QST

50th Anniversary

amateur radio

Radio And Messages

Flash Quake

Contact with Earthquake Areas Kept by Ham

Radio Hams Help in Emergency

Radio Hams Send Word To Alaskans

Reassurances Come From Alaska; Radio Ham Stands By For Reports

Westchester Residents Get Word Of Relatives

Radio 'Blackout' Didn't Last Long After Quake

Ketchikan Ham Is Busy Man

Bureau Applauds Ham Performan

Quake News Handled Radio Amateu

'Ham' Relays Messages From Alaska

PUBLIC SERVICE!

Gives Alaska Short Wa

thers Send Messages to Alaska

Local Ham Operators Await Replies

Hams Helped Alaska During Quake Disaste

Local Hams Keep Alaska Line Hot

Hams Getting Alaska Calls

Hams Provide Sta

Ham Operators Continue to Give Alaska Communications Service

Unpaid Public Servants

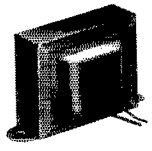
PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

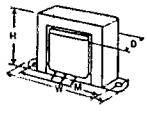
REPLACEMENT TYPE TRANSFORMERS & REACTORS

PIONEERS IN MINIATURIZATION

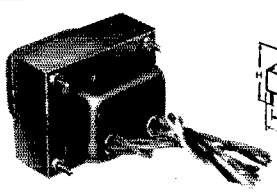
Thirty years of pioneering by UTC's research, design and engineering staffs assures you quality and reliability unequalled in the industry. UTC's line of stock and special custom-built items covers virtually every transformer and reactor requirement of both military and commercial use.

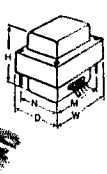
UTC replacement type transformers, here described, for 117 V 50/60 cycles, provide the highest reliability in this field. All units are low temperature rise, vacuum sealed against humidity with special impregnating materials to prevent corrosion and electrolysis. Shells are finished in attractive high lustre black enamel.



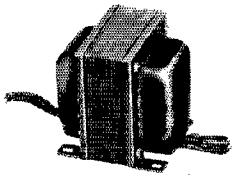


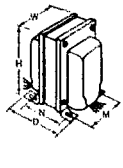
CHANNEL TYPE





DOUBLE SHELL TYPE





VERTICAL SHELL TYPE

CHANNEL FRAME FILAMENT/TRANSISTOR TRANSFS.

Pri. 115 V 50/60 Cycles—Test Volts RMS: 1500

Type No.	Secondary	W	D	H	M	Lbs.
FT-1	2.5 VCT-3A	2⅞	1½	1 1/16	2⅜	¾
FT-2	6.3 VCT-1.2A	2⅞	1½	1 1/16	2⅜	¾
FT-3	2.5 VCT-6A	3 1/16	1⅞	2	2 1/16	1
FT-4	6.3 VCT-3A	3 1/16	1⅞	2	2 1/16	1
FT-5	2.5 VCT-10A	3¼	2⅛	2⅝	3⅛	1½
FT-6	5 VCT-3A	3¼	2⅛	2⅝	3⅛	1½
FT-7	7.5 VCT-3A	3¼	2⅛	2⅝	3⅛	1½
FT-8	6.3 VCT-8A	4	2½	2⅝	3 1/16	2½
FT-10	24 VCT-2A or 12V-4A	4	2⅝	2⅝	3 1/16	2½
FT-11	24 VCT-1A or 12V-2A	3¼	2⅛	2⅝	3⅛	1½
FT-12	36 VCT-1.3A or 18V-2.6A	4	2⅝	2⅝	3 1/16	2½

Taps on pri. of FT-13 & FT-14 to modify sec. nominal V, −6% +6%, +12%

FT-13	26 VCT-.04A	2⅛	1¾	1¼	1¾	¼
FT-14	26 VCT-.25A	2⅞	1⅝	1 1/16	2⅜	¾

DOUBLE SHELL POWER TRANSFORMERS

Type No.	High V.	DC ma	5V. Fil.	6.3 VCT Fil.	W	D	H	M	N	Wt. Lbs.
R-101	275-0-275	50	2A	2.7A	3	2½	3	2½	2	2½
R-102	350-0-350	70	3A	3A	3	2½	3⅛	2½	2	3½
R-103	350-0-350	90	3A	3.5A	3⅛	2⅞	3 1/16	2 1/16	2¼	4½
R-104	350-0-350	120	3A	5A	3¼	3⅛	3⅞	3⅛	2½	5½
R-105	385-0-385	160	3A	5A	3¼	3⅛	4 5/16	3⅛	2½	7

VERTICAL SHELL POWER TRANSFORMERS

Type No.	High V.	DC ma	5V. Fil.	6.3 VCT Fil.	W	D	H	M	N	Wt. Lbs.
R-110	300-0-300	50	2A	2.7A	2⅝	2 13/16	3¼	2	1¼	2½
R-111	350-0-350	70	3A	3A	2⅝	3 1/16	3¼	2	2⅜	3½
R-112	350-0-350	120	3A	5A	3⅜	3 1/16	4	2½	2⅝	5½
R-113	400-0-400	200	3A	6A	3⅞	4 5/16	4⅝	3	3⅛	8

CHANNEL FRAME FILTER REACTORS

Inductance Shown is at Rated DC ma—Test Volts RMS: 1500

Type No.	Induct. Hys.	Current	Resistance Ohms	Dimensions, in. W	D	H	M	Wt. Lbs.
R-55	6	40ma	300	2⅜	1⅜	1⅞	2	½
R-14	8	40ma	250	2⅞	1½	1 1/16	2⅜	¾
R-15	12	30ma	450	2⅞	1½	1 1/16	2⅜	¾
R-16	15	30ma	630	2⅞	1½	1 1/16	2⅜	¾
R-17	20	40ma	850	3⅝	1⅝	2	2 1/16	1
R-18	8	80ma	250	3⅝	1⅝	2	2 1/16	1
R-19	14	100ma	450	3¾	1⅞	2⅜	3⅛	1½
R-20	5	200ma	90	4⅛	2¼	2⅝	3 5/16	2½
R-21	15/3	200ma	90	4⅛	2¼	2⅝	3 5/16	2½
R-220	100/8 Mhy 25/2 Mhy	2.5A 5A	.6 .16	3¾	2	2 5/16	3⅛	1½

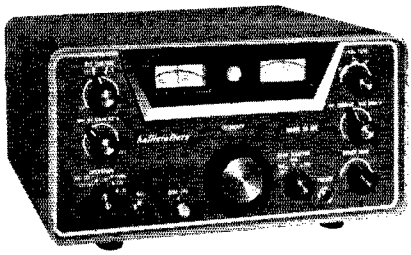
Write for latest catalog of over 1,000 STOCK ITEMS with UTC high reliability

UNITED TRANSFORMER CORP.

150 VARICK STREET NEW YORK 13, N. Y.

PACIFIC MFG. DIVISION: 3630 EAST IMPERIAL HIGHWAY, CULVER CITY, CALIF.

