone 328-1851

Leo, rush Receiver model _____ at your special price of \$ _____ () check enclosed () charge

Quote trade-in allowance on my _____ () Send info on Charg-A-Plan.

Name _____ call _____
Address _____
City _____ State _____

A 5 Dollar Signal?



HOW FAR do you think your voice would be heard with a five dollar rig? Not very far! For the same amount of money invested in the American Radio Relay League your voice, no matter where you are located, can be heard in Washington, D. C., in Atlantic City, in Geneva, or wherever Amateur Radio is cussed and discussed. As a bonus you get the best balanced magazine in amateur radio; each Edition with something for almost everyone from beginner through the most advanced ham. Your investment gets stretched even further when you consider the many services which the League makes available to its members: technical aid, license information, legal advice, literally dozens of awards and contests, and the opportunity to participate in the organization through a myriad of field appointments, such as EC OO, etc.

THE LEAGUE is "Of, by and for" the amateur. Its board of directors is elected by the membership and is responsible to them for its actions.

EACH AMATEUR is as important as the next and when he speaks his voice is heard. If you are not already a member join now and **LET YOUR VOICE BE HEARD**. Non-hams are invited to join also. They don't have the right to vote but they do get QST and can become full members as soon as they get their licenses.

**QST and ARRL membership \$5—
additional licensed family members
at the same address \$1. \$5.25 in
Canada, \$6 elsewhere.**

**THE AMERICAN RADIO
RELAY LEAGUE, INC.
Newington, Conn. 06111**

not require it. Many thousands never take more than the law requires. But this same minimum requirement has placed the U.S.A. at the top of the list of literate nations, and has been responsible as much as anything for the standard of living we now enjoy. The higher the level of required learning, the greater will be potential productivity of each individual, and therefore, the greater the country's or group's contribution to its over-all success.

Should we refuse to go along with incentive licensing because a few people object to it for whatever reason? No indeed! That would be allowing a few to hold down the level of the majority. If regulations require a higher level of learning for a certain privilege, it is not to hold down, but to raise up . . .

Let us not overlook the probability that breakthroughs such as laser and other strange-sounding terms can, within the next decade or two, so change the character of communications and their regulations that anyone not fully educated in today's terms could be completely out of the picture. There is no middle-of-the-way-position for us; we must go forward or we shall be left behind. — *WORA*

☐ I am a member of the ARRL but oppose your Licensing Petition RM-499 and want to add my voice to the storm of protest against it. No hobby should be made a chore. — *W12YF*

☐ I've previously written you that I agree with your FCC proposal. I agree more than ever when I read the poor arguments used against ARRL plans for incentive licensing. — *W0AII*

☐ You first started out on this thing, telling us it would solve our QRM problem. I run low power here and get out about any time I want to, sometimes getting on c.w. Many suggested a power limit on some bands, so you switch over to the argument about the coming Geneva Conference and the danger of losing some of our amateur frequencies. Wouldn't our chances of holding what we have be better with a larger number of radio amateurs and not fewer hams? Why wasn't this Geneva argument used right from the start? It took some time to cook up this malarkey, is why. — *W1011P*

☐ My renewal should not be taken as an indication of my agreement with your "incentive licensing" gimmick. — *W12YFM*

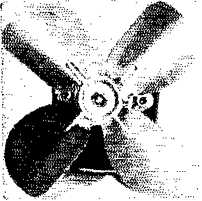
☐ It is true that some drastic measures are necessary to keep our band allocations, but could it be possible that incentive licensing is not the solution? It is inconceivable to me that the rest of the people that I have talked to that the pressures to take over more of our band spectrum for commercial use will be deterred when they find out that we have adopted an incentive licensing program. To most of us in this area this reflects a naive, narrow opinion expressed by reactionary leadership in ARRL. I think, OM, that the hams could better be served by people with more open minds on this subject. You have shown that your mind was closed to this long ago. Unfortunately, you and ARRL have ceased to be the true voice of ham radio in this country. Please open your eyes and mind before you ruin ham radio. — *K4QBP*

☐ It seems to me that many ignorant people, with proportionately ignorant vocabularies, which, to judge by their letters, consist mainly of four-letter words, are yowling about a proposal which may save the hobby they prize so much. If they don't believe it, they might find out about the many other services looking hungrily at our choice frequencies. Then

(Continued on page 162)

**BULLS EYE
BUYS AT
ARROW**

HAND-PICKED FOR HAMS BY HAMS



COOLING FAN

110-115 V., 60 cps, 4 aluminum blades. Ideal for many applications. Shown approximately 1/25th of actual size. Shipping weight 3 lbs. **\$2.29 ea. 3 for \$5.95**

DIRECT/5:1 REVERSE VERNIER DRIVE

The newest in the line of fine tuning aids from Jackson Bros. Direct/Slow Reverse (5:1 ratio) Vernier Drive. Easy fixing — requires only one 3/8" hole. High torque, low back lash, smooth and permanent movement, coaxial spindles, 1/4" shaft dia.

Model 4111/RV
Amateur **\$1.95**
Net



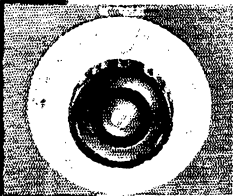
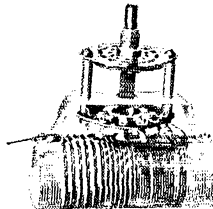
AMERICAN GELOSO V.F.O.'s

Wired, tested, calibrated, ready for use. Mod. 4/104 for driving one 807 or 6146 final in AM or CW under Class "C" conditions. Mod. 4/102 for driving two 807's or 6146's final. Has 5 bands. Supplied with Mod. 1640 dial ass'y. Mod. 4/103 for 144-148 mc bands. Combines VFO primary freq. of 18 mc with xtal fundamental freq. of 12 mc. Supplied with Mod. 1647 dial ass'y. Mod. 4/104, 4/102 or 4/103 less tubes and xtal, each **\$29.95**



AMERICAN GELOSO PI TUNING COILS

Units have 6 posit. tap switch mounted on ceramic coil form. Mod. 4/111 designed for use with two 807's or 6146's (in parallel). Freq. Range 3.5 to 29.7 mc. Mod. 4/112 is designed for use with single 807 or 6146. Handles up to 60 w. Range: 3.5 to 29.7 mc. Mod. 4/111 or 4/112, each **\$4.95**



PRECISION BALL DRIVE DIAL

Another superb product of Jackson Bros. of England, 4" dia. dial with 6:1 ball drive ratio. Fits standard 1/4" shaft. For that velvet touch... Amateur net **\$3.95**
Does not include panel.

TRADE-INS WELCOMED

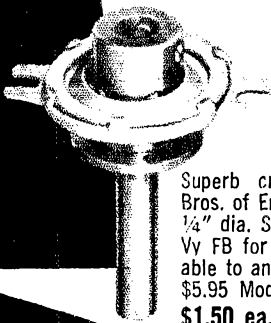
Your old equipment is worth money at Arrow. Get Arrow's deal before you buy.

VERSATILE MINIATURE TRANSFORMER

Same as used in W2EWL SSB Rig—March, 1956 QST. Three sets of CT windings for a combination of impedances: 600 ohms, 5200 ohms, 22000 ohms. (By using center-taps the impedances are quartered). The ideal transformer for a SSB transmitter. Other uses: interstage, transistor, high impedance choke, line to grid or plate, etc. Size only 2" h. x 3/4" w. x 3/4" d. New and fully shielded.



Amateur net **\$1.39.**
3 for \$3.49.
10 for \$10.75.



PRECISION PLANETARY-VERNIER for exceptionally fine tuning

Superb craftsmanship by Jackson Bros. of England. Ball bearing drive, 1/4" dia. Shaft 1 1/8" long: 6:1 ratio. Vy FB for fine tuning. Easily adaptable to any shaft. Comparable value \$5.95 Model 4511/DAF. **\$1.50 ea. 10 for \$13.50**

**MAIL ORDERS
PROMPTLY PROCESSED.**

Arrow's Export Dept. Ships To All Parts Of The World!

Prices Subject To Change Without Notice.

**TO SAVE C.O.D. CHARGES, PLEASE INCLUDE
SUFFICIENT POSTAGE WITH YOUR ORDER.
ANY EXTRA MONEY WILL BE RETURNED.**

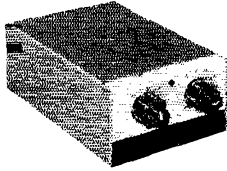
ARROW ELECTRONICS, INC. 900 Broad Hollow Rd., Farmingdale, N. Y.
516 — Mvrtle 4-6822

65 Cortlandt St., N.Y. 7, N.Y. • 525 Jericho Tpke., Mineola, N.Y. • 225 Main St., Norwalk, Conn.
212 — Dlgby 9-4730 516 — Pioneer 2-2290 203 — Vltor 7-5889

CW OPS:

QRQ with less effort try the "Ultimatic" Keyer

- DUAL LEVER OPERATION
- PERFECT DOTS, DASHES, SPACES • MEMORY PREVENTS LOST DOTS • CALIBRATED SPEED CONTROL • MONITOR
- TRANSISTORIZED.



MODEL 200, for blocked-grid keying \$ 98.75
 MODEL 200R, SPDT reed keying relay 110.75
 "NIKEY", dual lever 17.95

WRITE FOR BULLETIN 200.1

ALKAN
products

P.O. BOX 5494 LAKE ST. STATION
MINNEAPOLIS, MINN. 55408

DOW-KEY

New DK72

SINGLE POLE THREE THROW COAXIAL SWITCH



Weatherproof coaxial relay for remote switching of r.f. sources. Designed for mounting on mast and remote switching up to 3 antennas. Not a rotating or stepping switch. Simplify installation, save money by running one cable instead of several to your antenna array.

See your dealer or catalog sheet and complete specifications, or write:

MODEL DK72 with UHF Connector **\$22.95**
 With type N, BNC, TNC or C connectors, \$26.95

DOW KEY CO., Thief River Falls, Minn.

\$5.00 FREIGHT ALLOWANCE!

SAVE

BUY FROM WRL
WRL SPIRE TOWERS



WRITE FOR ANTENNA PACKAGE INFO

NO MONEY DOWN

SELF-SUPPORTING 3 SIZES 32', 40', 48'

All self-supporting with large tribander or other beams. May be extended to 120 ft. with proper guying.

3 MOUNTING BASES

(a) Rigid concrete mount. (b) Concrete mount with hinge base. (c) Earth anchor with hinge base (no concrete).

- ★ Fully galvanized
- ★ Aircraft riveted
- ★ Streamlined appearance
- ★ Includes rotor mount for Ham-M, AR22, etc.

\$58⁸⁵ 32 FOOT RIGID CONCRETE MOUNT

All shipments are via truck, collect, with \$5.00 frt. allowance.

"By Demand - Most Popular Tower in the USA"

WRL World Radio Laboratories, Inc.

3415 W BROADWAY COUNCIL BLUFFS, IOWA PHONE 328 1851

they might monitor the CB band and note the similarity of much of the CB operating and quite a bit of the ham operating. Then they might regard the FCC considerations of drastically reducing the CB frequencies and draw conclusions accordingly.

Those who worry about passing the test might try studying during the time they worry about selling their "useless" equipment. It might work wonders — *WN2LRS*

☐ I read President Hoover's message to the Atlantic Division Convention with great interest. I think what he had to say was both true and in the best interest of ham radio.

Due to the fact that we could easily lose any or all of our lower frequencies in the next few years, I propose the following to all hams in the country.

In my own area, ham radio is not too well organized. This is so in many small areas. I, with the help of others, plan to start a good club that will be informative and helpful to the public. We plan to get at least one net going to bring all hams together on the air.

I feel amateurs should band together to educate new hams on the courtesies, technical knowledge, and good operating practices that should be observed on the ham bands today.

Already we have started a code and theory class at our high school and plan to get a ham club going.

I hope others will wake up, get on the ball and help to make ham radio a respected, helpful, and meaningful hobby to the public and to themselves. — *WB2ECL*

☐ I am 15 years old, a Novice, and still wet behind the ears. I just recently received my membership certificate stating that I belong to the ARRL. This membership meant a great deal to me in that I had an organization working for me in amateur radio. I was shocked when I read the correspondence from members in the January *QST*. That anyone could condemn an organization to which they owe their existence as an amateur radio operator is unbelievable to me. I see that many criticisms come from Novices who want the easiest and shortest way to have all the privileges of the "big guys." If General class amateurs are afraid of losing any of their "talking privileges" they should study too or break out the old key. After all, thousands have a ball on c.w. If the ARRL wants us to work a little more it must be for a good reason and I as well as many others will whole-heartedly support you. — *KN7WLF*

☐ Comment from outside your country may or may not be welcome, but it is inevitable because of the profound effect your proposal will have on the future of amateur radio everywhere.

In my opinion, you are to be highly commended for taking this necessary decision and following it with firm action. By doing so, you have demonstrated real leadership.

Some of the criticism you have received has been childish, even hysterical. I think you can overlook this and remain confident that the broad, good sense that is characteristic of the American people as a whole will also come to the fore within the ranks of American amateurs. — *V7ISD*

☐ The officers and directors of the League are to be whole-heartedly commended and thanked for their courageous and forthright action in proposing a drastic upgrading of the American amateur radio technical-proficiency structures. Much of the nega-

(Continued on page 164)

Sale! MALLORY 12 VOLTS VIBRAPACKS: Puts out approx. 300 VDC @ 100 Ma. \$5.95.
MALLORY 6 V. VIBRAPACKS: Puts out approx. 300 VDC @ 100 Ma. \$4.95.
PRICE HEAVY DUTY RELAY: 115 VAC 3 P.S.T. (N. O.) 35 Amp. contacts. \$4.50.
10 HY. @ 75 MA. CHOKE: 2 lbs. 250 Ohms. Herm. sealed. 90¢.
CARDWELL TYPE TC-300 US VARIABLE CAPACITOR: 300 Mmf. 7000 VAC Peak Mycalex. \$8.75.
DK2-60B DOW-KEY COAXIAL TRANSFER SWITCH: Switches Power Amp. between exciter and antenna. 1 KW/standard UHF connectors/115 VAC. \$19.00.
KENYON UNIVERSAL MODULATION TRANSFORMER: Pri: 500 to 18,000 Ohms; Sec: 20 to 19,200 Ohms. 250 Watts of audio will modulate 500 Watts

R.F. Fully shielded. New. With specs. Kenyon type T-495, 21 lbs. \$10.95.
KENYON T-359 FILAMENT TRANSFORMER: Pri: 115 VAC @ 50/60 CPS; Sec: 7.5 V.C.T. @ 9 Amps. \$5.75.
KENYON T-369 DUAL FILAMENT TRANSFORMER: Pri: 115 VAC @ 50/60 CPS; Sec: #1 — 2.5 V.C.T. @ 8 Amps; Sec: #2 — 6.3 V.C.T. @ 4 Amps. \$3.95.
KENYON T-383: Pri: 115 VAC @ 60 CPS; Sec: 5.25 V.C.T. @ 21 Amps. (Secondary tapped at 5.1 and 5.0 volts). \$7.95.
KENYON FILTER CHOKE T-530: 10 Hy. @ 500 Ma. Orig. cartons. 31 lbs. \$14.95.
KENYON T-663 PLATE TRANSFORMER: Pri: 115 or 230 VAC. Sec: 2360-0-2360 VAC @ 500 Ma. 1CAS (350 Ma. CCS) Orig. Kenyon carton. 98 lbs. \$49.95.

ADDITIONAL ITEMS OF INTEREST AND ECONOMY . . .

MINI. VARIABLE CAPACITOR: 3 to 10 Mmf. W1/2" shaft. 29¢.
115 VAC BLOWER ASSEMBLY: 4 blade fan, 6" diam. Ideal for 4-400A's, etc. New. \$2.25.
PLATE XFMR: 1500-0-1500 VAC @ 350 Ma. Pri: 115 VAC @ 60 CPS. \$19.50.
ELDICO R-100 RECEIVER: \$295.00.
FRENCH TYPE CRADLE PHONE: Brand new, 19th Century reproduction. Ideal for Home or Office. Wonderful extension phone, just plug it and it's ready to operate. Black with Gold trim: \$49.00. All Gold: \$54.00.
"UG" COAX CONNECTOR SPECIALS: All brand new. UG-88B/11 @ 55¢; UG-290/U @ 50¢; UG-306/U @ 75¢.
TUNING-FORK GENERATOR: 400 or 500 CPS. Specially. \$7.50.
KW STEP-DOWN/ISOLATION XFMR: Pri: 220 VAC @ 50/60 CPS. Sec: 118 VAC @ 4.5 Amps. \$24.00
AIRCRAFT RANGE FILTER: Advanced version of the old familiar RL-8. Ideal for CW use. W/PL-55 plug & 3 ft. cable. Plug right into receiver without any rewiring. \$2.50.
25 AMP SILICON RECTIFIER: Rated at 50 to 75 PIV. \$1.75.
BINAURAL HEADPHONES: Receive two channels simultaneously. W/3 conductor standard plug & 7 1/2 ft. cord. Chamois earpads for comfort. \$9.88.
2 AMP. SILICON RECTIFIER: 2 Amps @ 700 PIV. Mounts with 10-32" screw. 60¢.
MALLORY INDUCTIONER: 3 Section. Tunes channel 2 to 13. W/data sheet. \$3.95.
RF CHOKE: 1 Mh. @ 600 Ma. Three for \$1.00.
RG-19A/U AMPHENOL COAX CABLE: Unused. 75¢ per ft.
DOW KEY COAX RELAY, Type DK60: 52 Ohms/1 KW/115 VAC. \$12.45.
DOW KEY COAX RELAY, Type DK60-G: \$13.70; DK60-2C \$14.35.
DOW KEY COAX SWITCH DKC-71: 52 Ohms/1 KW/SP-Six Throw/110 VAC. \$49.50.
DOW KEY IN LINE COAX BROADBAND PREAMP. DKC-RFB (1.5 thru 30 Mc.) \$10.75.
AMECO 1.8 to 54 Mcs NUVISTOR PREAMP (wired) \$24.95.
ZEUS 1 KW GAS GENERATOR: 115 VAC/60 CPS. \$148.13.

1 1/2 KW ZEUS. \$190.88; 3 KW ZEUS (115 or 230/60 CPS) \$431.25.
CAPACITOR SALE: .01 Mfd/5 KV \$1.00; 10 Mfd/1500 VDC G.E. Oil. \$2.50; 2 Mfd/7500 WVDC GE oil \$13.50; Pair of brackets for 2 Mfd 7500 VDC \$1.00; C.D. .5 Mfd @ 600 VDC 10¢; 8 Mfd/1500 VDC Oil. \$1.95; 4 Mfd/2KV oil \$2.95; 3000 Mfd/150 VDC \$2.95; 1500 Mfd/270 VDC surge \$2.95; 3800 Mfd/108 VDC \$2.50; 1700 Mfd/180 VDC \$2.25; 2000 Mfd/75 VDC \$1.75; 1250 Mfd/175 VDC \$1.00; 8000 Mfd/55 VDC \$2.95. 10 Mfd. @ 1500 VDC G.E. Oil Capacitor \$2.50. 3000 Mfd at 30 V.D.C. \$1.00.
LARGEST DIVERSIFIED TUBE STOCK IN USA! Unused, first-quality NAME BRANDS (G.E., RCA, Westinghouse, Eimac, etc.). Write or call for immediate quotes. Get all your tube needs at Barry's. Write for latest price list.
DRAKE 2B RECEIVER — \$279.95; Drake 2B-Q Speaker/Q Mult. \$39.95.
RME6900 Recvr and Matching Speaker — Write for special deal on this excellent SSB/CW/AM Recvr. S.S.B. DINNER AND HAMFEST — MARCH 24th — HOTEL STATLER-HILTON . . . INFO? W2JKN

COME IN AND BROWSE. MONDAY TO FRIDAY — Thousands of items that we cannot list in an ad. MON. TO FRI. 9 to 6. SATURDAY'S 10 to 2 P.M. (Free parking on Street Sat.) Mon. to Fri. parking lot 501 Broadway. **WE BUY AND SELL AND SWAP AS WELL . . . LET'S HEAR FROM YOU! WRITE FOR 1964 GREEN SHEET CATALOG NO. 12.**

DEPT. Q-3

BARRY ELECTRONICS
 512 BROADWAY, NEW YORK, N. Y. 10012
 WALKER 5-7000 (AREA CODE 212)

Enclosed is money order or check and my order. Prices FOB, NYC. Shipments over 20 lbs. will be shipped collect for shipping charges. Less than 20 lbs. include sufficient postage. Any overage will be refunded. Fragile tubes shipped via Railway Express.

Send for New 64 page greensheet catalogue No. 12

Send information.....

I have available for trade in the following.....

.....

Name..... Title

Company.....

Address.....

City..... State.....