EXPORT DIVISION: 13 EAST 40th STREET, NEW YORK 16, N. Y. CABLES: "ARLAB"



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 μv 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 6½" x 11"*
Small weight: *Only 13¼ lb.*
Small price: *$349.50 less power supplies and mobile mounting kit.*

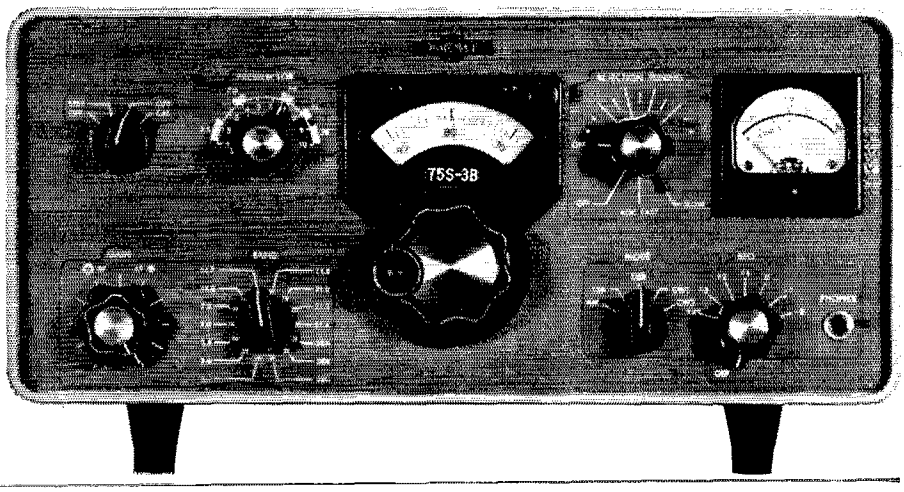
NEW SR-160

Tri-band SSB/CW Transceiver

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, 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.

COLLINS

QST

JULY 1964

VOLUME XLVIII • NUMBER 7

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 UNION

OFFICES

225 Main Street
Newington, Connecticut 06111
TEL.: 666-1541
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.

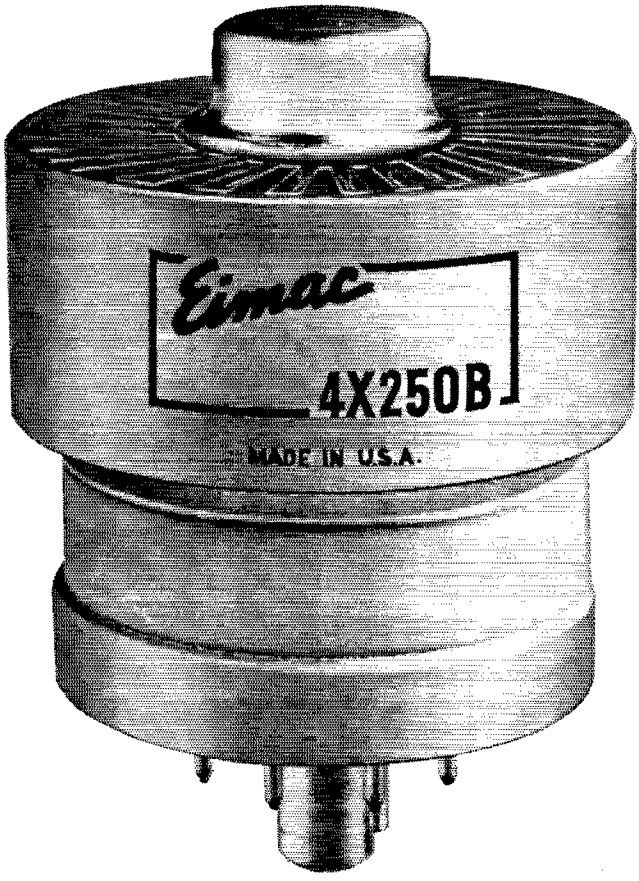
INDEXED BY
Applied Science and Technology Index
Library of Congress Catalog Card No.: 21-9421

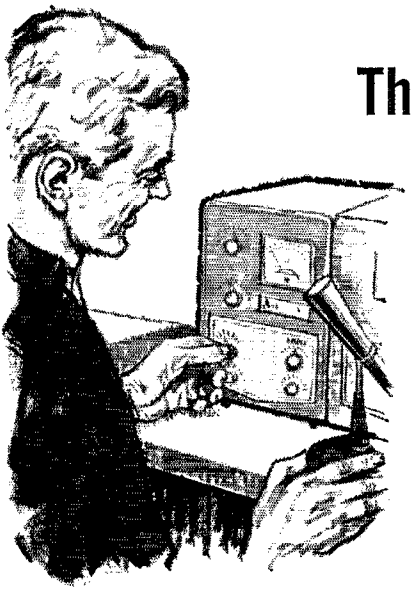
—CONTENTS—

EIMAC

4X250B tetrode chalks up 20,000 hours—and is still going strong!

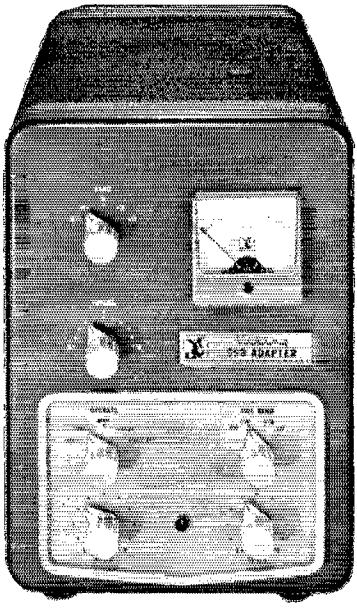
Back in 1960 an original-design Eimac 4X250B tetrode was placed in operation in a UHF communications system belonging to the County of San Mateo, California. 20,000 operating hours later—February, 1964—it was removed by San Mateo Chief Radio Engineer Walter Harrington, W6MX, for test and evaluation. Returned to the Eimac laboratory, this 4X250B tetrode passed acceptance tests with flying colors—within specification in all respects and equivalent in performance to a brand new production tube! This is another example of the way Eimac designs quality tubes for power, dependability, long life. For data on Eimac original-design tetrodes to meet your needs write: Amateur Service Dept., Eitel-McCullough, Inc., San Carlos, Calif.





Thinking about going to SSB?

... if you own a Viking "Valiant", "Valiant II" or "Five Hundred" ... here's a deal for you!



FOR A LIMITED TIME ONLY... NEW LOW PRICE ON SSB ADAPTER!

If you own a Viking "Valiant", "Valiant II" or "Five Hundred" – then here's your chance to go to Single Sideband at a tremendous saving! All authorized Johnson Amateur Equipment Distributors have $100 certificates, which when validated by him, may be applied against the purchase price of a new Viking "SSB Adapter".

Save $100 by going to SSB now! Offer expires August 1, 1964!

SAVE $100.00 NOW!

Certificates are available only through your authorized Johnson Amateur Equipment Distributor. See him soon and save $100.00 by going to SSB now!

(Offer expires August 1, 1964)

SSB ADAPTER – Popular, filter-type SSB generator – bandswitching 80 through 10 meters – more than 50 db sideband suppression. Features built-in multiplier requiring VFO input only – design and front panel controls make operating practically foolproof! Superb audio fidelity and balanced audio response. Other features: positive VOX and anti-trip circuits with built-in anti-trip matching transformer and adjustable VOX time delay. With remote power supply, tubes and crystal filter, less microphone.