FACTORY AUTHORIZED SERVICE
 ON RECEIVERS AND TRANSMITTERS

REPAIRS, modernization, calibration and alignment by competent engineers using factory standard instruments. Collins, Globe, Hallicrafters, Hammarlund, Harvey-Wells, National Co. Service representative for Hickok and RCA Test Equipment. Factory parts. All work guaranteed. Our twenty-seventh year

DOUGLAS INSTRUMENT LABORATORY
 176 Norfolk Avenue Boston 19, Mass

CALL-LETTER SIGNS

W8IYK

Price \$1.50 postpaid

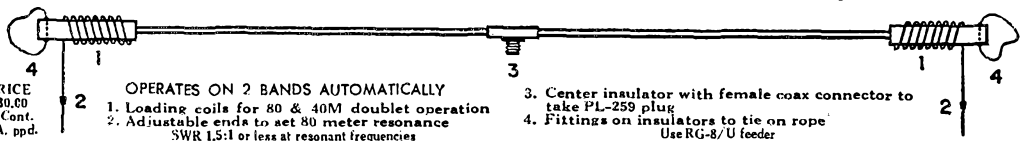
NEW PRODUCTS • Box 481 Dept. A • Grand Haven, Mich

ORDER your call in neat 2-inch die cut letters with base. Just right for the shack. You assemble - Letters: 3/32" silver solder card stock. Base: satin finish black plastic.

LRL-70 ANTENNA

70' LONG, 80 & 40 M

Power rating 2 Kw. P.E.P. or over



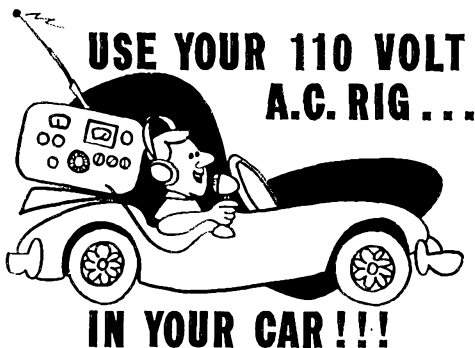
PRICE \$30.00 in Cont. USA. ppd.

OPERATES ON 2 BANDS AUTOMATICALLY

LATTIN RADIO LABORATORIES

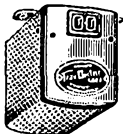
Box 44

Owensboro, Kentucky



WITH A
TERADO POWER INVERTER!

Plenty of A.C. Power for your A.C. Transmitter and Receiver is available from your car, boat or plane battery. Just add a Terado inverter to change the 12 volt direct current to 110 volt, 60 cycle alternating current, stable within 1/2 cycle, in spite of changing input or load. Also operates tape recorders, signal generators, grid dippers, tube testers, etc. Models from 15 to 600 watts, both vibrator and transistor types.



See your electronic parts jobber, or write:

terado CORPORATION
1061 Raymond Avenue, St. Paul, Minn. 55108
In Canada, Atlas Radio Corp., Ltd., Toronto, Ont.

**DOW-KEY
DK60
SERIES
COAXIAL
RELAYS**



Size
2 1/4 x 3 1/4 x 1 1/4
Less than 9 oz.
DK60-G2C

4 Standard Models, AC or DC,
UHF, N, BNC, TNC or C Conn.

Outstanding favorite for amateurs . . . Versatile combinations for industrial! Low VSWR less than 1.15:1 from 0 to 500 mc. LOW LOSSES . . . High Contact Pressures. LOW CROSS-TALK through use of patented "isolated connector" arrangement. HIGH POWER RATING. All coils encapsulated in epoxy resin for quieter operation and resistance to moisture.

- ★ UNCONDITIONAL GUARANTEE for one year. (We will repair if faulty within 1 year.)
- ★ See one of our 700 dealers and distributors in U. S. and Canada for catalog sheets or write:
- ★ All Relays available in weather-proof boxes for exterior installation
- ★ Ganged, multiple position switch arrangement available for remote control selection of antennas.

STANDARD RELAYS: DK60, DK60-G, DK60-2C and DK60-G2C —
PRICED FROM . . . \$12.45

DOW-KEY CO., Thief River Falls, Minn.

tive criticism of this action has been misinformed, emotional or apparently based on purely selfish motives. It is unfortunate that some of the influential "leaders" in amateur radio have, for purposes difficult to comprehend, joined in the outcry against this utterly necessary action for amateur radio preservation. The League needs and pre-eminently deserves, the support of all radio amateurs in getting favorable consideration of the upgrading program from the FCC. I hope that, as the League proposal becomes better understood through the efforts of QST and through judicious discussions on the air, support for the proposal will become more nearly universal among our ranks. In the meantime, let's read and re-read the careful, dispassionate discussion of the League program presented by our President (W6ZH) in the January issue of QST. It would be difficult for any fair-minded amateur radio operator to fail to respond with positive enthusiasm and complete approval toward our technical upgrading after reading W6ZH's analysis of amateur radio "privileges" and what we must do to have a fair chance of preserving them. — W6WXC

After careful consideration of your recent incentive licensing proposal it is my considered opinion that you, a small despotic group, have over-stepped your vested authority and made this proposal without the consent of at least one-half of the League membership. Your feeble attempt to cover up not offering a referendum to the membership was childish and immature. I would like to see this proposal offered to the League in the form of a vote, if it is passed by a majority vote, then I am all for it, if not, then let's forget it.

I personally worked and studied like a Trojan to earn my ticket but I haven't the slightest interest in moving to a higher class license. Please, gentlemen, I ask you to cease and desist. — W14RYN

I have yet to meet a person who didn't have 20-20 hindsight. As is so often the case, once you do something you find ever so many who can tell you with great conviction how you should have done it. I place myself in the latter class and say that I feel the mistake, if it is that, lies in taking a mechanical matter like "incentive" licensing and offering it as the starting point for a reformation of ham radio. — W30B

Keep up the good work. I very much favor the incentive licensing system you are advocating. It is not true that frequencies are being taken away from anybody since anybody interested in staying on the air can do so with just a little study. I would be embarrassed to admit that an easy exam kept me off the air because it would show that I really was not interested in amateur radio. — W8HXC

I think that it is time for all ARRL members to stand up and voice their opinions about the recently introduced idea of incentive licensing. While the vast majority of the members do not take the time to write and assert their positions on such matters, a few obviously ignorant and perhaps selfish amateurs try to destroy a very sound and well meant program designed by our intelligent and respected leaders.

I have read all the letters published in your column in the past few months, and I have yet to hear one good reason against incentive licensing. Also, I have talked to several people on the subject, with very enlightening results. First, it is apparent that almost all amateurs are in favor of incentive licensing. Secondly, most of those who are in favor of

(Continued on page 166)

NOW

EXCLUSIVE 66 FOOT **MOR-GAIN** 75 THRU 10 METER DIPOLE
NO TRAPS — NO COILS — NO STUBS — NO CAPACITORS

NEW MODELS

Fully Air Tested — Thousands Already in Use



40% Copper Clad wire—Under three lbs. Air Weight—Rated for full legal power—AM/CW or SB—Coaxial or Balanced 50-75 ohm feed—VSWR under 1.5 to 1 at most heights—Rust resistant hardware—Drop-proof insulators. Completely assembled, ready to put up. Model 75/40 Amateur Net \$23.80. Terrific Performance—No coils or traps to break down or change under weather conditions—Fully Guaranteed.

MODEL 75-10.....\$40.00 • 66 FEET LONG
MODEL 160-10.....\$45.00 • 133 FEET LONG
MODEL 160/75.....\$33.00 • 133 FEET LONG

MODEL 40/20.....\$17.00 • 36 FEET LONG
MODEL 80/40CW.....\$23.80 • 69 FEET LONG
VERTICALS 75-10.....\$59.50 • 33 FEET LONG

ORDER DIRECT OR WRITE FOR FULL INFORMATION

MOR-GAIN

P.O. Box 6006
Alexandria, Virginia 22306

OR THRU YOUR FAVORITE DISTRIBUTOR

Phones: Days 301-743-3334; Nights 703-780-2171

LET W3KT FORWARD YOUR DX QSLs

QSLs forwarded promptly to foreign QSL Bureaus, QSL Managers, or, if necessary, direct to DX station.

THREE CENTS EACH OR 36 PER DOLLAR
FIRST CLASS MAIL • NO MEMBERSHIP FEE
SAVE TIME! SAVE MONEY!

W3KT QSL SERVICE

Box 204 Chalfont, Pennsylvania 18914

EVERLITE*

World's THRIFTIEST Light Plants



NEW TRANSISTOR ALTERNATOR REPLACES GENERATOR

Now a Service Free Light Plant built with a transistorized alternator. Offers 30% greater efficiency — more power for less fuel. Terrific service life — no brushes to arc and burn. No more commutator to wear, no collector ring trouble. And best of all it costs no more to 'go modern with Everlite.' Thrifty 1200 watt, 115v. AC plant powered by a rugged easy starting 4 cycle engine — leader priced Model 869-12T. Wt. 65 lbs. as illustrated. **179.50**

* Trade-Mark Registered

f.o.b. factory

All sizes available — can finance. Write for catalog. Special models for public utilities — Approved for Civil Defense. Write

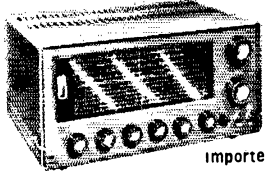
MASTER MECHANIC MFG. CO., Dept. 1-364 Burlington, Wis.

Southern Customers write Dept. 1-364, Box 65, Sarasota, Florida

LAFAYETTE RADIO ELECTRONICS

THE CHOICE OF VALUE-CONSCIOUS AMATEURS THE WORLD OVER

DELUXE 8-TUBE COMMUNICATIONS RECEIVER MODEL HE-30



7995
\$5 MONTHLY
On Easy Pay Plan

- Tunes 550 KCS to 30 MCS in Four Bands
- Built-In Q-Multiplier for Crowded Phone Operation
- Calibrated Electrical Bandspread
- Superheterodyne Circuit
- Stable Oscillator and BFO for Clear CW and SSB Reception
- Built-in Edgewise S-Meter

Sensitivity is 1.0 microvolt for 10 db. Signal to Noise ratio. Selectivity is ± 0.8 KCS at — 65db with Q-MULTIPLIER. Available in a semi-kit version with all major components premounted. Model KT-320 — only 64.95 Complete

PROFESSIONAL-QUALITY 14-TUBE COMMUNICATIONS RECEIVER MODEL HE-80



12950
\$7 MONTHLY
on Easy Pay Plan

- Dual Conversion on 6 Meters
- 5-Bands: 550KC-54MC
- Product Detector Circuit for Improved SSB Reception
- Separate BFO and Q-Multiplier Circuits (can be used simultaneously)
- Crystal Calibrator
- Efficient Superheterodyne Circuit
- Effective Automatic Noise Limiter
- Voltage Regulated Power Supply

Features outstanding sensitivity, Q-Multiplier selectivity and electrical bandspread, makes a handsome addition to your ham shack. Calibration crystal is sold optionally.

LAFAYETTE MAIL ORDER & L. I. SALES CENTER

111 Jericho Turnpike, Syosset, L. I., N. Y.

OTHER LOCATIONS

- Jamaica, N. Y.
- Scarsdale, N. Y.
- New York, N. Y.
- Bronx, N. Y.
- Natick, Mass.
- Newark, N. J.
- Plainfield, N. J.
- Paramus, N. Y.
- Boston, Mass.

Free!

Send for Big New 422 page 1964 Catalog

LAFAYETTE RADIO ELECTRONICS

Dept. VC-4 P.O. BOX 10
SYOSSET L. I., N. Y. 11791

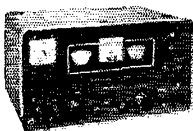
- Please send me new 1964 Catalog 640
- Ship Stock No. \$..... enclosed.

NAME

ADDRESS

CITY ZONE STATE

NOW! FOR SSB



HQ-180A—New features on popular HQ-180 include improved mechanical and electrical stability; variable BFO for CW and AM—fixed BFO for optimum SSB reception! Triple conversion, 17 tube superheterodyne circuit. Offers general coverage versatility (540 KC to 30 MC) with unequalled amateur bandspread!

HQ-180A.....Net \$439.00



HQ-170-A—The really "hot" receiver for SSB—provides 10 db signal-to-noise ratio at 1.5 microvolts AM or approximately .5 microvolts CW. Triple conversion. Full dial coverage of 6,10,15,20,40,80,160 meter bands plus 2-meter calibration. Offers endless combination of tuning techniques for optimum reception of SSB/CW and AM/MCW.

HQ-170-A.....Net \$369.00

Write for fully illustrated brochure!

WRITE OR CALL: BILL BRURING

W9ZSO

COMMUNICATIONS EQPT. CO.
518 STATE ST., LA CROSSE, WISCONSIN

CQ de W2KUU

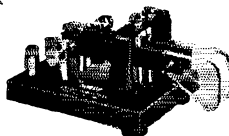
\$500.00

Paid For

51X RECEIVERS 17L TRANSMITTERS

Equally good prices for: ARC14 ARC38 ARC44 ARC52 ARN14 SG1 SG14 SG66 ID249 ID250 ID251 ID451 ID387 R490 H14 Tektronix 535 545 HP608 624 and 618S transceivers. Any Collins Radio unit. Also FRR, GRC, PRC, URR units and all test sets for aircraft or ground service Ship Air Freight subject to your approval to

TED DAMES CO., 308 HICKORY ST., ARLINGTON, N. J.



NEW!

THE IMPROVED NIKEY

Now with ball bearing pivots. The only key especially designed for use with all types of Electronic Keyers. Independent Dot-and-Dash. Levers make your fist sound "Truly Automatic" Standard Model \$17.95, Deluxe Model \$19.95. Check or Money Order.

THE PRODUCTIVE TOOL & MFG. CO., INC.
9 Market Street Stamford, Conn.

Kreco ANTENNAS

All Aluminum

3db GAIN

2 ELEMENT
CO-LINEAR ARRAY

LIGHT • STRONG

2 METERS	MODEL	CP-2A	24.00 net
6 METERS	MODEL	CP-6A	48.00 net
10 METERS	MODEL	CP-10A	57.00 net

The following models are cut to exact frequency

30 to 50 MC	MODEL	CP-30A	57.00 net
50 to 100 MC	MODEL	CP-30A	48.00 net
100 to 470 MC	MODEL	CP-150A	24.00 net

ALL BRASS AND HEAVY DUTY MODELS AVAILABLE

ASK YOUR DISTRIBUTOR OR WRITE

HERB KRECKMAN CO. • CRESCO, PA.

it have never written in and said so. So, in answer to those who complain about not being polled for their opinion, I say "go ahead." I think there would be some very surprised people if such a move were carried out! — Bobby Kennedy, Marshall, Missouri

☐ I am rejoicing because of your stand on incentive licensing. I had pretty much lost interest in ham radio due to its degeneration into a bunch of clunks with store-bought outfits who talk for hours about nothing with no attention to proper emission. Perhaps there is now some hope that the hobby will again become a means of providing public service and individual betterment. — W7PUY

The World Above 50 Mc.

(Continued from page 88)

Indiana, Wisconsin, Michigan and Ohio, so those of you who are "thinking about it" in those areas can now be sure that you'll have company on 144 Mc. s.s.b. when you get there. K8YWF at Tiffin, Ohio sez that 144 was not too good during December, although he did work K8IYT in Linden, Michigan on the 4th. K8ZES, also in Ohio, reports conditions fair to poor for December with minor openings into central Michigan. "No spectacular conditions or aurora noted although consistent contact with 100-watt stations in Detroit was no problem at any time." Sid also notes that there are about 9 active two-meter stations in Galion with a local net being held each Wednesday at 2000 EST.

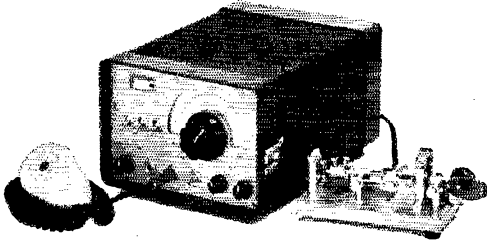
A couple of months ago we mistakenly listed W8KAY in the two-meter "box" as having worked 40 states on 144 Mc. Art, W8KAY, wrote to us to have the error corrected and pointed out that Jack Woodruff, W8PT at Benton Harbor, Michigan is the first W8 to have worked 40 states on 144 Mc. Our apologies to Jack for the error and also apologies and thanks to Art for the correction. Meanwhile—back at the farm—W8PT worked K4LXC on December 8 and December 22. The QSO of December 22 had several long bursts, allowing arrangement of other skeds and talk about 432 Mc. Also on December 14 Jack worked K5TQP in New Mexico during the Geminids for state #40. At Saginaw W8FZ tells us that about six locals are in the process of converting cab f.m. sets to 146.940 Mc. The group is converting the f.m. sets so that they can get in touch with each other without a lot of listening. Like a great many of the v.h.f.ers they have the habit of working around the shack and forget to tune. Would be nice to be able to set the receiver on a frequency and know that someone will alert the gang if unusual conditions show up.

Regular two-meter report received from Al Olecott, K7ICW, sez that he had a near-miss with W0ENC, South Dakota, during the Geminids. Bob's receiver drifted and he lost Al at the critical moment. Signals were in on the 11th, 12th, 13th and 14th according to Al, with the 14th being the peak. Tropo-scatter signals were better during December to southern California with one one-way s.s.b. QSO with W6NLZ, and a e.w. QSO with K6LZC on December 22. Another 7, but this one from Portland, Oregon, K7SJK, reports working K7JZP and W7VHX on January 5. K7JZP was on 144.12 Mc. and had a 559 signal (S4 on f.m.); W7VHX was on 144.05 Mc. with a 569 signal. Ron also heard W7LHL, whose signal was S9 on s.s.b.

From Albuquerque, New Mexico, W5FPB sends

(Continued on page 168)

THE VERSATILE



Li'l Lulu

COMPLETE 50 MC. TRANSMITTER

"INSTANTUNE"

The only single-knob VFO
ganged-tuned 50 Mc. transmitter
commercially available.

Be able to QSY instantly!

Price **\$225** through your dealer.

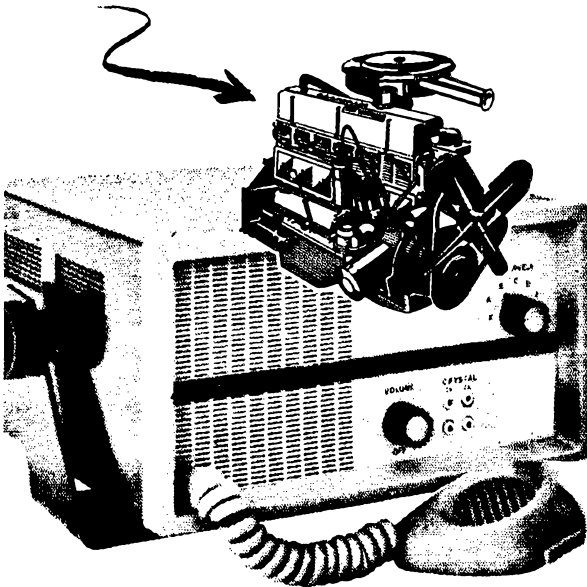
DESIGNED

BY

F. E. LADD, W2IDZ

WHIPPANY LABORATORIES, Inc. • 1275 Bloomfield Ave., West Caldwell, N.J.

Is this what you are hearing?



HALLETT NOISE KNOW-HOW SINCE 1916

Stop ignition noise with HALLETT 25000 Series and 27000 Series Signal Saver — the only shielding system approved and installed by automotive, marine and industrial engine manufacturers. The **ONLY** system with exclusive aircraft reliability design and features.

- OPTIMUM MECHANICAL PERFORMANCE
- COMPLETE IGNITION NOISE ELIMINATION
- WATERPROOFS ENTIRE SYSTEM

Every HALLETT system is pre-assembled and hi-voltage tested to insure electrical continuity and reliability. No tailoring — no trimming — snaps in place.

See your communications service center — automotive dealer or write HALLETT advising engine, make, year model and cubic inch displacement. Prices. 46.30 to 68.50 dependent on engine model.

Warranted and Guaranteed by Hallett to provide the ultimate in communications and mechanical performance.

HALLETT MANUFACTURING CO.

5910 Bowcroft Street, Los Angeles 16, California

Send complete literature including alternator-generator-regulator shielding.

ENGINE MAKE MODEL YEAR

CUBIC INCH DISPLACEMENT

NAME

STREET ADDRESS

CITY

ZONE

STATE

"Your Friendly Supplier"

OFFERS

**THE LARGEST INVENTORY
of USED EQUIPMENT in the
NORTHEAST. SEE SAMPLES BELOW.**

Collins 32V1	\$189.95
" 310B-1	99.95
" NEW 755-2 Display unit. Reg. 600.00	520.00
Hallcrafters S-53	39.95
" S-53A	44.95
" SX-96	144.95
" SX-101 Mk 1A	239.95
" SX-101 Mk III	259.95
" SX-101A	294.95
Hammarlund HQ-160	249.00
" PRO-310	299.00
Johnson Invader	479.00
" Invader-2000	849.00
" Navigator	119.95
" Challenger	89.95

"MARCH SPECIAL"

Hammarlund HQ-110C	\$184.95
National NC-98	84.95

WRITE FOR LATEST COMPLETE LIST

Evans RADIO

P.O. BOX 312 FONE 603-22-53358 CONCORD, N. H.

TRANSTENNA 102A

A PRESELECTION SECOND TO NONE AND A T-R SWITCH BEYOND COMPARISON

Pat. Pndg. U.S.A. & Canada

MODEL 102A

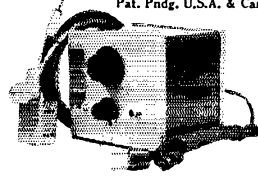
\$69.45 (Add \$7 for Sidetone)
15 DAY TRIAL

Return For Full Refund If
You Burn It Out Or Are
Not **FULLY PLEASED**

- Std. coax coupler (antenna feedline)
- No TVI or Suck out
- 30 DB Min. Gain (10-80 mtrs)
- No Effect on Transmission
- Monitored switching
- Full Legal Input
- Burnout Proof
- CW Sidetone (optional)

Write for Free Literature

33 Myrtle Avenue, Cedar Grove, N. J.
Tel: CEter 9-6412



IMPROVEMENTS

Muting circuit breaks between dots and dashes. Through operating positions for unity gain on all frequencies.

102B \$59.00 (excludes rear muting)

FICHTER ELECTRONICS

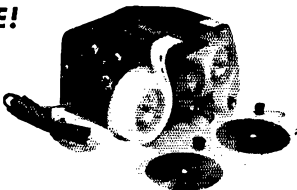
LEARN CODE!

SPEED UP Your RECEIVING

with G-C
Automatic Sender

Type S

\$32.00 Postpaid in U. S. A.



Housed in Aluminum Case. Black Instrument Finished. Small—Compact—Quiet induction type motor. 110 Volts—60 Cycles A.C.

Adjustable speed control, maintains constant speed at any setting. Complete with ten rolls of double perforated tape. A wide variety of other practice tapes available at 50¢ per roll.

GARDINER & COMPANY

STRATFORD

NEW JERSEY

along the following: WA5ETF has a 40' tower for his Finco 6 & 2 stacked turnstiles; W5LTR has a new antenna consisting of four 10-element beams up about 35' and puts out quite a signal; WA5CWS has his teletype operating on 144 Mc., and several others are working on their units; and during November and December there was a total of seven net meetings on 145.44 Mc. with a total of 14 stations checking in from once to seven times.

W5UKQ from Baton Rouge sez: "I had five schedules for the Quadrants M/S (January 1-4) and the one that really paid off was with WA0DZII in Marion, Iowa. We were both s.s.b. and the 'Blurb' and 'Fuggb' which came from my speaker are just a sample of what it sounded like. Wonder if this is the first s.s.b. contact via Meteor Skip?" (Sorry John, afraid not. But many congratulations anyway, as it is one more step forward on the higher frequencies.)

An interesting letter from Paul, W4HHK, who sez: "While in contact with K4CLE at Charlotte, Tennessee this morning (Jan. 21) on two meters, he reported receiving a delayed signal from me for a brief period of time. He heard each word I said twice — the original and the 'echo' a fraction of a second later. This occurred about 1545 GMT. Path distance is approximately 175 miles and my antenna heading was about 060 degrees true. I was using the kw. s.s.b. rig. We have kept many skeds, but have never observed this before. A delay of even 1/2 second would be a lot of miles. Could it have been reflection from a high flying aircraft, satellite, etc.?" Any ideas, anyone?

At Wilmington, Delaware, K30BU completed his meteor sked with K4IXC in Florida on January 4. As Joe sez, it was only his 3rd sked and his first complete QSO via M/S on 144 Mc. Joe runs 150 watts input to a six-over-six beam and K4IXC was running a kw. to 15 elements. Skeds with W9IFA at Carrollton, Illinois, have not as yet paid off, although many bursts were heard from George. None long enough to exchange contact information.

K3CFA in Pennsylvania had two new contacts on 144 Mc. e.w. during December, W3OMY and WA2STX. Joel sez that conditions on December 16 represented a fair opening to the north from his location. At Staten Island WA2OUM has been using a window-mounted conical TV antenna on two meters. Uncut to the band but Ed has been able to work Massachusetts twice and regularly works into Connecticut with that and a Twoer. WB2GKF at Clifton, New Jersey expects to have his two-meter kw. on the air by this time. When that project is complete he'll be starting a two-meter s.s.b. rig.

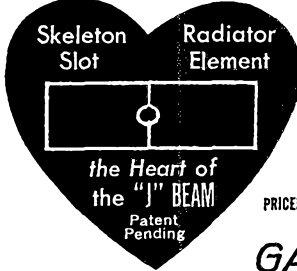
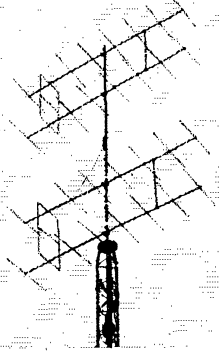
50 Mc.

50-Mc. operators will be interested to know that Mike Gauthier, K6ICS, has applied for reissue of the call of NEØICS. If the license is granted, Mike will be operating with that call on six meters (conditions permitting) on March 14, 15, 21, 27, 28 and 29, both a.m. and e.w. Keep your fingers crossed and maybe conditions will be right and you'll work him.

Sporadic E during December was fairly good throughout the country. From Iowa we received skip reports from W0DRE (Newton), W0PFP (Ames), and K0PCI (Des Moines). All three of the boys heard or worked stations in Florida, Alabama, Louisiana, Texas, North Carolina and Georgia between December 13 and 17. John, W0DRE, also heard stations in Arizona, Colorado and Nevada plus YV5PVP at 0430 GMT on the 14th. He gave

(Continued on page 170)

What will the "J" Beam do for YOU? ...Ask the man who operates with one!



Dual Feed—Perfectly Phased—Radiator Element Fashioned on Wave Guide Principles—Broad-Band The "J" Beam will increase your DX and make contacts more pleasurable! Ups "talk power" and gives you that "velvet smooth operation!" S.W.R. of less than 1.5 to 1 across entire band. You're never tied down to one frequency. Offers concentrated gains on short booms. "Add-on" modular design. Heavy duty WORRY FREE construction rivals commercial standards. Ideal for CD Nets, MARS, RTTY, TV Transmission.

PRICED LOW AS \$18.95—for 300 ohm Models. 52 ohm with Balun slightly higher
Write for Technical Bulletin A...FREE!

GAIN, INC. 1209 West 74th Street
Chicago 36, Illinois PHONE 874-2610

CQ de W2KUW

We will pay for every good
304TL \$10.00

Sent to us before June 30, 1964

Other large transmitting tubes & equipment also needed.
ARC-GRC-PRC-MN-TS-UR. 51J-V-X-Y-388-390, 17L.

TED DAMES CO. • 308 Hickory St., Arlington, N.J.

TV CAMERA

We have the lowest prices and complete stock of all components for making your own Ham TV or closed circuit TV camera plus exclusive VANGUARD printed circuits and incredibly low prices on P1.9 lens with focusing mounts. Complete ready-to-operate cameras also available at the lowest prices you'll ever find. For more information, price list, and photos, send 10c coin or stamps.

VANGUARD ELECTRONIC LABS
190-48-99th Ave.

Dept. S-3
Hollis, N. Y. 11423



STORAGE BATTERIES

For all applications requiring a steady, dependable power source. Over 200 quality built sizes available for portable, emergency or station use.

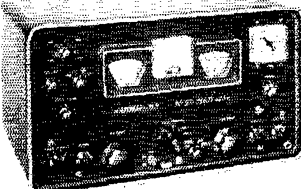
Let us know what you need.

WISCO

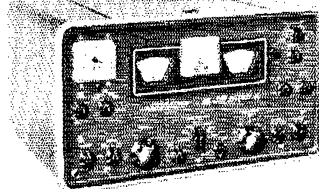
1222 — 18th Street
RACINE, WIS. 53403



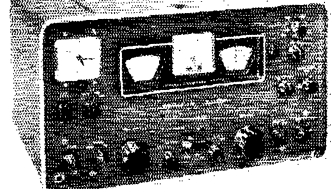
MAKE NEWARK YOUR HEADQUARTERS FOR ALL HAMMARLUND GEAR



HAMMARLUND
HQ-145X Receiver \$279.00



HAMMARLUND
HQ-170A Receiver \$369.00



HAMMARLUND
HQ-180A Receiver \$439.00

FREE! Send for the World's Largest Electronic Catalog—628 Pages

Write—Call or visit our Ham Shack for personal friendly service.

- Complete Stocks
- Best trade-in Allowances
- Lowest Prices

NEWARK ELECTRONICS CORPORATION DEPT. T-2
223 W. MADISON ST. • CHICAGO, ILLINOIS 60606

- Send FREE 628 page 1964 Catalog
 Send Current Used Equipment Listings

Name _____

Address _____

City _____ State _____ Code _____

NEWARK
ELECTRONICS CORPORATION

our
43rd
year

MOTOROLA FM MOBILE EQUIPMENT

SALES LIMITED TO AMATEURS ONLY

FMTR-41V 12 watt 30-50 Mc 12 volt.....	\$39.95
FMTR-80D 30 watt 30-50 Mc 6 volt.....	34.50
FMTR-80D 30 watt 30-50 Mc 12 volt.....	44.95
FMTR-140D 60 watt 30-50 Mc 6 volt.....	39.50
FMTR-140D 60 watt 30-50 Mc 12 volt.....	49.95
FMTRU-80D 30 watt 150-160 Mc 6 volt....	44.50
FMTRU-80D 30 watt 150-160 Mc 12 volt..	52.50
15 in. case for 80D & 140D units.....	2.50
10 in. case for 41V.....	4.00

DRAWER UNITS ONLY — NO ACCESSORIES AVAILABLE F.O.B. Boston

If you are not satisfied, you may return any purchase prepaid for full refund within 10 days

FM SALES COMPANY

1100 TREMONT STREET

BOSTON 20, MASS.

CANADIANS! We have large stocks of nationally advertised Ham parts. Write for Free Bulletin.

THE CRAWFORD RADIO

P. O. BOX 617

VE3YR 119-121 JOHN ST., N. VE3JU
"Geo" HAMILTON, ONT. "Bill"



COMING SOON! 6 AND 2 METER

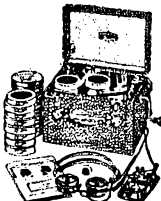
75 Watt Phone-CW Transmitter
Complete with Built-in Power Supply

AMECO EQUIPMENT CORP.
178 Herricks Rd., Mineola, L. I., N. Y.

\$149.95

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 5 to 40 WPM. Always ready. No QRM. Beats having someone send to you.



ENDORSED BY THOUSANDS!

The **Instructograph Code Teacher** literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the **Instructograph System**. Write today for full particulars and convenient rental plans.

INSTRUCTOGRAPH COMPANY

4709 SHERIDAN ROAD, CHICAGO 40, ILLINOIS
4700 S. Crenshaw Blvd., Los Angeles 43, Calif.

the YV5 several calls but no dice. Jim, W0PFP added a few different states to the heard/worked list of this period, the states being Mississippi, Kentucky, Tennessee and South Carolina. Mississippi and Kentucky added two new states to Jim's ever-growing 2-way s.s.b. list. At Des Moines Jim, K0PCI, added a few more states to the list when he worked West Virginia, Virginia, Maryland and Pennsylvania during the December 13 to 17 period. W0BMN at Council Bluffs sez that many new stations are showing up on 50 Mc., and s.s.b. activity is growing. And in Des Moines WA0BRU wonders if anyone else is operational at 52.5 Mc. Report from Prairie Village, Kansas, via WA0DZI notes December 6 as being a good day when he heard Missouri, Kansas and North Dakota. Ray also heard Colorado, South and North Carolina, Georgia and Virginia on about the 15th of the month. W0BVV worked Texas and the East Coast on the 14th.

Missouri reports skip through K0FPC, K0JWN, WA0FLL and WA0CHD. These boys report openings from December 13 through the 16th with the 15th being best of 'em all. Bob, K0FPC, reports hearing/working 1s, 2s, 3s, 4s and 8s on the 15th and sez that K4HZS was loud and clear above 52 Mc. K0JWN was hearing 2s in New York and New Jersey, 4s in Virginia and North Carolina, and 8s in Ohio on the same date. At Kansas City (Mo.) WA0FLL heard all call areas except 6 and 7 (same date); and WA0CHD at Pleasant Hill, Mo., heard 2, 3, 4, 5, 8, and 0 lands including 13 states. This particular opening was a great surprise to Bob, WA0FLL, 'cause as everyone knows, when you want to show off the rig and the shack the band is always dead: He did have a house full of visitors, he did turn on the rig, he did find the band open, and is still trying to remember whatever happened to those visitors. He sure didn't tell 'em goodbye.

At Lincoln, Nebraska K00UL notes that six has been rather quiet for the last few months but did open up several times between December 13 and 20. Out in Chicago WA9HSZ and WA9EOQ agree that the period from December 13 through the 16th was very good for skip with the 15th being best. Both of the boys heard 3, 4, and 5 lands, but Alex (WA9HSZ) heard 0s also and Ed (WA9EOQ) heard 2s instead of the 0s. WA9FIH at Cicero goes along with the boys that best period of December for skip was dates they have specified and best date the same (15) when 3s, 4s and 5s were getting into Cicero. December 13, 14 and 15 were the days noted by Dick, K9FNB, who sez: "On the 15th I worked many stations along the East Coast. The band was really crowded and copy was rough from heavy QRM. This was the best opening in months!"

WA9AEN worked into Texas and Louisiana during the good December period and WA9FXX reports hearing KH6 — on the 16th with his G50 and 8 elements. K8RKY and W8DOM in Ohio report same dates good in Ohio for skip and they were working into Indiana, Texas, Alabama and Arizona on the 15th. (Best day again.)

At Dayton, Ohio K8REG sez: "I would like someone in South America to run skeds with me in March."
(Continued on page 172)

WATSURBID? If your PRICE IS RIGHT we will ship or return deposit* if not acceptable. No Trades.

TR-3 • NGX-3 • SR-150/160 • SBE-33

SW-240, etc.

* 10% of your total bid. Bal. C.O.D.

WILLARD S. WILSON Inc. (Est. 1920)

403-405 Delaware Ave., Wilmington, Delaware
Willard W3DQ QCWA VVOWA



FORT ORANGE

Radio Distributing Co., Inc.

904 BROADWAY ALBANY 7 N. Y. U. S. A.
AMATEUR HEADQUARTERS

Cable Address "Uncledave" CALL ALBANY 518-436-8411 NITES 518-477-5891

INVENTORY IS COMPLETED - WE'RE OVERSTOCKED

SO PLEASE HELP US OUT - ONLY ONE OF A KIND

USED EQUIPMENT	USED EQUIPMENT	CLOSE-OUTS AND NEW DEMONSTRATORS
RME VHF1 52..... \$150.00	KNIGHT R100 RECEIVER..... \$79.50	COLLINS KWM2..... \$1000.00
RME DB23..... 17.50	AMECO CB-6 CONVERTER... 19.50	DRAKE 2B..... 245.00
RME CLIPPER..... 9.50	HARVEY WELLS VPST90 P/S... 39.50	EICO 710 G.D.O..... 42.50
NATIONAL NC300..... 175.00	HALLICRAFTERS HT33..... 249.50	GONSET G50..... 325.00
JOHNSON RANGER II..... 275.00	HALLICRAFTERS HA1..... 49.50	GONSET 3357 VFO..... 74.50
COLLINS KWMI..... 375.00	HALLICRAFTERS HT40 XMTR.. 74.50	HAMMARLUND HX50..... 419.50
COLLINS AC SUPPLY..... 75.00	HALLICRAFTERS SX140 REC... 84.50	MOSLEY CM-1 RECEIVER... 175.00
COLLINS SPEAKER..... 15.00	HALLIC. SX101A (Like New)... 295.00	RME DB23..... 39.95
COLLINS MP-1 P/S..... 150.00	HEATH AR3 REC..... 19.95	CLEGG THOR6..... 319.50
HAMMARLUND HQ170..... 275.00	HEATH AT-1 XMTR..... 19.95	NATIONAL NC60..... 52.50
HAMMARLUND S200..... 15.00	HEATH TX-1 XMTR..... 179.50	SIDEBAND ENGINEERS SB33.. 329.50
HAMMARLUND HQ100AC... 164.50	GONSET 6 METER LINEAR.... 89.50	HALLICRAFTERS HT37..... 419.50
HAMMARLUND S100..... 9.50	GONSET G76 W/AC..... 379.50	HALLICRAFTERS HT41..... 339.50
GLOBE SCOUT DELUXE.... 94.50	OR DC P/S..... 219.50	HALLICRAFTERS HA5..... 69.95
GLOBE DSB100 KIT..... 49.50	GONSET 3133 (2 Mirr. Comm.) 219.50	JOHNSON VALIANT I KIT... 275.00
GLOBE CHIEF 90 W/Mod... 27.50		JOHNSON VALIANT II KIT... 315.00
B&W 5100 TRANSMITTER... 175.00		JOHNSON RANGER II KIT... 210.00
EICO 720 TRANSMITTER... 74.50		JOHNSON 55B CONVERTER.. 295.00
LAKESHORE II PHASEMASTER. 139.50		
CENTRAL-ELECTRONICS 20A.. 149.50		

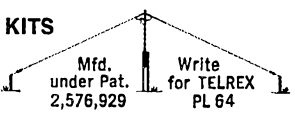


Telrex "BALUN" FED INVERTED "V" ANTENNA KITS

SIMPLE-TO-INSTALL, HI-PERFORMANCE ANTENNA SYSTEMS:

- 1 KW P.E.P. Mono-Band Kit... 1KMB1V/81K... \$14.95*
- 2 KW P.E.P. Mono-Band Kit... 2KMB1V/81K... \$18.95*

*Kit comprises, encapsulated, "Balun," copperweld, insulators, plus installation and adjustment instructions for any Mono-band 80 thru 10 Meters. Also available 2, 3, 4, 5 Band Models.



TELREX LABORATORIES
ASBURY PARK, NEW JERSEY

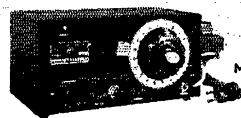


YOU CAN EARN EXTRA INCOME

This free booklet tells you how!

Just like hundreds of other hams... you can use your radio knowledge to earn thousands of dollars! Commercial mobile-radio communications are booming! These stations need competent, continuous service, and pay good money!

THIS FREE BOOKLET TELLS HOW YOU CAN START YOUR OWN BUSINESS IN THIS LUCRATIVE FIELD! SEND FOR IT TODAY!



LAMPKIN 105-B FREQUENCY METER. RANGE 0.1 TO 175 MC AND UP. PRICE \$260.00 NET.



LAMPKIN 205-A FM MODULATION METER. RANGE 25 TO 500 MC. PRICE \$270.00 NET.

THE PREFERRED MOBILE-MAINTENANCE METERS

MAIL COUPON TODAY!

LAMPKIN LABORATORIES, INC. MFG. DIVISION, BRADENTON, FLORIDA
AT NO OBLIGATION TO ME, PLEASE SEND ME "HOW TO MAKE MONEY IN MOBILE-RADIO MAINTENANCE"—and data on Lampkin Meters.

NAME _____
ADDRESS _____
CITY _____ STATE _____

LAMPKIN LABORATORIES, INC. Bradenton Florida



Teleset Headset delivers
Marginal Signals
with **Maximum**
Intelligibility

Here is the new quality headset designed by Telex to meet the special requirements of Ham operation. Same top performance magnetic driver element used in the more expensive Magna-Twin Mark III. Ruggedly constructed, yet lightweight—only 8 oz.—and completely adjustable for comfort. Single-cord design for more freedom of movement. Excellent sensitivity and broad response to 10,000 cps pulls those weak signals in through the QRM. Handsome beige and brown styling. You'll be surprised at the economy price. Write for descriptive literature today.

\$13.17

TELESET...

A Product of Sound Research



TELEX/Acoustic Products

COMMUNICATIONS ACCESSORIES DIVISION

3054 Excelsior Blvd. • Minneapolis 16, Minn.

K2RTU

LOOK, HAMS!

Replica 1964 front license plate with your call letters. Highest quality vacuum formed plastic to withstand all weather.

Black with 3-inch yellow letters
\$2.50 postpaid

Clubs and Organizations write for Special Discount Prices on group orders of ten and over.