Cat. No. 240-305-2...Wired, tested .....Net $369.50
(WITH CERTIFICATE: $269.50)

E. F. JOHNSON COMPANY
WASECA, MINNESOTA, U.S.A.

Section Communications Managers of the ARRL Communications Department

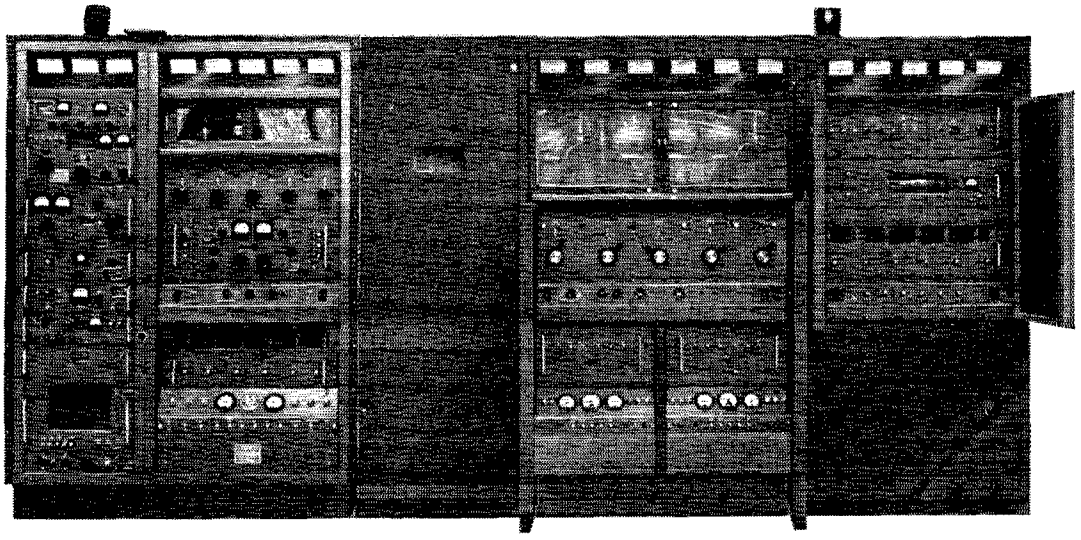
Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. **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, RM 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	W3ZRQ	Allen R. Breiner	212 Race St.	Tamaqua 18252
Maryland-D. C.	W3JZY	Andrew H. Abraham	RFD 1	Smithsburg, Md. 21783
Delaware	K3GKF	M. F. Nelson	505 Milltown Rd.	Marsballtown
Southern New Jersey	K2BG	Herbert C. Brooks	800 Lincoln Ave.	Palmyra 08065
Western New York	K2HUK	Charles T. Hansen	211 Rosemount Drive	Buffalo 26
Western Pennsylvania	W3UHN	Anthony J. Mroczka	475-5th St.	Donora
CENTRAL DIVISION				
Illinois	W9PRN	Edmond A. Metzger	1520 South 4th St.	Springfield
Indiana	W9YYX	Ernest L. Nichols	RFD 7	Bloomington
Wisconsin	K9GSC	Kenneth A. Ebneter	822 Wauona Trail	Portage 53901
DAKOTA DIVISION				
North Dakota	WØHVA	Harold A. Wengel	805-3rd St., S. W.	Minot
South Dakota	WØRRN	J. W. Sikorski	1900 S. Menlo Ave	Sioux Falls
Minnesota	WØOPX	Mrs. Helen Mejdrich	Route 3	Aitkin
DELTA DIVISION				
Arkansas	W5DTR	Curtis R. Williams	Route 3, Box 230	Little Rock 72205
Louisiana	W5FMO	Thomas J. Morgavi	3409 Beaulieu St.	Metairie 70001
Mississippi	W5EMM	S. H. Hairston	2321-27th Ave.	Meridian
Tennessee	W4UVP	William Scott	115 East Holston Ave	Johnson City
GREAT LAKES DIVISION				
Kentucky	K4QIO	Mrs. Patricia C. Schafer	732 Greenridge Lane	Louisville 7
Michigan	W8FX	Ralph P. Thetreau	27209 W. Six Mile Road	Detroit 48240
Ohio	W8AL	Wilson E. Weckel	2118 Tuscarawas St., W.	Canton 44708
HUDSON DIVISION				
Eastern New York	W2EFU	George W. Tracy	1138 North Country Club Drive	Schenectady
N. Y. C. Long Island	K2IDB	Blaine S. Johnson	266 Cypress St.,	Massapequa Park, L. I.
Northern New Jersey	W2CVW	Edward F. Erickson	13 Robert Circle	South Amboy 08879
MIDWEST DIVISION				
Iowa	WØNTB	Dennis Burke	1418 Douglas Ave.	Ames 50010
Kansas	WØALA	C. Leland Cheney	8114 Levitt Dr.	Wichita 7
Missouri	WØTPK	Alfred E. Schwaneke	Edgar Star Rte	Rolla 65401
Nebraska	WØGGP	Frank Allen	Box 272	Gering
NEW ENGLAND DIVISION				
Connecticut	W1FHP	Robert J. O'Neil	Hard Hill Road	Bethlehem
Maine	W1AHM	Arthur J. Brymer	20 Berwick St.	Portland 3
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	85 Solar Ave.	Braintree 02185
Western Massachusetts	W1BVR	Percy C. Noble	8 St. Dennis St.	Westfield 01085
New Hampshire	W1YHI	Albert F. Haworth	20 Plummer Rd. (Bedford)	Manchester 03102
Rhode Island	K1AAV	John E. Johnson	30 Fruit St.	Pawtucket 02860
Vermont	K1MPN	E. Reginald Murray	3 Hillcrest Drive	Montpelier 05601
NORTHWESTERN DIVISION				
Alaska	KL7BZO	Kenneth E. Koestler	2005 Sunrise Dr.	Anchorage
Idaho	K7HLR	Raymond V. Evans	Route 3,	Twin Falls
Montana	W7KUH	Walter R. Marten	3021-6th Ave., So.	Great Falls
Oregon	W7AJN	Everett H. France	3335 S.E. 116th Ave.	Portland
Washington	W7PGY	Robert B. Thurston	7700-31st Ave., N.E.	Seattle 98115
PACIFIC DIVISION				
Hawaii	KH6BZF	Lee R. Wical	P. O. Box 2200	Honolulu 96805
Nevada	W7PBV	Leonard M. Norman	652 Boulder St.	Boulder City 89005
Santa Clara Valley	W6ZRJ	Jean A. Gmelin	10835 Willowbrook Way	Cupertino
East Bay	K6LRN	Richard Wilson	107 Cordova Way	Concord
San Francisco	W6UDL/K6CWP	C. Arthur Messineo	2175-45th Ave.	San Francisco
Sacramento Valley	W6BTY	George R. Hudson	2209 Meer Way	Sacramento
San Joaquin Valley	W6JPU	Ralph Saroyan	6204 E. Townsend Ave.	Fresno
ROANOKE DIVISION				
North Carolina	W4BNU	Barnett S. Dodd	420 West Franklin St.	Salisbury
South Carolina	W4PED	Charles N. Wright	711 Merriwether Dr.	North Augusta
Virginia	W4QDY	Robert L. Follmar	1057 Dune St.	Norfolk 23503
West Virginia	W8JM	Donald B. Morris	1136 Morningstar Lane	Fairmont 26554
ROCKY MOUNTAIN DIVISION				
Colorado	KØTTB	Donald Ray Crumpton	P. O. Box 223	Alamosa
Utah	W7QWH	Thomas H. Miller	3148 South 3360 East	Salt Lake City 84109
New Mexico	K5IQL	Newell Frank Greene	P.O. Box 406	Dexter
Wyoming*	W7CQL	Wayne M. Moore	142 South Montana Ave.	Casper 82601
SOUTHEASTERN DIVISION				
Alabama	K4KJD	William S. Crafts	Route 3, Box 233	Athens 35611
Eastern Florida	W4GJI	Guernsey Curran	P. O. Box 48	Palm Beach
Western Florida	W4RKH	Frank M. Butler, Jr.	494 Elliott Rd.	Fort Walton Beach 32548
Georgia	W4RZL	Howard L. Schonher	P.O. 1902	Columbus 31902
West Indies (P. R.-V.I.)	KP4DJ	William Werner	563 Ramon Llovet	Urb, Truman Rio Piedras, P. R.
Canal Zone	KZ5TD	Thomas B. DeMeis	P. O. Box 1111	Balboa
SOUTHWESTERN DIVISION				
Los Angeles	W6FNE	John A. McKowen	3430 So. Hills St.	Los Angeles 90007
Arizona	W7FKK	Floyd C. Colyar	3411 West Pierson St.	Phoenix
San Diego	W6LRU	Don Stansifer	1427 Pescadero	San Diego 7
Santa Barbara	K6AAK	William C. Shelton	2036 Grandview Drive	Camarillo
WEST GULF DIVISION				
Northern Texas	W5BNG	L. L. Harbin	4515 Calmont	Fort Worth 76107
Oklahoma	K5KTW	Bill F. Lund	1220 S. Owasso	Tulsa 20
Southern Texas	W5QEM	Roy K. Eggleston	1109 Vernon Drive	Corpus Christi
CANADIAN DIVISION				
Maritime	VE1WB	D. E. Weeks		Harvey Station, N. B.
Ontario	VE3NG	Richard W. Roberts	170 Norton Ave.	Willowdale, Toronto, Ont.
Quebec	VE2DR	C. W. Skarstedt	62 St. Johns Rd.	Pointe Claire, Montreal 33, P. Q.
Alberta	VE6TG	Harry Harrold	1834-5th Ave.	N. Lethbridge, Alta.
British Columbia	VE7FB	H. E. Savage	4553 West 12th Ave	Vancouver 8, B. C.
Manitoba	VE4HW	William H. Horner	6 Hart Ave.,	Winnipeg
Saskatchewan	VE5QC	Mel Mills	1012-10th St., East	Saskatoon