Send check or money order to:

ONTARIO SALES COMPANY

DICK JOB, K2RTU

P.O. Box 9111

Rochester, N.Y. 14625

FREE

SEND FOR YOUR 1964 HAM CATALOG FROM WRL



WORLD RADIO LABORATORIES 3415 West Broadway, Council Bluffs, Iowa

NAME _____
ADDRESS _____
CITY _____ STATE _____

1961, to try out the possibilities of *TR DX* on 50 Mc. from North to South America at this point in the solar cycle. I will be running 1 kw. of e.w. on 50.01 Mc. with vertical and/or horizontal polarization on the antennas. Times will be 2300 and 2400 GMT. Days will be Tuesday, Thursday, Saturday and Sunday or by prearranged skeds. Anyone hearing my signals is invited to send reports of reception to me, Vince Varnas, K8REG, 4329 Renwood Drive, Dayton 29, Ohio." Hope you get some takers, Vince. It should be an interesting project.

In Michigan W8MBH and W8CVQ go along with those December 13/17 dates with the 15th once again being best. Reg and Walt were hearing 4s, 5s, 9s and 9s.

W7CJN at Butte, Montana sez that he kept skeds with W7EGN in Whitefish for 7 days on 50.1 e.w. but results were nil, and no openings of any kind noted on 50 Mc. during the entire month. W7OIO and K7GVJ in that area have recently joined the 6-meter ranks. At Las Vegas, Nevada, Al, K7ICW, sez: "K-skip openings quite good on December 4, 14, 15, 23 and 24. The 14th and 15th produced quite unusual and rare *EE* signals with *E* backscatter. Several 2-way S.S.B. backscatter QSOs using fairly low power at both ends by myself and K6QHC in San Francisco surprised us both on the 24th. Also short skip into Albuquerque, New Mexico was strong and quite lengthy. The skip on the 14th really woke up the boys from Ohio, west!" K7BFM tells us that Nevada hams are sending special Centennial QSLs during 1964, and 5 contacts qualifies a ham for a special Centennial certificate. Phil sez that K7QOP, K7UHC, K7UFP and K7BFM have their beams all sharpened up ready for spring and summer operation. "We realize that Nevada is hard to get on 50 Mc. but so is New Jersey, for example, from this end." California stations should not overlook the fact that ground-wave paths do exist over the Sierra Nevada from this part of Nevada (Carson City). One Reno station keeps a weekly sked with the San Francisco Bay area. In Carson City we are closer to the mountains but would be willing to try to establish paths." He goes on to say that he monitors 50.55 Mc. daily after 1700 local time and that Reno stations monitor 50.1 Mc. Nice to hear from two stations in Nevada. Keep up the good work!

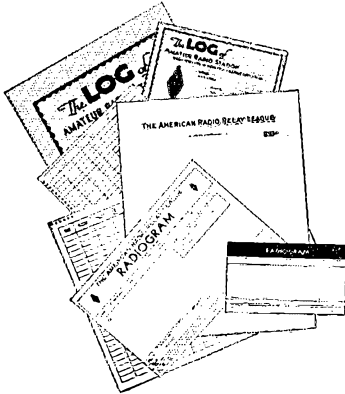
In Northern California W5GWY/6 is interested in starting a six-meter net. Anyone interested write him at P.O. Box 36, Cutten, California. Lacombe, Louisiana and W5UQR tells us that the first weeks of December yielded some real DX QRM on six meters with sections from all over the U.S. coming through with good signals. George (W5UQR) sez that although his own activity has been limited to week end skeds with s.s.b. stations along the Gulf Coast, these skeds with WA5DVV, W4ZGV/5 (Miss.), WA4EWA (Alabama), K4KIF (Florida), and W5UQR (La.) allow for very consistent contacts up to 200 miles. "Band opening noted December 13-16 nightly with good signals from most call areas," reports W5JPB at New Orleans.

Four-land goes along with the general consensus of opinion that December 13/16 was best of the month for skip. In Alabama W4YRM heard or worked into 5 call areas and 7 states on the 15th and 17th; WA4CQG (Kentucky) heard Pennsylvania, Virginia and Texas on the 15th and 16th; while in Florida W4ZGS heard/worked 1s, 2s, 3s and 8s on the 16th and 5s in Texas on the 21st.

In North Carolina WA1JCS, WA4QJZ (both in Oxford), and WA4DYN (Winston-Salem) all say "December 15 and 16." Walt, WA1JCS heard/

(Continued on page 174)

If You are An Active Amateur



YOU NEED THESE . . .

Record keeping can often be tedious. But not with the *ARRL Log Book*. Fully ruled with legible headings it helps make compliance with FCC rules a pleasure. Per book . . . **50¢**

Mobile and portable operational needs are met by the pocket-size log book, the *Minilog*. Designed for utmost convenience and ease . . . **30¢**

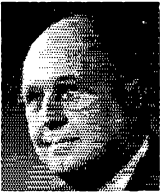
First impressions are important. Whether you handle ten or a hundred messages you want to present the addressee with a neat looking radiogram . . . and you can do this by using the *official radiogram form*. 70 blanks per pad. **35¢**

and they are available
postpaid from . . .

If you like to correspond with fellow hams you will find the *ARRL membership stationery* ideal. Adds that **\$1.50** final touch to your letter. Per 100 sheets . . .

THE AMERICAN RADIO RELAY LEAGUE

**NEWINGTON
CONN. 06111**



Before you buy or trade, wire, write,
call or drop in to see **WARD, W2FEU**

Be Sure to Write for Our
Latest Used List

ADIRONDACK RADIO SUPPLY

185-191 W. Main St., Amsterdam, N. Y.
Phone: Victor 2-8350

Ward J. Hinkle, Owner

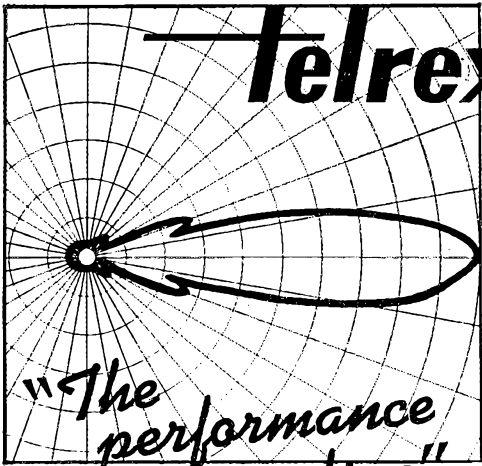
VHF CONVERTERS AND PREAMPS

I.F.s at 7, 10, 14, 20, 22, 24, 26, 27, 28, 30.5 & 50 Mc. All with built-in power supply. 6 meter (6CW4-6U8) **\$34.50** ppd. 2 meter (4-6CW4s), **\$54.95** ppd. Excellent appearance and workmanship. Weak-signal performance equal to or better than any Nuvistor manufactured converter. Write for descriptive literature.

PARKS ELECTRONICS

R.F.D. 2

Beaverton, Oregon



"BEAMED-POWER" ANTENNAS and ANTENNA SYSTEMS

The Choice of the Discriminating
Communication Engineer... the
Man who Never Settles for Any-
thing Less than **THE-VERY-BEST!**

You too - can enjoy World renowned **TELREX** performance and value!

Send for PL77 condensed data and pricing catalog, describing the World's most Popular antennas from \$6.95 to \$999.00. Expanded data sheets - your favorite band, also available.

VISIT BOOTH 1316-IEEE SHOW

ANTENNAS

Communication and TV Antennas

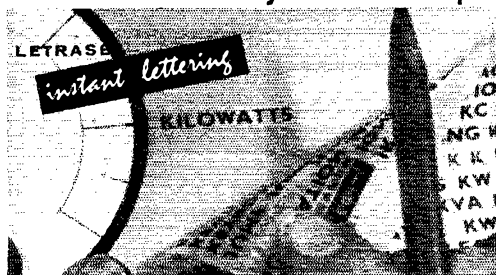
SINCE
1921

telrex LABORATORIES

ASBURY PARK 40, NEW JERSEY, U.S.A.

"The performance
line"
"— with a
MATERIAL DIFFERENCE!"

Because you've got to SEE it to BELIEVE it
..... we will send you a FREE sample!



A REVOLUTIONARY NEW METHOD FOR MARKING ELECTRONIC EQUIPMENT

Try this sample and you'll agree "Instant Lettering" is the easiest, quickest way to get professional lettering you've ever seen. Self-adhesive letters printed on a special plastic sheet are just pressed down into position on any equipment, drawing, schematic, etc. Transfers instantly to practically any surface. Looks like printing.

AVAILABLE IN THE FOLLOWING SETS AT \$4.95 EACH

- TITLES FOR ELECTRONIC EQUIPMENT
- TERMINAL & CHASSIS MARKING KIT
- METER & DIAL MARKING KIT

With these three kits you can completely mark prototype electronic equipment from component parts to finished control panel and meters--and make them look like finished production equipment.

In stock at leading electronics distributors or direct.

SEND FOR FREE SAMPLE AND FOLDER

THE DATA CORPORATION
63 71st STREET • DEPT. 6111-2 • GUTTENBERG, NEW JERSEY

Faster CW—Better readability

10-day money back guarantee. Budget payments



\$19.95

AUTRONIC

KEYER

\$69.50

transistorized, automatically eliminates erratic sending. Built-in speaker for practice or monitoring. Separate weight, speed controls. Phone jack. Any position, fixed or mobile. 7x5x2". Finest buy for reliability, performance. **AUTRONIC KEYER** will not walk. Fully adjustable. No contact bounce. Usable with any keyer.

Send card or QSL for info

ELECTROPHYSICS CORP. SINCE 1929
3017 West Coast Highway, Newport Beach, Calif.

DOW-KEY PANEL MOUNT



Durable, silver plated, precision made. Only $\frac{3}{8}$ " hole is needed, no screws.

DK60-P

.70 ea.

CONNECTORS



DOW-KEY DOUBLE-MALE CONNECTOR

DKF-2

Favorite everywhere. Precision made, rugged locking type. Silver plated.

.95 ea.

At your electronics dealer or write:

DOW-KEY CO., Thief River Falls, Minn.

worked 7 call areas during these two days: Joe, WA4QJA had contacts into 7 states in 9-, 0- and 5-lands; WA4DYN sez: "December 15 started off in 9 area with Illinois and Wisconsin coming in with 59 signals. Also heard a WA6 that night. December 16 Nebraska, Missouri, Kansas, and Illinois were booming in."

W4HHK in Tennessee reports double hop on the 15th and 16th when W6NLZ, W4HXX were heard/worked and a reception report was received from K7YSE Scottsdale, Arizona. Reception reports on Paul's beacon were received from North Carolina and Ohio. (Beacon transmissions are made on 49.940 Mc. using A4HHK daily whenever possible, usually around noontime CST and early evening hours.) Tom, K4SHY reports Texas, Oklahoma and Kansas as states being most frequently heard (Dec. 14 to 16), but also heard stations beyond normal ground-wave range in Virginia and North Carolina via backscatter. From Knoxville K4PZT heard 5 call areas on the 13th, 14th and 15th with rapid QSB on all signals on the 14th; and K4KYL noted skip on 7 days during the month with the same good period as other stations reporting. Jim heard all call areas between December 13-18 including 18 states. WA4IRX in Memphis also reports 18 states within 4 days (Dec. 14-17) with all except 7-land heard from. Delaware report from K3KEO sez that he was hearing 5s on December 6, 4s and 5s on the 16th, and 4s, 5s and VP7CX on the 26th. K3ARR at Sunbury, Pennsylvania heard 4-, 5-, 8-, 9-, and 0-lands on the 16th and 5s on the 17th; while W3JYL of Lancaster sez the band was open for four days during the week of the 16th and K3KPA sez: "had a little Sporadic K this month during openings on the 12th, 14th, 15th and 16th with stations in the South and Midwest."

At Baltimore, Maryland K3VGN and K3TUIJ noted December 15 and 16 skip openings. Brian, K3VGN heard 11 states in 7 call areas and Bill, K3TUIJ heard 9 states in 5 call areas. K3LLR at Oxon Hill sez: "December 14 through 17 openings were as far as western Texas with signals very strong and lasting late into the night." From in and around the New York City area reports received from WA2TQT, WA2SUY, WA2RAQ and WA2ZXR indicate openings from the 5th to the 21st of December with same "best period" as reported by all other areas in the country. Norm, WA2TQT heard 4-, 5-, 8- and 9-lands on December 15 and all states in 4-land plus West Virginia on the 16th. Stan, WA2SUY, heard 3s, 8s and 9s on the 15th and WA2RAQ was hearing 4s and 5s on the 17th and 4s on s.s.b. on the 21st. Barry, WA2ZXR reports that the band opening of the 16th into 4- and 5-lands lasted approximately four hours. At Schenectady Jim, WA2DRP, noted good conditions on 9 days during December with the 13th being best for ground wave (5 states) and 15th being best for skip (11 states). WA2PWI in New Jersey noted openings into 5-land on December 17 and 18 and into 4-land on the 20th, while WB2EZY heard 3- and 4-lands on the 14th, and 3s, 4s, 5s, 9s and 0s on the 15th. K2RPZ at Passaic, New Jersey, reports the opening of January 13 when he heard every call area except 6 and 7.

In 1-land K1PLR noted the opening on December 15 and worked 6 states in 3 call areas (5, 9, 0) and on the 17th worked into Mississippi. Harry also caught the opening of January 13 (cause school was closed—blizzard conditions) and worked 4 states in 2 call areas. And K1VPJ in Needham, Mass sez: "Some Sporadic K this month (December), very good at times with 4s, 5s 9s and 0s coming in with strong signals. On December 8 a northern ground-wave condition brought in many New Hampshire, Maine and Vermont stations with S9 signals." **QST**

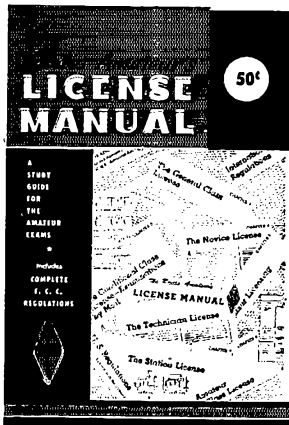
FOR NEWCOMERS?

YES, the ARRL License Manual is for aspiring radio amateurs and is indispensable to them. It is indispensable also to all active amateurs, whether old timers or recently licensed Novices. The "LM" contains study material for the amateur-to-be. It also contains the complete text of FCC amateur regulations, which ought to be in the shack of every amateur for reference. The 51st edition is complete, up to date and revised to include latest regulatory information.

Order **YOUR** copy today

PRICE **50¢** POSTPAID

THE AMERICAN RADIO RELAY LEAGUE, INC.
NEWINGTON, CONN. 06111



ALL the dope between two covers . . . complete and easy to understand.

- NOVICE • CONDITIONAL
- TECHNICIAN • GENERAL
- EXTRA-CLASS



I can give you personal service on helping you select better gear per dollar for your operating pleasure. Over 30 years' experience. Big trades, easy terms. Used bargains.

VAN SICKLE RADIO SUPPLY CO.
Gene Van Sickle, W9KJF, Owner
4131 N. Keystone Ave.
On the northeast side of
Indianapolis 5, Indiana



TELEPLEX teaches CODE

Teleplex performs no miracles. It just seems miraculous when compared to any other method. Get the facts. Don't waste your time and money. Write today for descriptive literature. It is free and interesting.

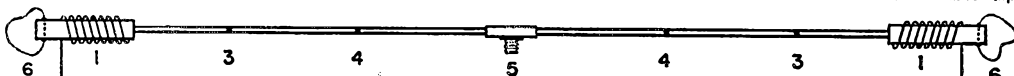
TELEPLEX CO. 739 Kazmir Court, MODESTO, CALIF.



LRL-66 ANTENNA

66' LONG. 80 THRU 10M

Power rating 2 Kw. P.E.P. or over on 80, 40, 15
On 20 and 10 1 Kw. P.E.P. Transmitter input



PRICE
\$30.00
in Cont.
USA, ppd.

- OPERATES ON 5 BANDS AUTOMATICALLY**
1. Loading coils for 80 & 40M doublet operation
 2. Adjustable ends to set 80 meter resonance
 - 3, 4. Decoupling stubs for 20 & 10 meters

5. Center insulator with female coax connector to take PL-259 plug
6. Fittings on insulators to tie on rope

LATTIN RADIO LABORATORIES

Box 44

Owensboro, Kentucky



Send one dollar for Instruction Manual



BANDIT 2000A

Compact grounded grid Linear Amplifier / 2000 watts PEP (twice average DC) / Self-contained solid-state Power Supply / Relay controlled antenna transfer / compatible with most 100 watt CW/SSB exciters / gray color scheme and modern case construction / All aluminum for maximum shielding.

*Hunter Manufacturing
Company, Inc.*

IOWA CITY, IOWA

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a box number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate. Provisions of paragraphs (1), (2) and (3), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No check-in-copies can be supplied.

(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

S.R.R.C. Hamfest: June 7, 1964. Write for details after April 1, 1964. Starved Rock Radio Club, W9MKS/W9OLZ, RFD #1, Box 171, Olesburg, Illinois.

BIG D Hambozee, August 15, 1964. Make your plans now. Write Box 30532, Dallas, Texas, H. D. Wheelless, Dallas Amateur Radio Club.

SIDEBAND Dinner is a "must"! See you March 24th Statler-Hilton. Send that \$10 check Now! 73, Buddy Robbins, W2JKN, 4665 Iselin Ave., New York 71, N.Y.

WANTED: Early wireless gear, books, magazines, catalogs before 1922. Send description and prices. W6GH, 1010 Monte Dr., Santa Barbara, Calif.

MOTOROLA used FM communications equipment bought and sold. W5BCQ, Ralph Hicks, Box 6097, Tulsa, Okla.

WE buy all types of tubes for cash, especially 6Jmas, subject to our test. Maritime International Co., 199 Front St., Hempstead, N.Y.

TORIODS: Uncased 88 Mhy. like new. Dollar each. Five \$4.00, P. P. DaPaul, 309 South Ashton, Millbrae, Calif.

SOUTHERN California: Transmitter and receivers repaired, aligned. Bandwidth, frequency, harmonics measured. Used ham gear bought, sold, traded. Robinson Electronics, 922 W. Chapman, Orange, Calif. Tel. KEllogg 8-0500.

CASH For your gear! We buy, trade and sell. We stock Hammarlund, Hallicrafters, National, Johnson, RME, Hy-Gain, Mosley and many other lines of ham gear. Ask for equipment list. H & H Electronic Supply Inc., 506-510 Kishwaukee St., Rockford, Ill.

WANTED: Military or Industrial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y.

WANT 1925 and earlier ham and broadcast gear for personal collection. W4AA, Wayne Nelson, Concord, N.C.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 08:00 to 17:30 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan. Tel SOrmandy 8-8262.

HAM TV Equipment bought, sold, traded. Al Denson, W1BYX, Rockville, Conn.

TOROID RTTY Kit: Mark-Space discriminator and bandpass filters. Includes 4-88 Mhy and 1-44 Mhy uncased like new condx, toroids; information sheet, mounting hardware and six mylar capacitors. \$5.00 ppd. Toroids: specify 88 or 44, less capacitors. \$1.00 each. 5.34.00, ppd. KCM Products, Box 88, Milwaukee 13, Wis.

ACT Now! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-WALKER-5-7000.

HAPPY Hams Club. Are you happy with Ham Radio as it is? Do you think more operating restrictions and license requirements are unnecessary? Be Happy with us! Send 25¢ (coin) for handsome inscrolled 8" x 10" Club Membership Certificate suitable for framing. It's a Wow! Brigman, W4JEN, Box 257, Norcross, Georgia 30071.

CRYSTALS: Free Bargain List. Nat Stinnette, W4AYV, Umattila, Fla. 32784.

WANTED: Parts, sets, as is GRC-9, BC-610, GRC-27, Autodyne. 236 Park Avenue, Bethpage, L.I., N.Y.

C. FRITZ QSLs. Bringing hams greater returns over a quarter-century! Samples 25¢ deductible. Box 1648, Scottsdale, Ariz. (formerly Joliet, Ill).

QSLs. Drawn by our own artist in three colors on lustre coat stock twenty exclusive designs 100 for \$3.85 (ten designs) or 200 for \$6.90 (twenty designs). Satisfaction guaranteed five working days. Constantine Press, Bladensburg, Maryland.

QSL, SWL, cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elm, Hamilton, Ohio.

QSL Specialists. Distinctive Samples 15¢. DRJ Studios, 2114 N. Laverne Ave., Chicago 39, Ill. 60639.

QSLs: samples 25¢ (refundable). Schuch, W6CMN, Wildcat Press, 6707 Peck Ave., North Hollywood, Calif.

QSLs "Brownie" W3CII, 3111 Lehigh, Allentown, Penna. Catalog with samples. 25¢.

QSLs-SMS. Samples 10¢. Mallo, Press, Box 375 M.O., Toledo 1, Ohio 4107.

PICTURE QSL Cards of your shack, etc. Made from your photograph. 1000, \$14.50. Also unusual non-picture designs. Samples 20¢. Raum's, 4154 Fifth St., Philadelphia, Pa., 19140.