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

100,000 WATTS

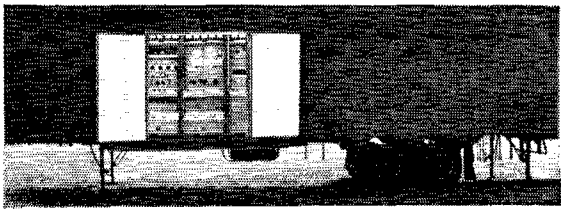
2-28 MCS



SSB • ISB • AM • AME • CW • FSK • FAX

GPT-100K

The GPT-100K uses the exciter, IPA and a portion of the final amplifier of the GPT-200K (AN/FRT-62). Illustrated are interior views of one 200 KW transmitter in a van presently in overseas operation.



- 100 Cycle Tuning 1 Part 10^9 Stability
- 100 KW PEP
- Air or Vapor Cooled
- Operate and Maintain From Front Panel
- Solid State Power Supplies
- Available Also —
  Air Conditioned
  Transportable Van
  Technimatic* Control

REQUEST BULLETIN 1016

*T.M. APPLIED FOR

THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, NEW YORK

and Subsidiaries
OTTAWA, CANADA • ALEXANDRIA, VIRGINIA • GARLAND, TEXAS • OXNARD, CALIFORNIA
SAN LUIS OBISPO, CALIFORNIA • LUZERN, SWITZERLAND • POMPANO BEACH, FLORIDA

THE AMERICAN RADIO RELAY LEAGUE, *INC.*,

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

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

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

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not 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, WØTSN, 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. Dumbrille VE2BK
116 Oak Ridge Drive, Baie d'Urfee, Quebec

Atlantic Division

GILBERT L. CROSSLEY W3YA
734 West Foster Avenue, 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 S. Tripp Ave., Chicago, Ill. 60629

Vice-Director:

Dakota Division

CHARLES G. COMPTON . . . . . WØBUO
1011 Fairmount Ave., St. Paul, Minn. 55105

Vice-Director: Charles M. Bove . . . . . WØMXC
16111/2 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 W2KR
22 Birch Hill Rd., Great Neck, N. Y. 11020

Vice-Director: Harry J. Dannals W2TUK
RFD 1, Arbor Lane, Dix Hills, Huntington, L. I. 11743

Midwest Division

ROBERT W. DENNISTON . . . . . WØNWX
Box 631, Newton, Iowa 50208

Vice-Director: Sumner H. Foster . . . . . WØGQ
2315 Linden Dr., S.E., Cedar Rapids, Iowa 52403

New England Division

MILTON E. CHAFFEE W1EFW
28 Reussner Rd., Southington, Conn. 06489

Vice-Director: Bigelow Green W1EAE
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
428 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 . . . . . WØBWJ
1070 Locust St., Denver, Colo. 80220

Vice-Director. John H. Sampson, Jr. W7OUX
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. Boivin W4LVV
2210 S.W. 27th Lane, Miami, Fla. 33133

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

ROEMER 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..."

HAMS AND THE LAW

A rash of recent amateur difficulties with local zoning or other ordinances — in Santa Barbara, Denver, Salt Lake City, Chicago and several eastern cities — has caused general discussion of the over-all problem in amateur circles and, inevitably, some misconceptions.

Many aspects of these cases are not what they seem, and certainly are not as reported or rumored. A principal misunderstanding seems to be that any attempt by a community to interfere with the operation of an amateur station is *per se* unlawful and that if an amateur loses the case it spells doom for all of us. The fact is that a municipality may indeed enforce ordinances which may in one way or another affect the operation of an amateur station, as for example, tower heights. The fact is also that it is not unusual for the amateur to lose the first round; in the landmark tower cases of Pennsylvania and New Jersey, the amateur indeed lost the cases at lower court levels and it was that result which permitted the League to carry the cases eventually to the Supreme Courts of both states to obtain an eventual favorable decision — and a *real* precedent.

Some uninformed amateurs have been active on the air criticizing the League for apparent lack of participation in these matters; they simply show lack of understanding of legal principles, or a willingness to repeat rumors without any attempt at confirmation. The fact is that the League's General Counsel has been active in all the cases which have come to ARRL's attention, including those mentioned above, in one instance for as long as two years. He has discussed problems with the amateur's attorney in each instance, either in person or by correspondence, furnishing advice and guidance as seems appropriate, and attended formal hearings when national issues seemed involved. But the fact also is that the League cannot lawfully engage in the practice of law for individual members either by direct representation of the amateur, by paying his local attorney, or by financing local court costs. It can and does cooperate fully with the amateur's attorney, and formally intervenes in such cases as may actually develop — e.g., on appeal — to a stage where a precedent may be set on a basic point of law.

Possession of an amateur license does not of itself exclude the individual from community responsibility, either of law or of common sense. We have to live with our neighbors, just as they have to live with us, and our rights are not overriding.

The one problem present in almost every case is TVI. The average TV viewer does not — and in some instances, refuses to — understand that the TV receiver he purchased for hundreds of dollars is not perfect and does not contain the simple circuits required to reject interfering signals — amateur and others. All too often TV servicemen, through ignorance, say either nothing can be done or install an inefficient filter at an outrageous price. An increasing number of complaints of interference to hi-fi stereo setups are being received. All too often the seller blames the amateur rather than go to the trouble and expense of installing a few inexpensive bypass capacitors.

The solution lies in cooperation and understanding by all concerned. In most instances, investigation discloses that the amateur's efforts to explain and cooperate have been too few and too late.

Zoning ordinances are modern things, schemes to organize the community into sections according to the use of the property therein. Usually such an ordinance, or its associated building code, places a restriction upon the height of buildings and structures. Such restrictions are generally valid, a proper exercise of the police power of the state, delegated to the community. They may on occasion affect the amateur who desires to put up a tower. But they must bear a reasonable relation to the "public health, safety, morals or welfare."

It is impossible to outline here in detail the principles to guide amateurs in every zoning or other problem which may arise locally. Each case is different in one way or another. But we must not panic when a minor skirmish trends or turns out adversely. Any attorney knows that the initial battles frequently are lost and that such losses do not have any real significance on the outcome of the case.

The Hq. has available, without charge, a collection of background material reporting actions in previous cases in various parts of the country, and it is sent upon request to any amateur who has or anticipates some local problem. Often the amateur or a committee of

the club can work out solutions to such difficulties by informal discussions with city officials. Should such a case come to court action, in his own protection the amateur has little alternative but to seek the services of a local attorney. Said attorney should immediately get in touch with the ARRL General Counsel for background and guidance. The League cannot litigate each individual case, but does stand ready to assist a local attorney in instances of such difficulty, and is prepared to intercede if and when any case develops to the point where it appears a precedent might be set which would be unfavorable to all of amateur radio. QST

1964 National Convention

Don't forget the 1964 ARRL National Convention next month in New York City. There will be three full days of convention activities; top-notch speakers, special interest talks and meetings, FCC examinations, special events for the ladies and a big "convention within a convention," the International VHF Convention. All this and the World's Fair, with its many attractions for the entire family, make the week-end of August 21–23 a must on your summer schedule. While you're in the area, be sure to stop at League headquarters and pay us a visit; we're less than a hundred miles away.

More details will appear in August *QST;* for tickets and full information, write HARC, P. O. Box 58, Central Islip, Long Island, N. Y.

COMING A.R.R.L. CONVENTIONS

July 4–5 — West Virginia State, Jackson's Mill, W. Va.
July 11–12 — Rocky Mountain Division, Estes Park, Colo.
August 21–23 — ARRL National, New York City
September 5–6 — Maritime Province, Charlottetown, P. E. I.
September 11–13 — Southwestern Division, Palm Springs, Calif.
September 25–27 — Pacific Division, Sacramento, Calif.
October 2–3 — Ontario Province, London, Ont.
October 17 — Michigan State, Grand Rapids, Mich.

Director Tom Moss, W4HYW (right), takes the first step in getting his Southeastern Division out of the quota cellar in the Building Fund drive by presenting a batch of member contributions to fund chairman Mort Kahn, W2KR, while Vice Director Chet Bolvin, W4LVV, beams approval. Extra space for the historical section bars the usual building fund page this month, but we'll be back in August with an up-to-date report on progress.

—•••—

The Coast Guard recently commissioned its new headquarters amateur station, K4CG, and the group pictured below was on hand for the dedication. (L. to R.) FCC's W4GF; W4KFC, trustee of K4CG; LCDR R. E. Mickley, Chief of Navy MARS; CDR Barnett, WA4KIU, CO of the Coast Guard Washington Radio Station; WN4NWV; K4UZA; CDR Langenbeck, K3JQU, Chief Communications Officer USCG; K3WUW; WN4RYA; WN4PRJ; WA4PEE; and K4TZK, president of the Coast Guard Washington Radio Station ARC. Not shown, but present for the ceremonies, were CAPT Ralph Dean, W4VA, Deputy Chief of Coast Guard Engineering; and CDR Edmund Redington, USCG Ret., W4ZM. K4CG is manned by military and civilian personnel of the Washington Radio Station and visiting CG hams. Amateurs everywhere are invited to visit. Two separate operating positions are set up, one for Novices, the other for holders of higher-class licenses. The club has twelve very active members who operate all bands and all modes.

The clipper-filter unit described in the text. Crystal filter is the unit to the left of the tube shield. Input and output jacks and the "normal gain" control, as well as the a.c. cord outlet, are on the other side of the chassis.

Speech Clipping for Single Sideband

BY W. K. SQUIRES,* W2PUL,

AND E. T. CLEGG,* W2LOY

ALTHOUGH audio speech clipping has been effectively employed in a.m. transmitters for many years, little success has been obtained with similar schemes applied to s.s.b. generators. The use of automatic level control improves s.s.b. performance mostly through making the transmitter (or exciter) easier to adjust for maximum peak power without serious "flat-topping," while providing a measure of speech compression. However, it cannot substantially increase the average-to-peak power ratio as can a well-designed audio clipper/filter in a.m. Audio compressors suffer similarly in that they operate on the *integrated* audio waveform rather than on a cycle-to-cycle basis as does a clipper.

The difficulty in applying audio clipping to an s.s.b. system is a *fundamental* one; it is not a problem of refined circuitry or ingenious gadgetry. It has been known for some time that it is essentially *impossible* to increase the average-to-peak power ratio in the resulting s.s.b. signal *by any form of audio clipping.*

Fundamental Problem

The big difference (as far as special processing is concerned) between a.m. and s.s.b. lies in the fact that in s.s.b. the envelope bears no simple relationship to the audio waveform used to generate it. In a.m. the radiated envelope is *identical* to the audio waveform (assuming linear, distortion-free modulation). If the audio waveform is a sine wave, the a.m. envelope is a sine wave. If the audio waveform is a square wave, the a.m. envelope is a square wave. In s.s.b. if the audio waveform is a sine wave, the s.s.b. envelope is that of a c.w. carrier. If the audio waveform is a square wave, the s.s.b. envelope contains a peak value that goes to *infinity*, with a waveform bearing no resemblance to the input square wave.

This situation can be seen more clearly in Fig. 1, which shows the r.f. envelopes for a.m., d.s.b. and s.s.b. for audio waveforms ranging from a sine wave to a square wave.[1] It can be seen that as the audio is clipped (made more nearly a square wave), the s.s.b. average-to-peak power actually *decreases!* In fact, in the extreme case of a perfectly square wave, the s.s.b. transmitter would require an *infinitely large peak power output* to accurately reproduce it. This inability to improve s.s.b. performance by clipping techniques suitable for a.m. (and d.s.b.) has been established more rigorously, and quantitative relationships between the modulating (audio) waveform and the resulting average-to-peak power rations have been published.[2] It is clear that another approach is required.

A Different Approach

Since operations on the audio waveform are so unrewarding, it is logical to attempt operations on the s.s.b. waveform itself. In fact, an obvious

* Squires-Sanders, Inc., 475 Watchung Ave., Watchung, N. J.

[1] Courtesy of E. Bedrosian, private correspondence. The "audio" waveform is $\sin^n \alpha$.

[2] Squires and Bedrosian, "The Computation of Single-Sideband Peak Power," *Proc. I.R.E.*, January, 1960, p. 123.

attempt to do just this is made by anyone who "talks up" his s.s.b. transmitter to the "flat-topping" point. The average power *is* increased, but the resulting splatter, distortion products and unwanted sideband energy bring complaints from neighbors, more conservative amateurs and certain regulatory bodies. However, it has been recognized for some time that a more refined process closely akin to this can offer s.s.b. speech energy improvements without the concomitant agonies.[3] These techniques can be applied to amateur s.s.b. with most effective results — and very simple equipment.

The approach is surprisingly straightforward. The s.s.b. signal is formed in the usual way, *with as little distortion as possible*. It is important that a good s.s.b. signal be formed. The carrier and unwanted sideband should be well down, and the wanted sideband should be properly bandwidth-shaped with a good filter (in a phasing exciter, by good design of audio and phase shift networks). This s.s.b. envelope is then amplitude clipped. The resulting waveform which now contains spectral components in the unwanted sideband (and everywhere else) is filtered *again*, preferably with a filter as good or better than the filter used to form the original s.s.b. signal. What results is a true s.s.b. signal with much increased average-to-peak power, but no out-of-band distortion products, which can be amplified and transmitted in the usual way. Typical waveforms as the signal passes through this process are shown in the oscilloscope photos of Fig. 2.

Before proceeding to a specific design, several conditions must be noted:

[3] F. De Jager, et al, U. S. Patents 2,874,222, 2,907,831, 3,003,037, 3,020,352.

1) System gain must be increased by whatever amount of clipping is taken. E.g., if 20 db. of clipping is performed, over-all gain must be increased by 20 db. to regain the previous (non-clipped) *peak* power.

2) As system gain is increased, hum and noise must be controlled, just as in a.m. clipping. In addition, carrier suppression must be improved (if inadequate) by the same degree to which clipping is performed.