DELUXE QLS. Petty, W2HAZ, Box 27, Trenton, N.J. Samples. 10¢.

QSL Special. 100 30 Star U.S. Flags on glossy cards. \$3.70. Ppd. Other samples 10¢ or 25¢ refunded. Dick, W8VXX, Rt. 4, Gladwin, Mich.

QSLs-SWLs. 100 2-color glossy, \$3.00; OSO file cards, \$1.00 per 100. Samples, 10¢. Rusprint, Box 7375, Kansas City 16, Mo. 64116.

QSLs. Distinctive samples dime. Volpress, Box 133, Farmingdale, N.Y.

CREATIVE QSL Cards. Free, new catalog and samples. Personal attention given. Wilkens Creative Printing, P.O. Box 1064-1, Atascadero, Calif.

ZIP Cole rubber stamp, call, name, address, with ink pad, \$1.00. K4ISA, E. Perry, Box 8080, Allandale, Fla.

QSLs, SWLs, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QSLs, SWLs, XYL-OMs (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing; eye-catching, comic, satirical, fabulous, DX-attracting, prototypical, snazzy, unparalleled cards (Wow!). Rogers, K0AAB, 961 Arcade St., St. Paul 6, Minn.

SUPERIOR QSLs. samples 10¢. Ham. specialties, Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

QSLs 300 for \$4.35. Samples 10¢. W9SKR. "George" Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLs. Samples 25¢. Rubber stamps: name, call and address \$1.55. Harry Sims, 3227 Missouri Ave., St. Louis 18, Mo. 63118. QSLs 3-color glossy. 100. \$4.50. Rutgers Vari-Typing Service. Free samples Thomas St., Riegler Ridge, Milford, N.J.

QSLs. Kromekote 2 & 3 colors, attractive, distinctive, different. Free ball point pen with order. Sample 15¢. Agents for Call-D-Cal deals. K2VOB Press, 62 Midland Blvd., Maplewood, N.J.

QSLs \$2.50 per 100. Free samples and catalog. Garth, Jutland, N.J.

QSLs. All kinds, free samples. W7IIZ Press, Box 183, Springfield, Ore.

AT Last! Something new in QSL cards! All original designs. Send 10¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

PHOTOSTAMPS of your station with gummed back for your QSLs. 100 \$1.50. Samples 10. Morgan, W8NLW, 443 Euclid, Akron, Ohio.

DON'T Buy QSLs until you see my free samples. Bolles, W5OWC, Box 9363, Austin, Texas.

RUBBER Stamps \$1.00. Call and address. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, N.J.

QSLs. Samples 20¢. QSL Press, Box 281, Oak Park, Illinois 60303.

1 1/2" Call QSLs \$2.40/100, \$2.90 (2 sides). Samples. Garieny, 2624 Kroemer, Ft. Wayne, Ind.

OUTSTANDING QSLs. New low prices. Professional. Samples 10¢. Brigham, North Billerica, Mass.

SUPERIOR QSLs. Samples 10¢. Ham Specialties, Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

QSLs-CB-SWL letters and cards. \$2.00, and \$3.00 per 100. Samples 10¢. Martin, 828-A Schuykill Ave., Reading, Penna.

QSLs. Sparkling new. Dime. Filmcrafters, Box 304, Martins Ferry, Ohio.

QSLs? WPE? SWLs? Personalized made-to-order service! Finest samples 25¢. Deluxe 35¢ (refundable) Sackers, W8DED, P.O. Box 218, Holland, Mich. (Religious QSL samples, 25¢). Christian Ham Callbook, \$1.00 postpaid.

QSLs. Nice designs. Reasonable prices. Samples 10¢. Gates Print, 317-11th Ave., Juniata, Altoon, Penna.

QSLs: 100 for \$3.50. Glossy. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y.

RUBBER Stamps for hams. Sample impressions. Hamm, W9UNY, 342 N. 93, Milwaukee, Wis.

QSLs. Large selection including photos, rainbows, cuts, etc. Fast service. Samples 25¢, includes beautiful 4-in. call letters for your shack. Ray, K7HLR, Box 1176, Twin Falls, Idaho.

QSLs. Samples free. Blanton's. Box 7064, Akron, Ohio 44306.

QSLs. Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

ATTRACTIVE QSLs: Guaranteed largest variety of individual samples (25¢ deductible). Paul Levin, K2MTT, 1460 Carroll St., Brooklyn, N.Y. 11213.

QSLs. 24 New Drawings. Samples 10¢. Brigham, Colson St., North Billerica, Mass.

QSLs, Gorgeous rainbows; cartoons, etc. Top quality! Low prices! Samples 10¢ returnable. Harms: WA4JE (W1GET-W2JME), 905 Fernald, Edgewater, Fla.

NOW! 1000 summed name-address labels with call, \$1.00. Pocket name-address rubber stamp with call, \$1.00. Ross's, Box 7-C, Granville, Michigan.

RUBBER STAMP call: Name, address: \$1.00. Dick, WAØFTH, Box 35, Irvington, Neb.

CANADIANS: HA-4 transistorized keyer, like new. Two new 4 mid. at 3 Kv (Sprague), \$16.00. VE3EGG, 64 Barrie St., Galt, Ont., Canada.

CANADIANS! Sell HT-37, \$450.00; F/W Johnson Courier linear, \$225.00. VE3QE, 32 Sylvia Crescent, Hamilton, Ont., Canada.

CANADIANS: Sell Collins 75S1, 32S1, 516-F2, 312B-4, 516-E1, Mosley TM-5 and V3, Jr. antennas, \$1300. Will trade down. Wilfred Geber, Benson, Sask., Canada.

CANADIANS! Selling out. Johnson Inverter, \$650; Johnson TR switch, \$25.00; Johnson filter, \$15.00; HO-170C, \$325.00; SPR, \$10.00; Hy-Gain 402B beam, \$95.00; D-104 mike with G-stand, \$30.00. D. Jackson, VE6MF, 1316 38th Ave. SW, Calgary, Alta., Canada.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J. Tel: GARfield 471-2020.

CASH! promptly paid for your ham gear. Trigger, 7361 North, River Forest, Ill. PR 1-8616.

TUBES Wanted, All types, highest prices paid. Write or phone Lou-Fronics, Inc., 131 Lawrence St., Brooklyn 1, N.Y. Tel. UL 5-2615.

BOOST Reception: 3.5-30 megacycle SK-20 Preselctor kit, \$18.98. Boost modulation, AAA-1 clipper-filter kit, \$10.99. Reduce noise NJ-7 noiselector, 1F, wired, \$4.49. Postpaid! Literature free. Holstrom Associates, Box 8640-T, Sacramento 22, Calif.

INTERESTED In two-meter linear amplifiers, transmitters, receivers, etc. If the price is reasonable to members of St. Mary's Radio Club, or as tax exempt donation to Missions. K8WLB, St. Joseph's Mercy Hospital, Centerville, Iowa.

401T tubes wanted. Also other xmtrs and special purpose tubes. We will buy military or commercial transmitters and receivers with designations ARC, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

ATTENTION! Mobilizers Heavy-duty Leeco-Neve 6 volt 100 amp. system, \$50; 12 volt amp. system, \$50; 12 volt 6 amp. system, \$60; 12 volt 100 amp. system, \$100. Built-in silicon rectifier alternators 12 volt 6 amps, \$100; 12 volt 100 amps, \$125.00. Guaranteed no ex-police car units. Herbert A. Zimmerman, Jr., K2PAT, 1907 Coney Island Ave., Brooklyn 30, N.Y. Tel. DEWey 6-7388.

MUST Dispose: 82 copies Proceedings of the IRE 3 volumes complete, 1926 to 1952. Real bargain! Write for list. Mrs. Miriam V. Knapp, W1ZIM, 191 Beechwood Rd., West Hartford 7, Conn. Tel: 521-2055.

WANTED: For personal collection: OSTs March, April, May and August 1916; ARRL Handbook Edition 1, CQ's for 1945 thru 1947. W1CUT, 18 Mohawk Dr., Unionville, Conn.

ACTIONFEST: Ft. Lauderdale, Fla., Armory, S.W. 24th St. & 4th Ave. Saturday, March 21st. Doors open 8 A.M. Broward Amateur Radio Club.

WANTED: All types of aircraft or ground ratios. 17L 618F or S 388, 390, GRC, PRC, 51J, RVX. Especially any item made by Collins Radio, ham or commercial. Also large type tubes and test equipment in general. For fast cash action contact Ted Dames, W2KUV, 308 Hickory, Arlington, N.J.

TUBES, Diodes, transistors wanted. High cash prices paid. Astral Electronics, Box 636, Elizabeth, N.J. Tel: 354-3141.

SELL, swap or buy ancient radio sets and parts, magazines, Lavery, 118 N. Wycombe, Landsdowne, Penna.

SELL: Following items in mint condx: R-390A at \$800; KWS-1 with RTTY at \$750.00; Model 14 typing perforator at \$115.00; Telex ribband beam. Reals some work on it at \$30. Want: CR R/27B, W1JW, 99 Water, Millinocket, Maine.

SALE: 75A-3, 2 filters, product detector, spkr, xtal calibrator, \$300. TG10 keyer with Army lesson. Takes one to five, \$20. WA9KJA, Birkhead, Apt. 1-424 W. Prairie, Decatur, Ill.

SELL: Microwave and UHF devices; parametric amplifiers, converters, SWR indicators, modulators, couplers. W0YAU, 333 W. 10th St., Claremont, Calif.

NATIONAL FR-24 dual diversity receivers and converters, etc. \$495; HT-32 SSB xmtr, \$289; FR-21 low freq. recvr, \$175; SP-600X17, \$425; R-390/URR, 500 kc. 32 mc., \$675; 200 V, \$625; URA8A, \$195; 51J-3, \$675; Boehme Aut. keyer, \$125.00; Wheatstone perforator, \$175. Wanted: Teletype equipment, Alltronic-Howard Co., P.O. Box 19, Boston, Mass. 02101 (R1 2-0048).

WANT OSTs prior to 1927 and early ham and broadcast equipment, including parts and tubes. W4EDW, Sanders, 3596 Canadian Way, Tucker, Ga.

EQUIPMENT Constructed, kits assembled, communication receivers and service equipment serviced, 40 years of electronic experience. Wally Cox, 1826 N. Talbot, Indianapolis 2, Ind.

COLLINS Owners! Work A.M. Wired kit, \$5.00. No soldering, holes, chassis removal! Switch In-Out! (State Model!) KVM-2 independent receive control, \$15.00. It's a honey! Kit Kraft, B-763, Harlan, Ky.

FOR Sale: Plate Transformers, 3600-0-3600 VAC at 1000 Ma., with dual 110V and 220V primaries, \$35.00. Peter W. Dahl, 5331 Oaklawn Ave., Minneapolis, Minn. 55424.

SELL: Frequency shift converters manufactured by RCA, type CV57, \$75.00, less tubes; \$135.00 with tubes. Brand new TV camera kit, \$120.00, less lens and vidicon tube. Send for lists. Spera Electronics, 37-10 33rd St., L.I.C., L. N.Y.

SALE: HO-170 w/clock, in mint condx, in orig. carton; \$200.00 or your best offer. Will ship anywhere. A. L. Godshall, W3SDE, 309 Lansdale Ave., Lansdale, Penna.

MUST Sell: Valiant F/W in mint condx, \$195.00; also must sell RME 6900 revr, FB for SSB, AM, CW, Built-in xtal-cal., WWV, \$175.00. Dan Safran, 163-40 Sixteenth Ave., White-stone 57, L.I., N.Y.

FOR Sale: Like new SX-117 receiver, used less than one year. Will ship in original carton. Best offer. Also a Viking Naviax for CW VFO xmtr. Best offer. W0OG1, Box 147, Rocky Ford, Colorado.

SSB Rig for sale: HT-32 xmtr; NC-300 revr. accessories. Like new. Make offers to Goldenson, Sunny Ridge Road, Harrison, N.Y.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Rd., Swampscott, Mass. Tel: 617-598-2530 for the gear u want at the price u want to pay.

VALIANT II factory-wired, in mint condx, guaranteed perfect. Few hours operation. Best offer over \$300. Roy E. Pellegrini, 21 W. 215 North Ave., Lombard, Ill. Tel. MA 7-3475 after 8:00 P.M.

POLYCOM "2": Transceiver; Precision 10-60 tube tester; tubes, RCA WV98B; RCA WR49B; Utica F-M receiver; Seco 320A SWR bridge; Lafayette Technician, All spotless condx. Best offers. Locascio, 8420 51st Ave., Elmhurst, L.I., N.Y. 11373.

COLLINS 75S-3 receiver, late serial No., guaranteed to look and work like new. Utually good buy at \$524. Central Electronics 20A SSB exciter, with 458 VFO in factory cabinet. Ex-clnt condx, \$129.50. Will ship, F. W. Rockwood, W1IOB, 186 North Rolling Acres Rd., Cheshire, Conn. 203-8R-28599.

SENeca: Brand new; going 1296 Mc. Will ship anywhere for \$165.00. K8WVL, 1191 E. 83, Cleveland, Ohio.

POLYCOM PC-6 6-meter transmitter and Hi-Par halo. In ex-clnt condx; \$200. K1QOT/2 13 South Avenue, Ithaca, N.Y.

WANTED: NRI Comm. Course. No kits. Robert C. Mannson, 2082 W. Greenleaf Ave., Chicago 45, Ill.

WALKIE-TALKIES: One set of BC-611s complete with custom ground crystals for transmit and receive on 3985 Kc. More range than CB units, full superhet receiver. Trade for mobile or SSB gear on \$55.00 for both. Will ship postpaid. KH6DLE, 84-525 Ipena Street, Waianae, Oahu, Hawaii.

6 Meter Communicator III, in ex-clnt condx. A.C., D.C. power cords and manual. K0POP, 3255 Polk St., Onaha, Nebr.

SWAP, Sell and buy ads. Write for free copy. All kinds of equipment and deals listed. Hams Hobbymart, Kruse, K1WPZ, Box 38, Rowayton, Conn.

WANTED: Wheatstone perforator and Boehme or Creed keyer. W9MDD, RR #1, Slinger, Wisconsin 53086.

FOR Sale: CE600 L, new 813, \$205; Eldico SSB 1000 linear in perf. condx, \$300; WRL Galaxy 300 w/VOX, PSA 300 console with built-in clock, QSO timer and linear relay, still in warranty, \$395. All instruction manuals included. 60 ft. crank-up tower with Hy-Gain 1H3 beam, damaged, \$75.00. Looking for KWS-1 and 75A-4. F.o.b. Mechanicsburg, Penna. R. D. Shafter, W3YXV, c/o Oven Industries, 5281 E. Simpson Rd., Mechanicsburg, Penna. Tel: PH 717-766-0721.

ATTENTION! Have you seen "Equipment Exchange"? Interesting Buy, Sell, Swap offers galore! Rush name for interesting sample copy. Brand, Sycamore, Ill.

WANTED: Multimatch modulation trans. 300 W or more; also Jennings vacuum variable with shaft. State price, condition. W6YFE, 4520 Davenport, Oakland 19, Calif.

EXCEPTIONAL Buy, Collins 75S-1 receiver with custom cover, Serial 10553. Flawless, \$335.00. Valiant transmitter, beautiful condition. Custom cover, \$185.00. Gonset 20 meter, Bantam Beam, \$15.00. 675 Sierra Meadow, Sierra Madre, Calif. 213-3561-1214.

75A4 plus vernier knob and 1500 cycle filter. Like new condx; \$475.00. Luther Lester, W5MIR, 3347 East Virgin St., Tulsa, Okla.

G-76, latest model; transistor DC power supply; Newtronics Hustler mobile ant. w/resonators for 75-40-20-15. Mike and 50.88 Mc. xtal. All in gud condx. All for \$300. WA8JDB, 37789 Park Ave., Willoughby, Ohio.

BUY, Sell or trade ham gear. Free listing in Ham Directory. Card for free details. Lupi, 1225 Hillside Place, North Berren, N.J.

FACTORY Wired Johnson Viking Ranger, AM and CW; 160-10 meters with FT; SX-99 Hallcraters. Make offer for L.o.b. deal NYC to Lieberman, 209 Giles St., Ithaca, N.Y.

PRINTED Circuit boards, Hams, Experimenters. Free catalog. P/M Electronics, Box 6288, Seattle, Wash. 98188.

FOR Sale: HT-32A, immaculate, \$395.00. Drake 2B with 2B0, less than a year old, \$200.00. No trades! Randy Bailey, 2400 Leon, Austin, Texas.

NATIONAL NC-125 in excellent condx, matching speaker, instruction manual, \$95. Heathkit oscilloscope OM-2, \$42.00 list, wired by an E.E. \$25.00. W2FC1, Herb Holzberg, 115 Sandra Drive, Totowa, N.J. 256-0826.

FOR Sale: Estate of W3PUK. Many instruments, 250THs, parts for full kilowatt, etc. Send \$5 stamp for full list to W3VDA, Box 1333, Harrisburg, Penna. 17105.

SELL: Transmitter described in August 1960 OST, page 32. Operational and in gud condx. Highest bidder over \$20.00. Richard Sorrel, Box 366, Wharton, Texas.

COLLINS 75A-3, \$350; Cosmophone 50, \$650; Globe King 400B, \$350.00; Mosley CM-1, \$100; Collins 310C, \$75; Monitors \$75; Hunter Cycle Master CM-20A, \$95. All equipment is in A-1 condx. W9MAM, 1514 W. Fisher St., South Bend, Ind.

SELL: Drake TR-3, AC supply and spkr, \$225; Astatic 10-C mike on G-stand, \$20.00. Heathkit HW-12 transceiver, factory aligned with crystal calibrator, \$120. Hy-Gain Hy-Tower, \$85; Heathkit AM-2 SWR meter, \$10. I. L. R. Graham, Box #649, Olmsted AFB, Penna. 17057.

MODEL Nineteen teletype printer complete with Model 14-TD and power supply. Perfect condition. No table, \$150.00, less freight and packing charges. Sry, no trades! Mel Marsley, W8ULU, 2242 Stevens Ave., Kalamazoo, Mich.

HQ-100 for sale, \$130.00. Also Viking Adventurer, \$30; Heathkit SWR, \$10; WRL screen modulator, \$7.00; 6 and 2 meter xtal converters with IF amplifier, power supply, \$23.00; 6 and 2 meter VFO 60-watt transmitters, complete in rack, \$180. Leo Rotenberg, 6636 McCallum St., Philadelphia, Penna, 19119.

SELL: Drake TR-3 transceiver and AC p/s in original cartons with guarantee cards. Both for \$550.00. Carl Seidler, WA2YUL, 2854 W. 29th St., Brooklyn, N.Y. 11224.

SELL: Gonset G6-3, \$95.00; Eico 720, \$65.00. Both are in excellent condx. Skip Kortman, 65 Oak Drive, Little Falls, N.J..

MINT R-100A. Needs aligning. \$80.00. Jay Eriebacher, 301 Bruce, Syracuse, N.Y.

MY Entire Shack for sale: the Cadillac of Novice rigs. Won 10th place in Novice Roundup with babied SX-100 (speaker, earphones, and SWL antenna, \$190); Eico 720W (key and antenna, \$80); 8 Peterson xtals, \$15; Heath balun (new), \$8; bug, \$10; Ameco 7N144K (brand new, wired and unused, \$35.00). Also Eico 377K AF generator, \$20. Together for \$325.00 with extras. Prices include shipping costs. Will help install in the Chicago area. Write: Don, c/o University of Chicago, 5514 South University, Room 1809, Chicago, Ill. 60637. Tel: FA-4-9500.

COLLINS KWM-1. Noise blander. AC supply, carrying case, \$500. Shipped insured, prepaid. Lt. Col Foss, W4SPK/1, Sugarloaf Lane, Bangor, Me. 947-8157.

FOR Sale: Johnson Viking I and VFO, \$100; National 183D receiver and speaker, \$165. Mrs. Kenneth Mochl, 1120 Abbott Court, Adrian, Mich.

COLLINS S/LINE: Must sell entire station, 75S-3, \$550; 32S-3, \$625; 30L-1, \$480; 312B-4, \$175; 516F, \$100; Collins SM-2 mike, \$40. 1000 watts, never damaged, no scratches. Orig. cartons. Antenna system: TA-33 Tri-Bander, \$75; 40 ft. F-Z Way HD-40 crank-up tower, \$75; CDR Ham-M rotor/control unit, \$100; 50 ft. control cable, inc. Dick Fredrickson, W7MPZ, RFD 1, Box 163-A, Warrenton, Va. Tel: 347-1186.

SHAWNEE Transceiver, excellent condx: \$180. Dan Reid, Anderson College, Anderson, Ind.

JOHNSON Viking II, with matching VFO, Priced for quick sale at \$130.00. On the air daily. K4NGO, 214 Hawkeegan Dr., Frankfurt, Ky.

TOROIDS 88 mhy 60¢ each or 5/\$2.50. Fasold, WA6VVR, Box 34, Dixon, Calif.

KWS-1 75A4, Hy-Gain beam, spare tubes, like-new condx: \$1250 f.o.b. Minneapolis. WOCTW, 8715 Logan Ave. South, Minneapolis, Minn. Phone 881-8126

WANTED: Electronics instructor. First Class Commercial Theory and workshops. Science camp. Call NYC EN 2-4340. Epstein, 440 West End Ave., N.Y. 24, N.Y.

WANTED: CV89A/URA-8A chassis, less plug-in units. State price and condx. KIAJE, 50 Crabapple Lane, Groton, Conn.

SALE: 3600-0-3600 volts at 800 ma. plate xfmr with dual 115V and 220V primaries, \$20, or will trade for Drake 2BQ. K5YYI, 901 N. Evans, El Reno, Okla.

SELL: HX-50 SSB xmtr, 3 months old, \$370. HQ-170, 9 months old, \$285. Split shipping charges. K2SPG, 4031 Wickham Ave., New York, N.Y. FA-4-4693.

WANTED: Collins 136C-1 noise blander for 75A-4. State price wanted and condx. W5MUG, 2469 Paden, Jackson, Miss.

SELLING: Clean National HRO-50T-1. Make offer. Dick Sowler, Box 35, College Station, Berrien Springs, Mich. 49104.

CABINET for DX-100, \$90; rest of the rig included free! Contact W3AEQ, Box 62, Lehigh University, Bethlehem, Penna.

DRAKE 2B, \$199; DX-100, \$99. Might trade for VHF rig. K9FLU, 4524 Cross St., Downers Grove, Ill. WO 8-2003.

CENTRAL Electronics 10B, QT-1, coils 10 thru 80. In excellent condx. \$75.00. Ferris, 1768 Fruitdale, Indianapolis 41, Ind.

SELL: SP400SX, now in use; \$100 or will trade for Johnson KW Matchbox. W5MFX, 901 W. Cherokee, Enid, Okla.

LM Frequency meter, with calibration book, \$40. W4KLG, Dassel, Minn.

MUST Sell: Exclnt GPR-90, best reasonable offer. K2LAI, 427 E. 69th St., NYC 21, N.Y. Tel: 212-TR9-8087.

TTY, Mod. 15, with book. In excellent condx. Just overhauled: \$125.00 or will trade in part for SX-117 only. Will ship. K0WHQ/6, 4775 Pochontas Ave., San Diego 17, Calif.

WANTED: 4 or 5 element 20M Telrex beam. Desk cabinet for relay rack 19" x 17" panel space, any condx. W2UGM, 66 Columbus, Closter, N.J. Tel: PO 8-1884.

QUITTING Sideband. Sell Collins 32S-3 in orig. box w/warranty card. Used two months. \$500. Also like-new Valiant 11, \$375 or willswap. Wanted: Antique and wireless gear. Will pay cash or swap new and used ham gear. Leica cameras num movie. Also want magazines, Duck and Electro Brainerd catalogs, prior 1925. W6GVY.

COLLINS S/Line, complete, 30S1, No. 12957; 32S-3, No. 10881; 75S3, No. 12638, 516F2, No. 15143, 312B4, No. 57230, \$2600. F.o.b. WICPI.

SELL: Cleaning out! Send for list of power supplies, meters, miscellaneous parts, etc. Molyneaux, 5801 Shadesview Dr., Mobile, Ala. 36608.

DETROIT Areal Sell Gonset G-28 10-meter Communicator with D-104 mike, \$145.00. Eico 720 trans. and Eico 722 VFO, Both F-W. \$120. All perf. condx. K8UFE.

SELL: Swan SW-240 SSB Transceiver and AC pwr. supply. Like new condx. \$125.00. W3JLT, R. C. Frics, 2209 E. Penna. St., Allentown, Penna.

BARGAINS! Reconditioned guaranteed shipped on 15-day trial. Subject to sale. \$272, \$149.00; G-76, \$249.00; SX-101A, \$225.00; HT-32, \$299.00; HT-37, \$299.00; HQ-170, \$199.00; Viking 11, \$99.00; HRO-50T, \$99.00; NC-190, \$129.00; NC-270, \$129.00; brand new B&W 6100, \$595.00; hundreds of other items. Write for free list and time payment details. Henry Radio, Butler, Mo.

TRADE Eico 'scope, Model 460, perfect for 2 or 6 meter transceiver or SX-71 or? W9BPG, 609 Henrietta, Gillespie, Ill.

DXER Beware: A real bomb, York 5000 transmitter, 1 kw. using 4-1000A, bridge power supply, vacuum tuning condenser, SSB kit with 24' deep, 6 ft. high. Further details. Bill Brown, WOSYK, 28 Marine Lane, Hazelwood, Mo.

CENTRAL Electronics 100V, excellent condx, \$485.00; HQ-170, \$249.00; K2JZW, 212-HI-5-8947.

RANGER II, \$175.00; Kit #4 finished but no more time for hamming. Parts, work and instructions ready for completion. Mark Tuttle, WA6ULU, 4426 Cromwell Ave., Los Angeles 27, Calif. 43671.

WANTED: Mosley 20-meter vest pocket rotary beam VPA-3, new or used. Charles McKnight, Delataville, Va.

WANTED: One BC-610 transmitter. Any reasonable condition considered. Advise price and condx. George Barry, W5UQR, Rte. 1, Box 219-C, Lacombe, La.

SELL: Clegg Zeus, \$475.00; Clegg Thor VI, \$280.00; Poly-Comm 6, \$250.00. All equipment is in mint condx. Original boxes, all manuals, cables, etc. Will ship any place in U.S.A. you pay shipping charges. Write: Bob Singletary, 2830 N.W. 22, Oklahoma City, Okla. K5FZG.

NCX-3 and NCX-AC supply, both \$329.00. Never on air, in original cartons, one-year factory guarantee. Need cash for college. N. Blair, 70-06 Roosevelt Ave., Jackson Heights 72, L.I., N.Y.

COLLINS 32S3 less power supply. Has had very little use, \$600 or will consider Viking Ranger as part payment. W3GRF, 6959 Temple Hills Rd., Washington 31, D.C.

The following equipment for sale is in perfect working order: All no older than 6 months. Sold on a pick-up basis only for your QTH: Heath HX-10 SSB transmitter, \$300.00; HDP-11 SSB mike, \$15.00; HA-10 linear, \$200.00; Drake 2B with 2BQ and 2A, \$240.00; Heath SWB bridge, \$10.00; Ham-M Rotor, \$90.00; E-Z Way 45 ft. foldover tower with Wondersound post, \$195.00; Mosley TA-33 Sr. with 401S, \$75.00; Johnson T-R Switch, \$20.00; Drake low-pass 100WV \$10.00. All associated coax and connector included. Will sell as package deal only for \$1000. Contact: J. J. Perry, 424 Elmhurst Road, Utica, N.Y. Tel: RA-4-5374.

WANTED: Commercial, Military, all types, ARC, ARN, ARM, BC, GRC, PRC, TRC, URR, URM, TS, 618S, 17L, S1R, others. Ritco, P.O. Box 156, Annandale, Va.

HAM-License School! Preparation courses in code and theory. Call Ron Reed at Gkanite 8-3245, 11671A San Vicente Blvd., W. Los Angeles 49, Calif.

FOR Sale: Globe Scout Deluxe, coaxial relay, mike, antenna, Gonset G-63 receiver w/xtal, calibr, matching spkr. Package deal only! Also IG-34 keyer w/tapes, misc. tubes, parts. Make offer. Dick, K6GJM, 423 Lois, La Habra, Calif. 90631

COLLINS 75A-4 S/N. 3550, 800 cycle 3 J. Kc. 6.0 kc filters, \$550.00; 75A-4 S/N 1817 3. 1 kc. filter, \$500.00; KWS-1 S/N 1045, \$650.00. All in excellent condx. W5QMI, 9310 Beck Ave., Dallas 28, Texas.

CLOSING Station: Viking 500, RME 6900 with speaker; D-104 mike, PTT, metal operator's desk, Advance Ant. Relay, one owner, two years use. Clean and in per. condx: \$900.00. John Ayers, W4KFL, Box 9, Loccoia, Ga.

SAN FRANCISCO Area: For sale: Heathkit KW linear, un-assembled brand new, \$185.00; Johnson Ranger J, s/d condx, \$75.00. Other gear also: WA6VQS, 283 Sunstank Lane, Los Altos, Calif.

HAVE Collins 231-C transmitter, ten-channel autotune 2 KW AM rig. Will give to a worthwhile charitable organization. Prefer local pickup. Contact W7KV. 19849 Marine View Seattle 66, Wn.

RANGER I, late model, PTT, keyer, factory wired, never modified, perf. condx: \$140.00. D. M. Burns, 1663 Merline Ave., Dayton 10, Ohio.

SELL: DX-100. Unmodified, \$150. Will ship freight collect. Alan Bateman, K9AYB, R. 3, Boonville, Ind.

DX-100 for sale. No modifications. Excellent condx: \$100. W4HL, Hammond Smith, 610 Park Lane, Decatur, Ga.

WANTED: Measurements Model 80 Signal Gen. or equivalent must be in gud condx. For sale: New Hickok 288AX, K5BFN.

RK-65 Tubes wanted, W2K1 T, 151 Rock Creek Lane, Scarsdale, N.Y. Tel: 914-723-5493.

HAMMARLUND SP-600 JX17, .54 to 54.0 Mc. general coverage receiver, in excellent condx: \$350.00. K8LCU, 3431 W. Brainard Road, Cleveland, Ohio 44122.

CHRISTIAN Ham Fellowship now being organized. (Non-profit, undenominational, fellowship organization) Christian Ham Club, \$1.00 donation. Write Harry Wieskamp, WA8CFH, 96 East 21st, Holland, Mich.

75A-1 recently factory aligned. In excellent condx. \$195.00 at W2GUR, Phone 316-F-2-8612 after 7 PM.

WANTED: Used ham call letter license plates and any other type plates issued by law for my personal collection, the older the better. Any help greatly appreciated, will refund postage. Chuck Crisler, W5ASRC, 154 Ronald Blvd., Lafayette, Louisiana.

HAMMARLUND HQ-110C, \$125.00. Elmac A-54 \$30. WIBGA, 101 Vine St., Pawtucket, R.I.

ALLIANCE Penatorator and control box. In gud optg. condx. DIR model, \$13.50, automatic model, \$15.00. Ppd continental USA. Krauss, W8SPR, 906 Morris, Salem, Ohio.

NEED Money for college. Valiant F-W with factory aligned SB-10 single sideband adapter, cost \$550. Sell: \$400. SX-111 receiver and R-48 speaker. Cost \$300. Sell: \$200. All equipment one year old, in excellent condx. WA2ITF, 124 Oxford Dr., Tenafly, N.J.

SELL: Eico 720 90 W. CW xmtr, expert wiring, in A-1 condx. \$65. W2HFM, 60 Lindgren, Merrick, N.Y.

HALLICRAFTERS SX-111, excellent. John Lamy, K0WME, 509 W. B'way, Sedalia, Mo.

SELL: HQ-180C, \$320.00; SR-150 and PS-150AC, \$630; both in v. exlnt condx. Can't be told from new, in orig. cartons with all manuals. Joe Reifer, WA2BQB/9, 2305 Sheridan Road, Evanston, Ill.

WANTED: Correspondence course on communications, electronic technology or transistors with experiment equipment if possible. Thomas Condon, 321 Moreland St., Staten Island 6, N.Y. NY.

SHILLING Out: Complete station: Heath Marauder and Hallcrafters SX-111. Both are in exlnt opt condx and appearance. Also matching speaker, TA-32LR, AR-22 rotor, Heath HDP-21 microphone, Dow-Key, and Heath SWR bridge. \$625.00 takes everything. Mark Silverstein, 99-11 60 Ave., Flushing 68, L.I., N.Y. WA2UBA.

COLLINS 51-J (URR-388) factory aligned, checked, \$600. WA6VOS.

LIKE New B&W 5100B and 51SB-B. \$350; HQ-170C, \$250; B&W 180TR switch, \$10; Heath Batun coils, \$4.50; also 12V Babcock DX-Mtrr, \$35; PMR6 with 12V supply, \$50, 4 new UES72, \$9.00 each. KOMEX, P.O. Box 285, Earlham, Iowa.

CREAM Puff, matching Hallcrafters station, HT32 (\$350); HT33A (\$500), SX101A (\$260); EV729 mike, LP filter, connecting harness and desk. All for \$995 certified check or separately as priced. K2EJL, 1122 Hillside Avenue, Plainfield, N.J.

WANTED in any condx: HX20, E. C. Drake, 819 Millcrest Ct., Clinton, Iowa.

HQ-129X with matching spkr, \$120; 122 VFO, \$25; Johnson Challenger with PTT, \$110. All in exlnt condx with manuals. F.O.B. Yaeger, W9PWD, 2219 Mississippi St., La-Crosse, Wis.

MOBILE Equipment: Elmac PMR6A, \$30; Viking Mobile xmtr, \$30; James C-1450 power supply, \$15; Viking VFO, \$10; Dow 12V relay, \$8; manuals furnished. Package deal, will throw in S-meter and cabling, \$80. Prices firm. Cash with order. Will ship F.O.B. K9CLS, Ward Drill, Greendale, Wis.

SELL: Valiant, \$200; Drake 2B, \$205; Bud low-pass, \$10; Element 15M Beam, Wanted; Poly-Com 62B. WA2ODT, 5644 Mapleton Dr., Utica, N.Y.

MOBILE: Swan SW-120, both supplies, all top-quality accessories. Will ship in East. Make an offer! Lt George Hall, OSD, USAINTC, Ft. Holabird, Md.

HARMONIC arrived in December. Need money, all in mint condx. Warrior Linear, \$215; HQ-150, \$185. Range w/PTT; S-149; HQ-180 C, \$289. WA2LIM.

PANORAMIC Spectrum analyzer or equal 455 Kc. wanted. SW-175 wanted. Have SW-120, W2KIT, 151 Rock Creek Lane, Scarsdale, N.Y. 914-472-0754.

SELL: TH-4 beam, Ham-M rotor, forty-foot Spaulding tower. W2KWB.

HALLCRAFTERS S-76, \$90; Johnson Adventurer, Knight VTVM, VFO, speaker, bug, other misc. equipment. Best offer. Write K7UPJ, 742 W. Galena, Butte, Montana.

COLLINS 32S1 and 75S1 with 500 Kc filter, MMI mic., 516F power supp., mint, \$800; Elmac AF68 and PMR8 with M1070 (12VDC and 117 VAC) pwr. supply, Elmac S-meter, mobile xmtr-mig, rack, mic, exlnt, \$250; RTTY, 28 keyboard, xtd condx, \$25; latest Simpson 260 (new condx), \$25.00. K6PJU, 3334 Carlton Ct. Gar., Matco, Calif.

INVADER 205 5 months old, like new condx. Must sell to first reasonable offer. All offers acknowledged. Fern Belanger, 61 Lafayette St., Fall River, Mass.

SALE: GPR90, brand new, no reasonable offer refused. M. Smythe, 250 W. 136th St., N.Y., N.Y.

FOR Sale: Complete rig. Heathkit Marauder and SX-101A. Both in exlnt condx. \$450. Bob Glaser, W0VGA, 415 Emery, Mulvane, Kansas.

VALIANT, factory wired. Like new condx. One owner. \$225.00 or better. W1GVT, 218 Berlin Ave., Southington, Conn.

GOVT. Surplus sales. Information on how to bid on electronics including catalogs. Send \$1.00 to George's, Box 89, Drexel Hill, Penna.

FOR Sale: Hammarlund HQ-129X, \$110; BC-348Q, \$55, both in exlnt condx. Hammarlund 4-20 transmitter, great for Novice, with 807 final, \$22.00. Wanted: QST 1959 March-July. W0UBV, 2125 Summer, Burlington, Iowa.

FOR Sale: NC-125 w/matching spkr, xtal calibrator, instruction manual, exlnt condx. \$80. Eldico TR-75 (TV) with 80/40 meter coils, instruction manual, \$25. Combination \$100. Son's interest sold. Immaculate HQ-145X with xtal calibrator, accessory sock, solid-state 514, instruction manual: \$210. Earl Fox, 766-3871, 10 Cedar St., Basking Ridge, N.J.

HEATH Kilowatt Warrior Linear, Superior condx: \$175.00. W1PMM, Augusta, Me.

GLOBE Scout 65B, \$50; S-85 receiver with S-meter, \$60; 40 watt 2.8 Mc. surplus transmitter, needs pwr. supply, \$40; Heath 12v. Vibrator supply, \$10; K2DAC, Larry Finch, 16 Linden Blvd., Great Neck, N.Y. Tel: 516-HN6-0027.

6-METER Matched station: Communicator III, linear, VFO, Turner mike, Ameco preamplifier, separate power supply, extra \$26's, \$330. ARC III transmitter and receiver: \$25. Bob Wamsley, 5007 East 70th St., Indianapolis, Ind.

SELL: Invader, factory-new, \$410; SX-111 with R488 spkr, \$175; Johnson TR switch, \$18; G42U1*Birdcage 10-20-40 mtr. beam, new, \$30. W2COY, Box 552, Sidney, N.Y. 13838.

WANTED: Hammarlund MLW-125 capacitor, 125 mmdf variables. Restoring early Collins transmitter and will pay \$10 for this vintage 1932 capacitor. Write for picture, WA6EJF, 1101 Loneview, Marion, Iowa.

SELL: DX-100 modified for SSB, \$150; SB-10, \$85. All equipment is in exlnt condx. Gary Sundstrom, P.O. Box 232 Camden, Me. K2LXL and K1YQE.

SELL: NC-155, in exlnt condx: \$95 or your best offer. Double conversion 6 thru 80 meters. WA2TVL, 116 Hunters Lane, Sparta, N.J.

DUMONT 890-B 2-way frequency and modulation meter. NBFM, \$360. Write for details. Phil Petersen, 3001 St. Charles Rd., Bellwood, Ill.

HQ-170A, with IF type noise-silencer, \$285. Want: 6N2 Thunderbolt, K9AUJ, 1508 Glencazes Dr., Kokomo, Ind. 400 QST's 1921-1956. Sale or trade. Ferguson, 209 Home Ave., Graham, N.C.

FOR Sale: Heathkit Apache, factory-wired, \$185.00; Gensel Twins G-66B and G-77. Complete with AC-DC power supplies: \$250. Bernie MacCallum, W1WAE, 10 Pine Knoll Road, Lexington, Mass.

SR-150 Hallcrafters all-band transceiver, like new; SR-150, \$650; AC pwr. supp, \$99.50; DC pwr. supp, \$109.50 and mobile mounting rack, \$39.95, a \$898.95 value, all for only \$598.95, a \$300 saving. Johnson Viking Pacemaker, \$199.50. Raner \$149.50; Johnson Viking kilowatt, desk model, \$850.50. Collins 75A-4 receiver, \$499.50. Phil Rand, P.O. Box 28, Redding Ridge, Conn.

LINEAR Amplifier, 1500 W. PEP, 2-4X125As in PP 5-panel meters, rack panel, handswitching, 80/40 meters. Requires 5 watts to drive. A terrific buy at \$225.00. Stephen Lynch, K2SLT, 219 E. 69th St., N.Y. 21, N.Y. Phone 212-744-3192.

HEATH DX-100B absolutely immaculate, ready for sideband, \$145; Hallcrafters SX-71 with pre-amp and QF-1, \$80. Also friend's good DX-100, \$110; both graduating electronic eni-neers. Jim Roberts, W4EJO, 904 Treemont Road, Wilson, North Carolina.

FIRST Check gets Electric Instructograph, all new tapes, key and phones: \$40. Souped up ARC-5 with 15 and 75 meter coils. \$40. Jim Connell, Henderson, N.C.

SELL: Viking II, \$100; 122 VFO, \$25; in exlnt condx. WA4EPH, 314 Jamestown Rd., Williamsburg, Va.

SACRIFICE: Collins 75S3 receiver, 32S1 transmitter and 316F2 power supply, 4-1000 sockets, transformers and other linear parts. Roy Carthen, 2609 Reef Court, Orlando, Fla.

TRADE Ham gear for multithru or similar offset printing machine. No junk wanted. Gene Hubbell, W9ERU, Box 350, RR #4, Rockford, Ill.

SELL: FW Valiant, immaculate condx: \$300; wanted: teletype equipment, back issues of ham magazines. WA2WMP, 86-91 188th St., Jamaica 23, L.I., N.Y.

GLOBE Scout 680-A, \$40; Lafayette HE-30 with Heath HD-11 Q-multiplier, \$50. WA2ULM, 1368 Clifton Park Rd., Schenectady, N.Y. Tel: FR 2-0456.