3) High-level stages must have increased *average* power capability. Many linear amplifiers which perform creditably on "normal" s.s.b. exceed power supply and tube ratings on clipped s.s.b. since the *average* power requirement can be increased by 10 to 20 db. On some voices, with heavy clipping, the average input power may be only a few decibels below the peak power!

Experimental Unit

The unit shown in the photograph was designed to operate with a commercial s.s.b. transceiver (the Clegg Venus VI). This transceiver forms an s.s.b. signal at a 9.0-Mc. i.f. and the s.s.b. speech clipper was designed to operate following the 9.0-Mc. balanced modulator. The schematic of the unit is shown in Fig. 3.

The output from the balanced modulator is applied to a crystal bandpass filter having a 560-ohm input/output impedance and 3.1-kc. (−6 db.) bandwidth. At the output of this filter, the resulting s.s.b. voltage is amplified by a 6AZS remote cutoff pentode to provide the increase in system gain required. The gain of this stage can be adjusted independently in either "clipping" or "normal" mode. In the "clipping" mode the gain setting controls the degree of clip-

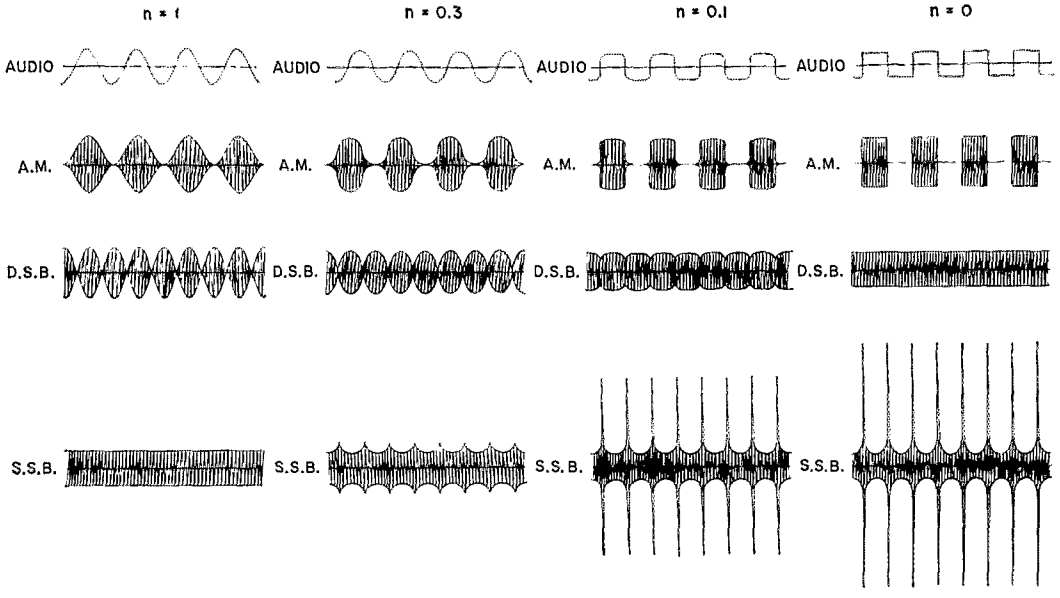


Fig. 1—The same audio signal gives widely-different envelope patterns, depending upon the type of transmitter. Various audio waveforms are shown in the top line; the resulting envelopes for 100 per cent a.m., double-sideband suppressed carrier, and single-sideband suppressed carrier are shown below. The various audio waveforms are obtained by substituting values shown for n in $\sin^n \alpha$.

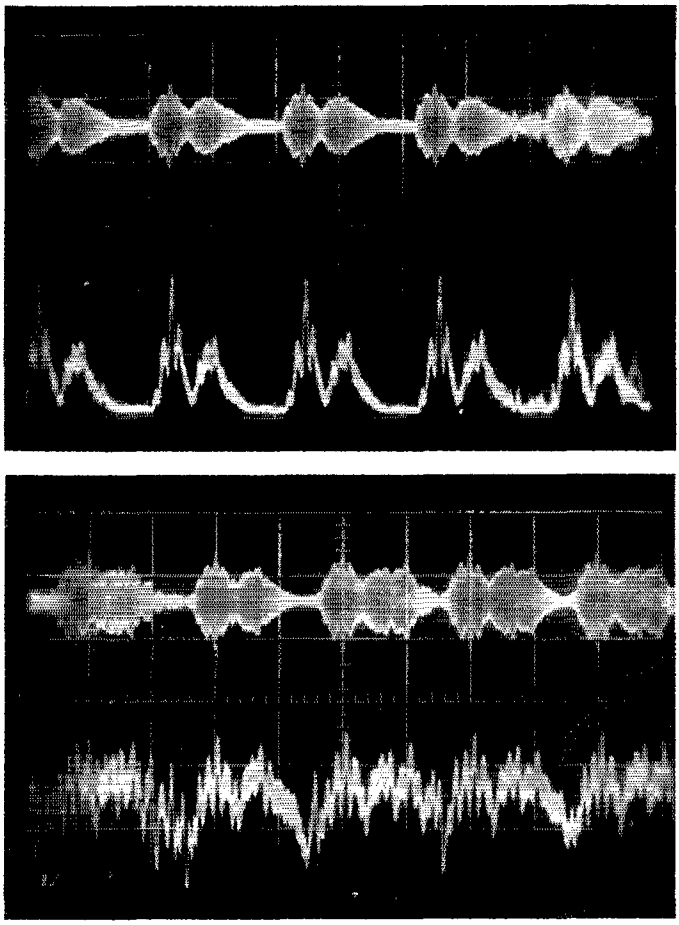


Fig. 2—Oscilloscope photos showing the clipper action. In each picture the top trace is the s.s.b. input to the clipper. (Above) Rectified s.s.b. output from the transceiver, no clipping. Peak power is set just below "flat-topping." The word is, "Hello." Zero power is the bottom line. (Below) Same as above, but with clipping. The increase in average power is apparent.

ping, and in the "normal" mode it resets the system gain to its original (without clipper) value.

After amplification the s.s.b. signal is clipped by a full-wave diode pair whose threshold is set by the "peak set" control. This control establishes the maximum output voltage, and peak power level, attainable in the clipping mode. Once properly set for maximum peak power without power-amplifier "flat-topping," no increase in audio gain, or shouting, can produce a higher *peak* power level — or cause "flat-topping."

The output of the clipper is impedance-matched to the second s.s.b. filter (identical to the first) by the 6AZ8 triode section. This filter does not show on the schematic, or in the photograph, since it is the s.s.b. filter normally used in the transceiver itself. In the transceiver, the 9-Mc. filter output drives a 12AU6 mixer which, with a 5.0-5.5-Mc. v.f.o. injection frequency, converts to 14.0-14.5-Mc. output and then to 50.0-50.5 Mc.

Construction of the unit is completely straightforward. The only precautions necessary are to shield the input from the output of the first filter (to obtain good skirt selectivity) and to thoroughly shield the entire unit to avoid any pickup and possible r.f. feedback.

The design is typical of that required for many different s.s.b. transmitters. Its adjustment procedure would also apply to versions designed for other transmitters and is as follows:

1) Using the 9-Mc. output of the transceiver, with the modulator temporarily unbalanced, T_1 is adjusted for maximum carrier output (in "normal" position).

2) The transceiver is reset for normal s.s.b. operation with the carrier properly nulled. With the clipper in "normal," the transceiver audio gain is advanced, usually to "full on" if no overload in stages preceding the clipper occurs. Then the "normal gain" control is adjusted to produce normal s.s.b. transceiver output with no "flat-topping" on voice peaks. For future *no-clipper* operation the "normal gain" control is treated as though it were the usual audio gain control. The above adjustments are best carried out with an oscilloscope for viewing the transceiver output.

3) Switched to "clipping," the "clipping level" control is set full on, or at maximum gain. The "peak level" control is now set so that voice peaks are at the same output level as established in (2) above. The "clipping level" control now establishes the depth of clipping to the desired level. No further adjustment of the "peak set" control is necessary.

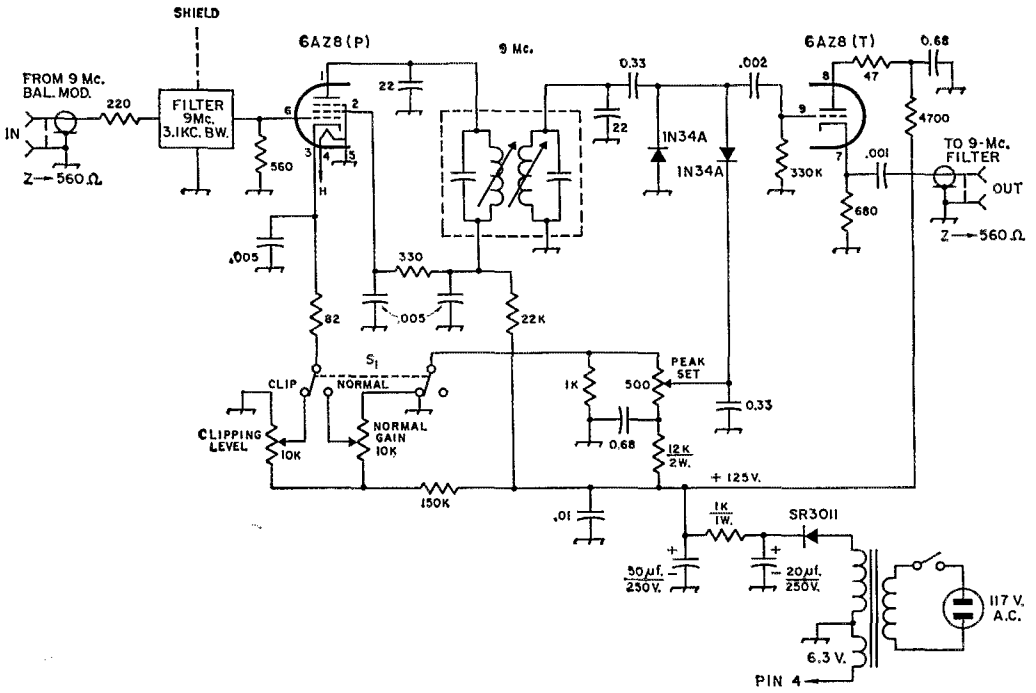


Fig. 3—Schematic diagram of the s.s.b. speech clipper. Unless noted, all resistors are ½ watt, decimal-value capacitances are in μf., whole-number capacitances are in pf. The input to the clipper comes from the output of the balanced modulator in the exciter. The output from the speech-clipper unit is returned to the input side of the filter in the exciter.

Operating normally in the clipping mode, it should be observed that the average plate current is greatly increased over that when not clipping, the amount of increase being dependent on the setting of the "clipping level" control and individual voice characteristics. It is important to reiterate the several precautions which must be observed:

1) Hum, room background noise and residual carrier level will be increased when clipping. In some transmitters, steps may have to be taken to reduce hum and improve carrier balance. Room noise can be reduced by use of a close-talking microphone.

2) Final amplifier average power input is greatly increased. Tubes which ran cool before may glow ominously when "full-bore" clipping is used. If the final amplifier has a c.w. d.c. input rating equal to its s.s.b. d.c. input rating, no difficulty will occur. The same is true of power-supply capability; in some units plate and screen voltage regulation may have to be improved.

Results

Only personal observation "on-the-air" of such a unit's efficacy can be fully convincing. Variations in individual voice characteristics and the signal-to-noise conditions at the time will modify the results; therefore, no "claims" will be made here. The following observations are described as conservatively and objectively as possible.

Laboratory measurements (with a number of different voices) indicate:

1) Average power increases of 10 db. to as much as 20 db. were obtained.

2) As much as 30 db. of clipping did not adversely affect intelligibility under good signal-to-noise conditions, although distortion *was* severe.

3) In artificially-produced low signal-to-noise situations, clipping was as effective in producing intelligible copy as was a 10-db. increase of power without clipping.

4) Unwanted sideband, out-of-band distortion products and carrier rejection could be maintained at levels as good as those obtained without clipping.

On-the-air tests, largely on 6-meter s.s.b., confirmed in a general way the results of laboratory measurements. These tests are the most difficult to interpret and objectively summarize. Typical results were as follows:

1) Until properly informed, many stations regularly worked previously (without a clipper) were convinced a "linear" had been added.

2) Stations that previously could not be worked consistently reported solid and consistent copy when clipping was used.

3) Average reported signal improvement in weak-signal-path "A-B" tests indicated a gain when clipping equivalent to 6 to 12 db.

4) Strong "locals" occasionally complained of distortion and background room noise. This was easily remedied by switching to "normal"

mode (since clipping is hardly needed here).

5) Over any weak-signal path, intelligibility was *always* better with clipping than without.

In passing, one discovery was made regarding best reception of clipped s.s.b. With room background noise, and average power greatly increased, a good fast-attack a.g.c. in the receiver tends to accentuate the rumbles, gurgling and scraping heard during voice pauses (without VOX). This can be alleviated by simply retarding the r.f. gain somewhat to lower the a.g.c. dynamic range. A good receiver a.g.c. is a good speech compressor — with clipped s.s.b. it doesn't need to work so hard.

Units similar to the one described could be readily designed for many existing s.s.b. exciters or transmitters. They are relatively simple and inexpensive considering the results obtained. If the final amplifier and power supply will swallow the increase in average power, they can approach the results of adding a linear amplifier to the exciter. *With* a linear. . . . QST

Strays

The Southern Counties Amateur Radio Association joins the resort-convention center of Atlantic City, New Jersey in playing host to the National Democratic convention during the week of August 24, 1964. Message handling plans from K2BR/2 include relay of convention hall traffic via ten meters to the Atlantic City Lighthouse, where it will be dispatched on all bands.

—•••—

K7IQA recently won newspaper acclaim for his work with the March of Dimes "Telerama", a fund-raising campaign of KXLY-TV in Spokane, Wash.

—•••—

The Anne Arundel Radio Club (Md.) participated *en masse* in the WBAL-TV (Baltimore) Cerebral Palsy fund-raising drive last December.

—•••—

Author Horn, 11MK, (see page 22 of this issue) has written an article for *Electronics* (October, 1963) on the control of an artificial hand by means of muscle potentials. It's a fascinating discussion of one of the uses to which electronics can be put.

—•••—

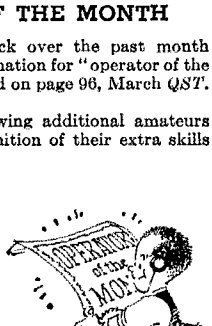
Two Hundred Meters and Down, by the late Clinton B. DeSoto, is a 184-page history of early amateur radio (to 1936) which has been out of print for about ten years. The League arranged for reproduction, through a photographic process, of a number of copies of this book and has some still in stock at a special reduced price (because of quantity purchase during the anniversary year) of $1.00, approximately our cost. Address ARRL Hq., 125 Main St., Newington, Conn. 06111.

OPERATOR OF THE MONTH

Have you thought back over the past month and picked out your nomination for "operator of the month?" Details appeared on page 96, March *QST*. Let's hear from *you*.

During May the following additional amateurs were nominated in recognition of their extra skills and courtesies:

K3STI
K4OCU
WA5AGR
K8CIR
K8DDG
W8VII
WA9APT
HK3RQ



FAMILY MEMBERSHIP

For families with two or more amateurs, ARRL By-Laws provide that, after one individual has become a Full Member of the League at the regular dues rate ($5 in the U.S.), additional amateur members of that family may join the League for a special dues rate of $1, with all rights and privileges except the receipt of additional copies of *QST*. Our correspondence indicates some misunderstanding of this arrangement. Please note.