HOWARD Radio: Used equipment guaranteed top operating condition—75S-1, \$325; 5100B, \$195; 51SB, \$129; RME 6900, \$29; 20C, \$155; Banphor VFO, \$79; 100B, \$79; NC-300, \$199; NC-181B, \$175; SX-101 MkIII, \$195; SX-111, \$189; Globe 500B, \$295; Globe 350 F/V, \$195; G-76 w/AC & DC PS, \$365; Invader 200, \$425; Courier, \$195; HQ-170C, \$229; HQ-160, \$205; HQ-140XA, \$159; 2A, \$185; 2B, \$209; AF-68 & PMR-8, \$225. Dealer in all lines of HAM equipment. Free new and used list. Box 1269, 1475 Pine St., Abilene, Texas, 79604

COLLINS KWS-1 transmitter, late mods. Serviced by Collins January 1963. In exlnt condx: \$675.00. Collins 75A4 receiver, reduction knob, 3:1 mechanical filter, xtd condx, \$395. Both \$895. Cash, no trade. Write: L. M. Divinia, 115 So. Battin, Wichita, Kans. Tel: 316-686-405.

KWM2, new, with 516F2 power supply and independent receive frequency control. SN 12332, \$950. Lynn White, Box 763, Harlan, Ky.

FOR Sale: New NCX-3 and NCXA, perfect 75S-1. Want: KWM2, 30L-1, 32S-1, K6VJE, 10234, Vista LaCruz, LaMesa, Calif.

HT-37, \$295; Drake 2A with Q-multiplier and spkr and xtal calibrator, \$185. WA2FSD, Tel: 516-HU2-2737.

VALIANT: Factory reconditioned. Make a fair offer. WB6BJJ, 553 Merriewood Dr., Lafayette, Calif.

SALE: GPR90, Brand new, \$275.00. WA2EGE.

KWM-2 with 516F2 AC supply/spkr: \$795.00; 516E1 12V DC sply, Webster Bandspanner, Morrow tuning coil, Bumper mount, \$175.00. Throw in Turner mike. Set 6146's on package deal. Box 124, Liberty Lake, Wash.

MARCH winds blow values your way—Bonus with the following selection-HT-4 antenna with New HT32B-\$725.00; Ham M roto with SX115-\$595.00; Hygain 203G- with used Invader 2000-\$995.00-1A331F- with New Valiant 11-\$495.00; Hipar-L16 with Cleghor \$349.95- Telrex6C with Venus & ACpwr-\$85.00-Used Equipment- next: omniunicator, 111-6 meter-\$169.00- Lettine, 242-559.95-Health-sixer-\$34.95- Towerw/M/PS \$44.50- Knight 1-150-\$89.95- LA-\$179.95- Central Elect, 100V-\$395.00; Sonar 80-\$225.00-SW240-\$265.00; SW175-\$175.00; SW 140-\$175.00; HT-32-\$359.50-HT-41-\$279.00; HT-33 \$350.00; HT33B-\$475.00; Drake 2B-\$225.00 2A-\$189.95- 2BQ-\$29.00; SX101A-\$250.00- S40B-\$50.00 Heath TX-1-\$199.00 RX1-\$299.00; Highest trade-ins. Write or latest list, W4VJL, Fern, Brock, K400K; Bill Beck, Freck Radio Supply, 38 Biltmore Ave, Asheville, N.C.

GRICE Electronics, Inc. has: Heath HX-30, \$165; HA-20, \$85; Johnson Valiant, \$245; Viking II, \$109; B&W 5100, \$200; 51 SB-B, \$90; Hammarlund HQ-110-C, \$170; Collins KWS-1, \$925; 75S-1, w/cv filter, \$425; many more. Write for used equipment list: P.O. Box 1911, Pensacola, Fla. 32502.

SELL: Viking KW, better than new. All modifications, extra used final tubes, \$750; Collins 35C-2 low-pass filter, \$25.00; Viking 250-33 speech amplifier, \$45.00; Viking 250-421 RF swapper, \$15.00. Entire package: \$800. Cash and carry deal only. W0MAF, (Kansas City), 5841 High Dr., Shawnee Mission, Kansas.

HOSS-TRADER Ed Moory needs folding money to buy hay for his ponies. New equipment, factory warranty: Swan SW-240, \$269; SB-33, \$399; Demo NCX-3, \$39; New Collins 75S-3, \$569; 200-V, \$539; new TH-4 Hy-Gain beam, and demo Ham-M rotor, \$179; new Galaxy 300, \$249; Demo Hunter Bandit, \$429; new Spitfire mobile linear, \$149; factory reconditioned 75A-4, serial #4100, \$469. Used bargains: HQ-170-C, \$169; 10-B, \$59; \$2.01 MK 3, \$185; HT-32, \$295; HT-37, \$285; Demo 2-B, \$219; TR-3, \$44; Warrior linear, \$179; W4W-M-2, \$775; 32S-3, \$495; 30L-1, \$359; Thunderbolt linear, \$279. Terms: Cash, Ed Moory Wholesale Radio, Box 506, DeWitt, Arkansas. Phone WAH06-6280.

SALE: Gonset Communicator IV 2M. K2BPX. 709 Graisbury Ave., Haddonfield, N.J.

SELL: Drake 2B, 2BQ combination speaker and Q-multiplier, 2 AC xtal calibrator. Cost \$327 but will sell for \$260. New Transenna T-R switch, \$45; 2 walkie-talkies, like new, 1-1/2 watts, each \$50; Fdion low-pass filter, \$5. You pay shipping. R. Lamb, 1219 Yardley Road, Morrisville, Penna.

4-1000A amplifier, TVI-suppressed, well metered, \$150; \$185 to \$300 with pwr. supp; home brew transmitter, VJ-O-4E27, wonderful c.w. rig, \$75; large vacuum variable, \$45; 800W amplifier \$50; \$85 with pwr. supp.; various high power supplies; L&V grid dipper, \$25; Messner band switching signal shifter 9-1090, \$25; field strength meter, \$5; coax, lowest prices, various meters: OF-1, \$7; H.V. transformers, capacitors, chokes; 811A \$3, \$2; 829B's, \$5.50; 832A's, \$2.50; 4E27/5-125B's \$8; 4E27, \$4; 4-125A's, \$6; 4-150A's, \$3; 750TL, \$45. Charles Jaeger, 204 Via Antibes, Newport Beach, Calif.

SELL: SX-101 Mark II. In gnd shape: \$195. K4SSB, 31 South 42nd St., Birmingham, Ala.

ART-13, in excellent cond: \$39.50; BC-433F receiver with shock mounts: \$12.50. Ace Electronics, 1422 Market St., San Francisco, Calif.

WANTED: For cash: 200 or 300 mmf, variable vacuum capacitor 10 kv. Prefer Jennings UCS200. Also 1 kva. Sola line voltage regulator. W2DYV, 548 W. Graisbury Ave., Audubon, N.J. 08106.

FDICCO-SSH100F xtal lattice filter rig SSB-AM-CW, 100 watts output 80 thru 100 meters pi-net output with built-in scope. New condx, w/manual: \$385.00, SX-111, product detector, exclnt condx w/manual: \$200. Ed Heubach, W9CON, 216 Edgewood, Morton, Ill.

COLLINS 301-1 less than year old and in mint condx, with original carton, manual, etc. Firm: \$390. Also Collins 62S-1 Xmas purchase still in sealed plastic covering and in original carton: \$795. Might consider high serial number 75A-4 which has only factory modifications and in mint condx. H. Jack Holt, K1VFO, Quassapaug Rd., Woodbury, Conn. Tel: 263 2341.

NCX-3, with NCXA AC supply: \$400; Communicator III, 6 meters, \$150; Clean equipment seldom used. H. Darley, Box #209, Morton, Ill. 309-264-1301.

QST: 1923-1963, complete run. Your best offer over \$100. C/O's 1948-1963. Best offer over \$25.00. Shipping cost extra. Lester Harlow, W4CVO, 29 E Rosevear, Orlando, Fla.

IUX-100B, Mosley TA-33JR. Both \$175.00, in exclnt condx w/manuals. Pwr. supply, 600/100 Ma. 250. Reg. 150 and 225 and filaments \$20. Yates, Mackinac, Illinois 61755.

SELL: Hy-Gain, Duo-Bander 20-40 beam, \$75 and 40 ft. crank-up, fill-over galvanized tower with around post \$140. W6YMR, 2138 Montrose Dr., Thousand Oaks, Calif.

FOR Sale: Heath DX-20 transmitter; AR-3 receiver, OF-1 "Q" Multiplier complete with manuals, perf. cond. Used only four hours. \$70.00. Blakeslee, 17 Mountain Rd., Chatham, N.J.

ELMAC AF-67, 60W; PMR-7, 570; both units with matchline James 6/12 v. pwr. supp., \$130. WA6YZG, Traver, 59A Burroughs, Chino Lake, Calif.

HO-170C, \$210; Marauder, \$310; Warrior, \$200; 2Mtr. GE-FM transmitter, complete with Antenna, 30W output. All exclnt condx. W8FAX, Box 182, Allen Park, Mich.

COLLINS KWM-2, 516F-2, 312B and less than 33 hours. Sell or trade. No time to operate. W5KQU, 3859-A Villa, Los Alamos, New Mexico.

SELL: Halliaterers SX-110, in A-1 condx, best offer. Wanted: Polycrom 6 & 2. WA9HEU, 704 Main, W. Dundee, Ill.

COLLINS KWM-2, 516F-2, in mint condx, never mobile. Will ship. \$950.00. W6MNH, 834 N. Cedar St., Escondido, Calif. Phone: 714-745-3901.

GALAXY 300, Vox, AC and DC power supplies. All good condx. Don Leitschuck, Odell, Nebr.

NC-109 by National for sale. Like new in performance and appearance. \$99.00. WA2HPA, 22 Colony Drive, Summit, N.J.

WANTED: Kleinschmidt TT-76A tape machine and TT-4A pasc printer. W9UE.

TRADE: Two building lots in South Venice, Florida. paved street two blocks off Route 775. 1000 ft. private sand beach on Gulf, yacht basin and club house. Owner will trade for KWM-2 w/AC pwr. supply or \$1000 cash. Write for map of location and info on fishing and boating or mail asked on 14 mc. SSB with W4PC, P.O. Box 482, Pinnellas Park, Fla. 33565.

FOR Sale: Globe King 500B, delivered in Southern New Mexico or El Paso, \$225.00 with spare 4-400, A. Lawrie, W5-MHT, 1513 Elizabeth, N.E., Albuquerque, N.M. 229-7853.

KWM-2 with Waters relection tuning, \$795; PM-2 (piggy-back) AC supply, \$110; KWM-2 suitcase, \$50; 399C-1 (external PTO-sprk), \$115; 30L-1, \$375.00; Drake 1-A, \$135.00; HO-180C, \$265.00; HT-32, \$340.00, W8WGA, Phone: AC 513 2770409.

SIDEHAND: Marauder exc., \$300; Drake 2B and spkr, and Q-multi., all exc., \$200. Also ant. relay and acc. All for \$480.00, Stu Personick, WA2KCH, 3230 Cruger Ave., Bronx, N.Y. 212-014-2381.

WANTED: 50 Gonset Radio 874C-58A co-ax cable connectors for RG-58. With or without attached cable. W5AFC, 231 Astor St., San Antonio, Texas 78210.

COLLINS Station, complete: 2S-1, 516F-2, 30L-1, 75S-3, \$195.00, 75A-4, 3100 and 500 cycle filters, \$450.00. QST bound volumes. Run in from 1926 through 1945. \$100. Entire lot: \$1595. Cash and carry deal only. Write W2AEB.

SELL: Entire! Used 3 months; fico 720, \$79.00; Heath revr HR-10, \$74.00. New condx! Write to 423 Perkiomen Ave., Lansdale, Penna. Bill Bartholomew.

TAPE Recorder: portable Grundig Niki model: 3 1/2 ips, 3 1/2 recls, battery and 110-220v. ac pwr. supplies. Mike, extra plus and recls. Gud cond: \$50. K9KTL, 3514 N. Riley, Indianapolis, Ind. 46218.

HAMMARLUND HK1B keyer, \$18; Dow-Key DKC-TRP TR switch, \$12; Dow DKC-RFB Preampl, \$6.00; Heath HO-10 Monitor scope, \$40. K2RNN, 322 Farwood, Haddonfield, N.J.

SELL Complete station: Seneca VHF-1, Hammarlund HQ-145, 5 and 6 meter converters, new AR-22 rotor, Mosley 9-cl, beam antenna, for 2 & 6 meter. Low-pass filter, mike, coaxial cables, Anthony Crosso, WB2KZH, 10 Turs Court, Wallington, N.J. Tel: 933-5393.

CENTRAL Electronics 200V, extra gud condx, currently on the air. Best offer over \$450.00; PMR and mobile pwr. supply: \$65.00. Dr. M. B. Robbins, 23-01 Raddburn Road, Fairlawn, N.J.

WANTED: Collins 30L-1, Halliaterers HT-30; Harvey W Bandmaster "Z" Match. Stata condx and price. W3OKW.

WANTED: P & H 8015, 75A 4 & 6 Kc filter. Sell 200 Mc. 4CX250 linear and power supply, DSB-100, other great list. W4API, Box 4095, Arlington, Va. 22204.

KID From Texas Specials. New Swan SW-240 with Ad-Com DC supply \$369. New SB-33 with DC supply \$389. Immediate delivery on SBE linear. Reconditioned and guaranteed equipment specials. HT-37 \$279, HQ-110 \$99, SW-240 \$229, HQ-129X \$79, Collins 811A \$439, Globe King 500A \$249, Valiant \$149, B&W \$100 with 515B \$229, Drake 1-A \$129, SX-101A \$199, HQ-170C \$179. Clean homebrew linears, send for list. Marauder HX-10 \$249. Ad-Com supply with new guarantee \$79. New 4-1000A's \$65, used \$35. Jennings vacuum variables \$45. SR-150 \$449. Bryan W5KFT, Edwards Electronics, 4124-34th St., Lubbock, Texas. SWS-2595. Terms. Cash. Trade, or 24 months to pay.

SALE: Swan 20-meter transceiver, GSB2D1 final 10-80; 1500 watts PEP, RTTY, converter and AFSK. Cash offers. K1CNK, 1E, W6-3-5045.

FOR Sale: Heathkit "Shawnee" HW-10 6 meter transceiver, 8 months old, professionally wired and tested, in mint cond; \$200. Will ship anywhere. K2VWZ, 491 Rebecca Lane, Ocean-side, N.Y.

APACHE \$175; SB-10, \$75.00; Valiant \$250; NC-300, \$175; S-120, \$50; TR-44, \$50. F.o.b. H D H Sales Co., 170 Lockwood Ave., Stamford, Conn.

SELL: 6 mtr. Shawnee transceiver, used v little: \$200; Heath TS-4A IV sweep generator, like new condx; \$50.00; NRS model 250 wideband oscilloscope, slightly modified to accept microphone type plug set of four matching probes, \$60. Vv clean wired units. Will pay shipping charges within reason. K1MYA, 335 Winchester St., Keosau, N.I.

FOR Sale: Jones MM252 MicroMatch calibrated SWR and pwr. output 0-1000 watts, \$24.00. R. Arrowsmith, 4605 North 17th St., Arlington 7, Va.

COLLINS VFO for 75A-4, 70E-24, new, \$39.00; 70E-23 for KWS-1, new \$39.00; VFO for KWM-1, 70K-1, new, \$39.00; 136-B blanker for KWM-2, \$70. Richard E. Mann, 7205 Center Dr., Des Moines, Iowa.

SX101A with deluxe knobs and spkr, HT32A, HT33B, less PL172. All in mint cond, first \$1000 takes them. Want: Crank-up tower, beam rotor, etc. W2WCO, 9 Poplar Place, Franwood, N.J.

KNIGHT T-150 transmitter (Wired) 6-80 UFO, etc., \$65; Harvey Welis HF-50 transmitter, \$20. Ed Seler, 2513 W. Shaker, Chicago 47, Ill.

VALIANT, \$225; PMR-7, AF 68 with power supply, 6 meter converter, \$200. W2PZQ.

SELL: Viking II, WRL-755A VFO and assc., \$160; SX-99, \$90. All F.W. and in gud condx. K1CJB, 133 N. Main St., South Hadley Falls, Mass.

SFLL: Gonset G-63 receiver, 80 thru 6 M. xtal calibrator, in all most new condx, \$110. Price firm. WA2PTG, S. Banks, 2630 Kingsbridge Terrace, Bronx, N.Y. 10063.

COLLINS KWM-2, \$850; 30L-1, \$400; 312B-5, \$250; AC supply \$85; DC supply, \$125.00; 351D-2, \$90. All in A-1 condx. K0JXW, 270 S. Pershing, Wichita, Kans.

KWM-1 transceiver complete with cables, 312B-1 spkr, 516F-1 ac supply, 515E-2X DC supply, 351D-1 mobile mount. All in mint condx. \$595. F.o.b. W0CVU.

WANTED: B&W pi-network, type 850, also vacuum variable, Trade, or for sale, 10 meter Neil Mobileer transmitter with Dow Key coax relay, mike, etc. WA2WMK, Box 725, Sag Harbor, N.Y.

NVM-2, mobile mount, A.C. supply, will demonstrate and deliver \$875. C. Ham, W2KDG, 38 Radcliff Dr., Huntington, N.Y.

CRYSTALS Airmailed: Kits, MARS, Marine, SSB, Neis, CD, etc. Custom finished chrt stabilized FT-243 .01% any kilocycle \$500 to 8000 \$1.75. (five or more same or mixed frequency \$1.50.) (Ten or more same frequency \$1.25.) 1700 to 20,000 Kilocycles \$2.25. Overtones above 10,000 Kilocycles. Add 50¢ each for .005% HC-60u miniatures above 2000 add 65¢ each. QST Kits, FT-243, DC5-500. "Three band converter," "Phasors," "AMP 95/50," "SSB Package," Mixer or Filter—\$14.95 & Write regarding specific needs. Airmailing 10¢ crystals surface 5¢ Crystals since 1933. C-W Crystals, Box 2065-Q, El Monte, California.

\$253, \$595; 75S3, \$495; 30L1, \$375; pwr. supp., \$75; control box \$100 or \$1500 complete, Xmt and linear used 3 hours. Also 200V \$495. Everything is in mint condx. K1AGL, S. Partyka, 141 Waite Ave., Chicopee Falls, Mass. 413-592-2952. Call person-to-person.

FOR Sale: Heath HR-20 SSB revr, factory aligned, in exclnt condx, used only 20 hours; HP-23 pwr. supply, AK-7 spkr. Package deal. Best offer takes it. Will ship. Write: S. U. Berger, 14 2nd Ave. S.E., Cedar Rapids, Iowa.

NCX-3 and AC pwr. supply, like new: \$350. Don Bright, RRI, Stillwell, Kans. TW 7-2551.

FOR Sale or trade: Fico 460 scope, \$80 or Heath monitor scope and \$20; HT-37 and 2-B w/2-BQ and Knight xtal cal. \$600 or Drake TR-3 w/p.s., or you make offer. No space. All in exc. condx. All F.o.b. K5SPM, 11415 Chatten Way, Houston, Texas, 77024.

SALE: National NCX-3 transceiver. No power supply. Will ship c.o.d. for \$275.00 in original box. K0GXL, Mark Holland, 6701 Hickman Rd., Des Moines, Iowa.

RANGER, in gud condx. F/W with manual. Will ship. \$140.00. Drake 2-AQ, Q-multiplier and sneaker combination for Drake 2A or 2B. Perfect. \$25.00. K8A1A, Box 953, Hamilton, Ohio.

WANTED: 800 cycle mech. filter 455-08-B. Will pay \$50. W6LDS, 173 Whittier Lane, Hayward, Calif.

HEATHKIT HW-32 20M SSB transceiver, less power supply, like new, in top operating condx. \$95; an exceptionally well-built Heathkit QC-1A Mohican receiver, an excellent performer. \$75. Little used Heathkit XC-2 2M converter, \$10. Please enclose SASE. K8HLL, Box 77, Rte. 2, Stevensville, Mich.

SALE: HT-32A, \$400; SB-10, \$60; Gonset Super Six converter, \$18. All exclnt condx. I.o.B. W3BCP, Morganza, Md.

SELL: Brand new Hammarlund HX-50 in original carton with all manuals and warranty; never used. Included is VOX modification kit and 160 meter adapter kit. \$375 or reasonable offer. Also: HQ-170AC used 10 hours, perfect, \$310 and HK-1B, perfect, \$26 and AR22, never used, \$25. Vibroplex Original, perf., \$16. Must sacrifice entire shack. Phone 212 FL 7-6802 N.Y.C.

COLLINS 75S-3 receiver. Bought OKT 63, like new condx. Need time for family and work. Inviting reasonable offers. Groeger, Box 459, Dahlgren, Va.

SELL: B&W 380 T.R. switch, \$9.50, Globe 755 VFO, \$24.95; 372 and 8008, \$1.95; 6 ft. 5 1/2 in. enclosed relay rack, \$19.90; 12 sockets and 1 ft. xfrm., \$6.95. Cardwell 8013, 2000 mmfd., \$9.95. Joseph Artoli, 36 Hawley Ave., Woodmont, Conn.

SELL: Hy-Gain 18HT vertical, \$75.00; Lincoln 6-meter transceiver, \$40.00; Horat 1500, \$45.00; Motorola 6 meter FM mobile, \$50; Heathkit HD-11 Q Multiplier, \$12.00. Will ship small items only. E. V. Weiner, 511 Fifth Ave., Coralville, Iowa 52241.

HAMMARLUND HQ-180C. Matching speaker, earphones, \$300; Bought new. Ameco code oscillator, key, records, new condx, half-price. Dr. Goldrich, 90 Audubon Ave. Jersey City, N.J.

SELL: Hallcrafters HA-4 T.O. Keyer, complete with Vibroplex "Vibrokeyer" key. Both units brand new. \$78 net value. Will ship postpaid in U.S. for first \$54.00. Irving Patridge, WDTT, Milbank, S.D. Zip: 57252.

JOHNSON Desk kilowatt, new sideband modification kit, Ranso, P.T., sequence keying, factory-wired, kilowatt Match-box SWR bridge, new tubes extra spares, 4-400A's, \$10.00, 872A's, not surplus. Complete cables, ready to operate, condition like new; \$900 cash. Ted Brix, 3733 No. Van Ness Blvd., Fresno 5, Calif.

WANTED For personal collection: WD11, UV200, UV201. WEVT filaments OK. State quantity and price. Lloyd Andres, 5790 S.W. 114 Terrace, Miami, Fla.

HEATH Two-er \$45.00, Gonset Communicator III \$165.00, Gonset Communicator IV \$275.00, Gonset G-50 6 meter Communicator \$275.00, Collins 32V3 AM transmitter \$350.00, Collins 33S3 Receiver \$550.00, Gonset Geo Receiver and J15 AC 12V DC power supply \$175.00. Homemade 2 meter transmitter, complete with transistorized power supply, but cables have to be made up. \$100.00, Collins 75A3 with 3 and 6 KC filter \$325.00 Gonset VFO & Audio Preamplifier for use with Communicator VI \$35.00, Cush-Craft 3 cl full size beam \$25.00, Workshop 10 meter 3 cl beam \$15.00, Tel-Rex 10 meter 3 cl beam \$20.00, Workshop 20 meter 3 cl beam \$50.00, Tel-Rex medium duty rotator & indicator \$35.00, Video, Box 43, Rte. 2, So. Portland, Me. Tel: 772-270.

FREE Two or six meter coaxial antenna for ham in each state for test report. QSL Gotham, 1805 Purdy, Miami Beach 39, Fla.

FOR Sale by college student: National NC-88 receiver, gud condx. \$60. J. Mockus, Box 236, State College, Penna.

HUNTER Bandit 2000A, like new condx, \$385 or you make offer. Richard E. Mann, 7205 Center Dr., Des Moines, Iowa.

POLY-COMM 6 AC/DC, new, \$260; new G-E 6146's, \$2.95; new G-E 5R4GYA's, 75¢; 8005's, \$3.95; 54G's, \$2.95; New surplus 220 Mc. amplifier with 5894 tube, \$19.95. Unmodified APX-6, \$14.00. F.o.B. W4GJO, Box 1294, Sarasota, Fla.

GSB201, \$220; Apache TX-1, \$150. Both in exclnt condx. WA6MGO, 213 N. Dianthus, Manhattan Beach, Calif. FR 4-4318.

COLLINS 75S3 and 32S3 in excellent condition. Would like to sell these to purchase M2. No trades. Highest bidder receives rack mounts free. John H. Holmes, Jr., Box 4125, Austin, Texas.

OVERSTOCKED Again! Premium quality reconditioned equipment! Free trial! 90-day guarantee! Low monthly payments! Over 1,000 units on hand! Write for free lists! Biggest savings ever! Just a few: 20A, \$99.00; Cheyenne, \$69.00; Viking II, \$109.00; Invader, \$359.00; FMIR-6A, \$49.00; NC-125, \$89.00; 40M Swan, \$149.00 and hundreds more! World Radio Laboratories, Box 919 Council Bluffs, Iowa.

RETIRED Ham has hobby repairing, converting, or modernizing receivers and transmitters to make them useful in today's crowded bands. Forty years' ham experience. Write me your needs and I will quote a low price for my service. Sam Appleton, K5MKI, 501 N. Maxwell, Tulla, Texas.

COMPLETE New Collins S-Line. #30S-1, 32S-3, 75S-3, 62S-1, 312 B-4, 516F-2. SM-1 dynamic as a unit only for \$2900.00. Cash. F.o.B. Woodbridge, Conn. WICFE.

MUST Sell: Complete station—\$475.00 or in part: Valiant, \$250.00; HQ-170 \$235.00; TR switch, \$20; D-104, \$15.00; low-pass filter, \$10.00. All gear in A-1 condx. K1KSS, 231 Laurel Hill Dr., So. Burlington, Vt., or call 802-3725.

FOR Sale: 1 KW Barker & Williamson L1001A with Deluxe pwr. supp., rack, relay supp., Variac, meters, \$240; Mosley TA33SR w/CDR rotator and atmum. mast, \$110; Collins 75S-1 and 32S-1 with military type 516F-1 pwr. supp, \$770. C. Campbell, 20 Lois St., Danbury, Conn.

HARMONIC Arrived in Dec. Need money. All in mint condx. Warrior Linear, \$215; HQ-150, \$185; Ranger w/PTT, \$-149; HQ-180 at \$289, WA2LIM.

SELLING Lafayette HE-35A and Halo, WA2RUW, RD 5, Box 159, Kingston, N.Y.

S-107 with 20-meter antenna. First \$40.00 m.o. gets. Stan, WA2SUY.

QST

ADVERTISERS

Advertising is accepted only from firms who, in the publisher's opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League."

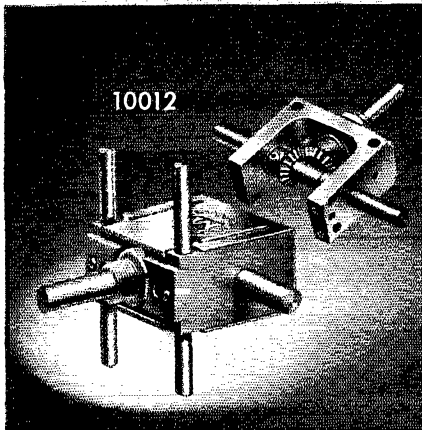
Quoted from QST's advertising rate card.

Amateurs and Electronic Engineers: Practically everything you need can be supplied by the advertisers in QST. And you will know the product has the approval of the League's technical staff

Designed for



Application



10012

The No. 10012 RIGHT ANGLE DRIVE

"Designed for Application." Extremely compact. Case size is only 1 1/2" x 1 1/2" x 3/4". Uses bevel gears. Mounts on adjustable "standoff rods," single hole panel bushing or tapped holes in frame. Ideal for operating switches, potentiometers, etc., that must be located, for short leads, in remote parts of chassis.

JAMES MILLEN MFG. CO., INC.

MAIN OFFICE AND FACTORY
MALDEN
MASSACHUSETTS



Index of Advertisers

Adirondack Radio Supply	173
Alcom Electronics	142
Alkan Products	162
Allied Radio	184
Alltronic-Howard Co.	152
Amateur Product	136
Ameco Equipment, Corp.	137, 170
American Cable and Radio Corp.	154
American Radio Relay League, Inc.	160
<i>QST</i>	181
<i>Advertising Policy</i>	109
<i>Handbook</i>	175
<i>License Manual</i>	173
<i>Supplies</i>	161
Arrow Electronics, Inc.	138
Ashe Radio Co., Walter	149
Astale Corp.	150
Automatic Telegraph Keyer Corp.	148
Barker & Williamson, Inc.	154
Barrington Specialties	163
Barry Electronics	143
Belden Mfg. Co.	144
British Radio Electronics, Ltd. (Eddystone)	154
Burstein-Appelbee Co.	127
Centimeg Electronics Corp.	118
Clegg Labs., Div.	115
Cleveland Institute of Electronics	120, 166
Collins Radio Co.	132
Communication Products Co.	170
Communications Equipment Co.	122
Cornell-Dublier Electronics Div.	166, 169
Crawford Radio, The	174
Cush Craft	163
Dames Co., Theodore E.	149, 162, 164
Datak Corp.	141
Douglas Instrument Co.	1
Dornet & Co., Inc., The	123
Editors & Engineers, Ltd.	174
Eitel-McCullough, Inc.	110
Electro-Voice, Inc.	168
Electrophysics Corp.	158
Evans Radio	170
E-Z Way Towers	101, 103
Fichter Electronics	153
Finnay Co., The	130
FMI Sales Co.	167
Fort Orange Radio Distributing Co., Inc.	1, 99
Gain, Inc.	5
Gardner & Co.	151
Gotham	157
Grand Central Radio, Inc.	106, 107
Hallett Mfg. Co.	183
Halicrafters Co., The	170
Hammarlund Mfg. Co., Inc.	111
Harrison Radio	150
Harvey Radio Co., Inc.	105
Heath Co., The	166
Henry Radio Stores	165
Hi-Par Products Co.	171
Hornet Antenna Products Co.	163, 175
Hunter Mfg. Co., Inc.	165
Hy-Gain Antenna Products Corp.	182
Institute of Electrical & Electronics Engineers	152
Instructograph Co., Inc.	165
International Crystal Mfg. Co., Inc.	171
International Time Indicator Co.	139
Johnson Co., E. F.	134
Kreckman Co., Herb	169
Lafayette Radio	131
Lampkin Labs, Inc.	172
Latin Radio Labs	148
Master Mechanical Mfg. Co.	173
Millen Mfg. Co., Inc., James	147
Mini-Products, Inc.	160
Mor-Gain	128
Mosley Electronics, Inc.	146
National Radio Co., Inc.	121
New Products	125, 139
Newark Electronics Corp.	169
New-Tronics Div.	131
Ontario Sales Co.	172
Organs & Electronics	148
Parks Electronics Lab.	173
Penta Labs, Inc.	147
Productive Tool & Mfg. Co., Inc., The	160
Radio Amateur Callbook	128
Radio, Inc.	146
Raytheon Co.	121
RC's Electronic Components & Devices	139
RE Communications Associates, Inc.	134
Rohn Mfg. Co.	158
Scientific Associates Corp.	116
Seco Electronics, Inc.	136
Shure Bros., Inc.	129
Sideband Engineers, Inc.	156
Skyline Products	135
Squires-landers, Inc.	114
Swan Electronics Corp.	132
Sylvania Electric Products, Inc.	130
Technical Materiel Corp.	175
Teeruff (Equipment Crafters, Inc.)	172
Telex, Inc.	171, 173
Telrex Labs.	142
Tepabco	164
Terado Corp.	155
Trigger Electronics Corp.	116, 117
United Transformer Corp.	175
Utica Communications Corp.	156, 169
Van Steekle Radio Supply Co.	152
Vanguard Electronic Labs.	145
Vibroplex Co., Inc., The	124
W3KT QSL Service	167
Waters Mfg. Co.	170
Webster Mfg. Co.	169
Whippany Labs, Inc.	159, 162, 172
Wilson, Inc., Willard S.	
Wisco	
World Radio Labs.	



TWO BIG SECTIONS

IEEE SHOW '64



march 23-26
9:45 A.M. - 9 P.M.

at the
**NEW YORK
COLISEUM**

all 4 floors!

- ELECTRONICS EXHIBITS
- CONVENTION PAPERS

See the finest products of industry,
hear famous men speak! Just one entrance
fee lets you visit both sections.

Buses to the N. Y. Hilton every few minutes

PRODUCTS • PAPERS • PEOPLE • PRODUCTS • PAPERS • PEOPLE

ONE GREAT SHOW!



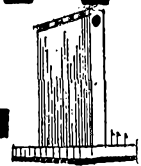
at the
**NEW YORK
HILTON**

2 floors, including Hilton's
main exhibition area

- ELECTRICAL EXHIBITS
- CONVENTION PAPERS

IEEE Members: \$1.00
Non-members: \$3.00
Minimum age: 18

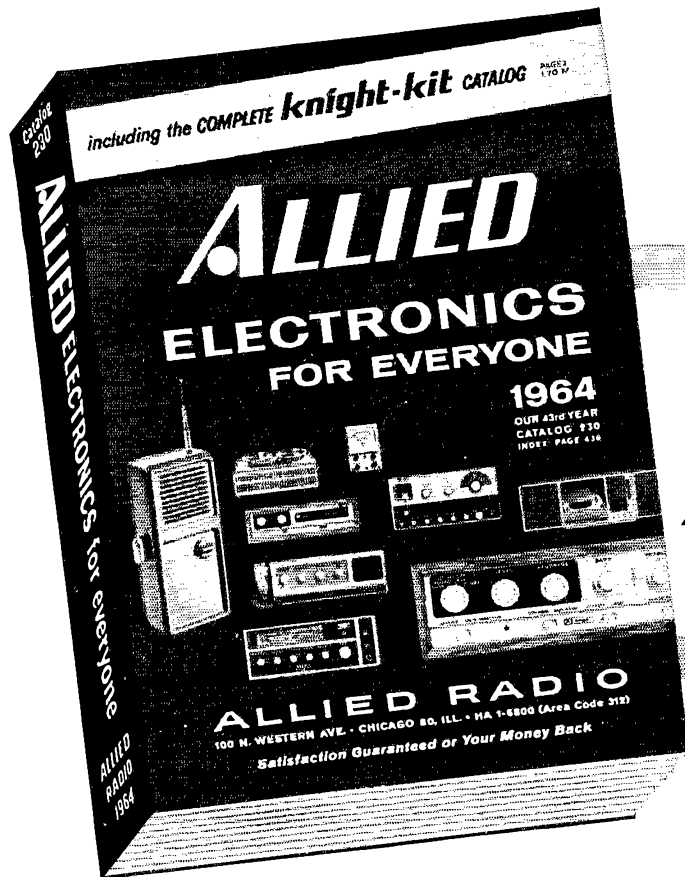
IEEE SHOW '64



march 23-26
9:45 A.M. - 9 P.M.

Buses to the N. Y. Coliseum every few minutes

● PRODUCTS • PAPERS • PEOPLE • PRODUCTS • PAPERS • PEOPLE



FREE

send today for
your 444-page

ALLIED

1964 CATALOG

world's largest
electronics catalog

BIGGEST SELECTION
BIGGEST SAVINGS

EVERYTHING IN ELECTRONICS FOR THE AMATEUR

*get every ham
buying advantage*

LARGEST SELECTION

ALLIED stocks the station gear you need—at lowest, money-saving prices. Same day shipment from the world's largest stocks.

HAM-TO-HAM HELP

Our staff of more than 60 licensed hams goes all-out to give you the personal help you want. Whether you write, call, or visit our Ham Shack, you'll like the friendly interest and attention you always get at ALLIED.

EASY TERMS

Take full advantage of the ALLIED Credit Fund Plan.

ALLIED RADIO

serving the Amateur for 43 years

- Ham Receivers and Transmitters
- World's Largest Stocks of Station Supplies
- New Build-Your-Own Ham Knight-Kits®
- Citizens Band 2-Way Radio
- Electron Tubes and Semiconductors
- Test Instruments and Meters
- Everything in Stereo Hi-Fi
- Tape Recorders and Tape
- Everything in Electronic Parts, Tools & Technical Books

SEND FOR YOUR COPY TODAY



ALLIED RADIO, Dept. 13-C
100 N. Western Ave., Chicago 80, Ill.

Send FREE 1964 ALLIED Catalog



Name _____
PLEASE PRINT

Address _____

City _____ Zone _____ State _____

...need we say more?

Have been in amateur (and commercial) radio since the '20's, and the NCX-3 is the most enjoyable and interesting rig I ever owned. W7M--, Seattle, Washington

In comparison with a higher priced unit our NCX-3 walked away with the honors. I am more than pleased with my NCX-3.
K9U--, Rockford, Illinois

Amazed at the ease of operation and tuning. Fine quality signal reports.
K6O--, Palo Alto, California

I have used SB gear commercial and amateur. NCX-3 tops even commercial.
K5G--, Midkiff, Texas

I have always believed National to be the best; now I am sure. NCX-3 is best in the field. WNSF--, Vicksburg, Mississippi

Best I have used in 32 years. Excellent.
W1G--, Framingham, Mass.

This is without doubt the best buy ever made.
K6B--, Fresno, California

The advertising on the NCX-3 is completely misleading. The equipment looks considerably better than the pictures in the advertising. The performance and styling is much better than advertised.

W4Y--, Grovetown, Georgia

Far better performance than anyone has a right to expect.
W9K--, Park Ridge, Illinois

Best transceiver design in its price class. DJ5--, West Germany

Finest piece of communications gear of this type I have seen and used.
W9W--, Taylorville, Illinois

Having a ball with it! Excellent reports audio wise and signal strength.
W1H--, Merrimac, Massachusetts

I've had the NCX-3 just over a month now, and I must say that it does everything your advertisements say and then some.
W1--, Portland, Maine

I get amazing signal reports on mobile op. Most fun I've had since I got on the air! Very excellent piece of electronic equipment.
W6L--, Mission San Jose, California

NCX-3 is untouchable in its class.
WNSF--, Vicksburg, Mississippi

How you did it I don't know. The rig is absolutely unbelievable, fabulous.
WA2J--, Freeport, New York

This is one of the nicest pieces of equipment I have ever had the privilege to own.
KØI--, Cedar Falls, Iowa

I have been in ham radio for about 9 years and I am sure that this is the best piece of radio equipment ever to enter my room. Keep up the good work.
W9R--, Belleville, Illinois

Best VOX I've ever used!
K5R--, Dallas, Texas

Words cannot express my ultimate satisfaction with the NCX-3. Thanks to National for putting such a rig on the market.
K9M--, Peoria, Illinois

Am quite surprised and pleased with my investment in the NCX-3. SSB reception quality is best I've heard. Good job National! K9A--, Cicero, Illinois

This rig is the best rig I have run for general performance. The SSB audio is terrific.
WAOA--, Delta, Colorado

Best investment in amateur equipment I ever made! WA4A--, Colonial Heights, Virginia

Couldn't be happier. NCX-3 for the world!

Wouldn't trade this K7V--, Williams AFB, Arizona

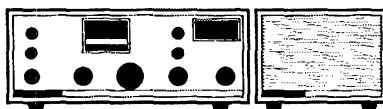
Best piece of amateur radio gear on the market for performance and price.
W9R--, Indianapolis, Indiana

I wish to state the performance is beyond my expectations — the performance of the unit is excellent.
Merriam, Kansas

Outperforms any other transceiver I have heard. National has done it again.
K9L--, LaPorte, Indiana

You have a wonderful rig in the NCX-3! I wouldn't sell it for double the purchase price! Sure works fb on SSB and CW. Couldn't be more happy with the finest rig I've ever owned!
WØP--, Independence, Kansas

The nicest piece of equipment I've had in many a year. W8L--, Lansing, Michigan



NATIONAL RADIO COMPANY, INC.

37 WASHINGTON STREET, MELROSE 76, MASSACHUSETTS 02176
Export: Ad Auriema Inc., 85 Broad Street, N.Y.C.; Canada: Tri-Tel Associates, 81 Sheppard Avenue, W. Willowdale, Ontario



RCA High-Perveance Beam Power Tubes

For the mobile man who wants a hefty signal from a compact rig, RCA High-Perveance Beam Power Tubes are the answer.

High-Perveance design enables you to get the power you want at lower plate voltages—making it easier to work with practical values of pi-network components, use more compact tank circuits and lower voltage-rated filter capacitors, simplify rf and dc insulation problems.

Another feature of RCA Beam Power Tubes for mobile service is their special heaters—designed to withstand the strain of repeated on-off operation and to operate efficiently over the wide range of voltages encountered in car electrical systems.

At “cruising” speed or engine “idle”, RCA Beam Power Tubes have the ruggedness and performance capability it takes for mobile service. Check the Power Chart for the types you need.

Available through your RCA Industrial Tube Distributor.

Select your Power and Tube Number

Plate Input Watts			RCA Tube Type
CW	AM	Conditions	
9.9	—	CCS Max.	8077/7054
17	15	CCS Max.	6417
24	17.5	ICAS Max.	7551
40	27	ICAS Max.	6893
85	55	ICAS Max.	6850*
120	85	ICAS Max.	6883B/8032A
210	175	Typical	8072

*Twin Type (total for both sections)

For more technical data on any of these RCA Beam Power Tubes, write: Commercial Engineering, Sect. C-37-M, RCA Electronic Components and Devices, Harrison, New Jersey.



The Most Trusted Name in Electronics