1) All participants in the Family Membership plan must be Full Members — i.e., holders of amateur license. Unlicensed persons do not qualify.

2) There must be an immediate family relationship — i.e., husband or wife, brother or sister, father or mother, son or daughter.

3) The rate for the initial membership is the standard $5 ($5.25 in Canada). The rate for additional amateur members of the family is $1 — not $2 as many seem to believe.

4) All Family Memberships must be concurrent — i.e., expire in the same month.

So if you are part of a ham family, slip in an extra dollar for each other ham in your clan next time you renew your League membership.

The Eye-Bank Network, launched by WØNTI, WØGET and others in 1962, was featured in an article "Race Against Blindness," by Max Gunther in the May 30, 1964, edition of *The Saturday Evening Post*. The net meets twice daily, at 0100 GMT on 3963 and at 1300 GMT on 3970, to exchange information on corneas needed or available at various eye banks. *QST* ran a story on the network in May 1963, page 79.

—•••—

Amateurs everywhere are invited to watch for K3BSA, which will be in operation from the National Boy Scout Jamboree, Valley Forge, Penna., July 17–23. Operation will be on 80, 40, 20, 10, 6 and 2 meters, phone and c.w. Each QSO and SWL report will be verified by a special QSL card. QSLs should be sent to Boys' Life Radio Club, New Brunswick, N. J. 08903.

The Nuvistor Goes Mobile on 50 Mc.

Effective V.H.F. Reception with No Plate Power Supply

BY HENRY A. BLODGETT,* W2UTH/FRL

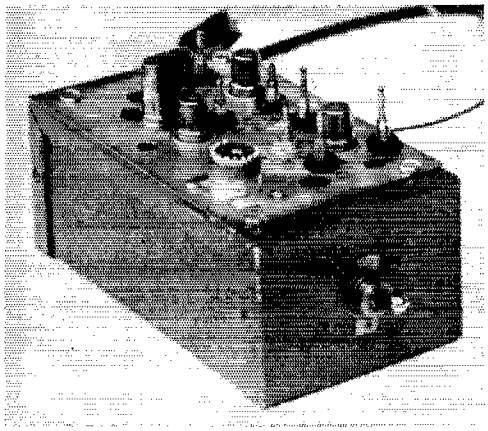


Fig. 1—50-Mc. mobile converter, using the 12-volt Nuvistors. I.f. output is 600 kc.

SINCE the advent of the 12-volt ignition system in the American automobile, with its resultant effects on car broadcast receiver design, amateurs desiring to use v.h.f. converters with their B-plus-less car receivers have been faced with something of a dilemma. Hybrid tubes (12EK6, 12AD7, etc.) may work well enough on lower bands, but they fall flat on their plates in the v.h.f. range. Transistors that work well at 50 Mc. and higher may not be very attractive from a cost standpoint. A recent development in the Nuvistor line by RCA looked like a good solution. This is the 8056, a hybrid Nuvistor with a 6.3-volt heater, sporting a transconductance of 8000, when used with plate voltages of 12 to 24 volts.

After indifferent results with mobile converters using transistors and earlier hybrid tubes, the writer set about making a 50-Mc. converter for a 12-volt broadcast receiver, using the 8056. Results have been more than gratifying, providing better reception than has been obtained with several of the better v.h.f. transceivers commonly used for 50-Mc. mobile work.

There is nothing original about the circuit, it being a slightly-modified version of the popular Nuvistor converter originally described in *QST*, and now appearing in the ARRL *Handbook*.[1] If provision is to be made for muting the converter during transmitting periods (a good idea for mobile stations, where a speaker is always

* 515 Victor-Holcomb Road, Victor, N. Y.

[1] *The Radio Amateur's Handbook*, 40th ed., 1963, pp. 408–412; Tilton, "Two-Band Station for the V.H.F. Beginner," Part 4, *QST*, October, 1961.

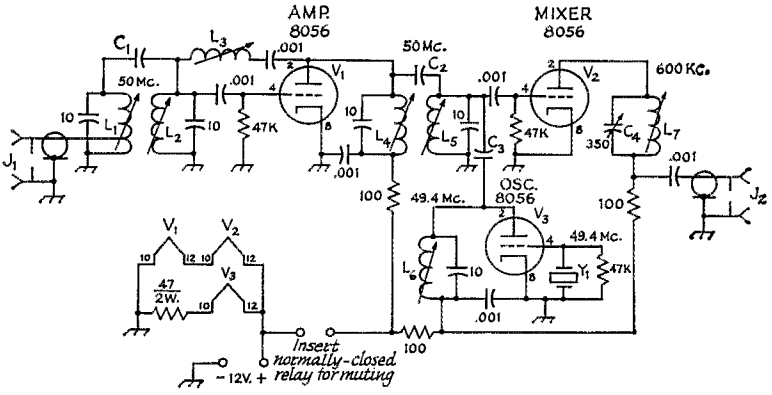


Fig. 2—Schematic diagram and parts information for the hybrid-Nuvistor converter. Decimal values of capacitance are in μf.; others in pf. Capacitors are ceramic unless specified. Resistors are composition, ½ watt unless specified.

C_1, C_2—No. 22 insulated hookup wires 2 inches long, twisted together 1½ inches.

C_3—No. 22 insulated hookup wires one-inch long, twisted together ½ inch.

C_4—Mica padder, approx. 350 pf.

J_1, J_2—Coaxial receptacle.

L_1—10 turns No. 28 enam., close-wound on ¼-inch iron-slug form; tap at 3 turns (Miller form No. 20A000RBI).

L_2, L_4, L_5—8 turns No. 28 enam., close-wound on ¼-inch iron-slug form (Miller 20A687RBI). L_1 and L_2 are ⅞ inch apart, c. to c.; L_4 and L_5, ¾ inch apart; L_5 and L_6, ⅞ inch apart.

L_3—No. 32 enam., close-wound ⅛ inch on ¼-inch iron-slug form (Miller 20A686RBI).

L_6—6 turns No. 32 enam., close-wound on ¼-inch iron-slug form (Miller form No. 20A000RBI).

L_7—Ferrite antenna coil for broadcast band (Miller 6300). Tune to 600 kc. with C_4.

Y_1—49.4-Mc. crystal (International Crystal Mfg. Co. FA-5, FA-9).

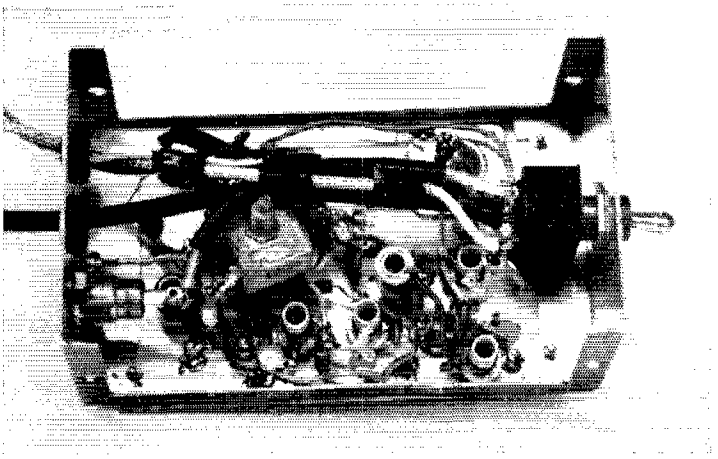


Fig. 3—Interior view of the W2UTH mobile converter.

used for reception), it is necessary to bring out the 12-volt plate supply separately from the line to the heaters. Some wiring is saved by doing the 12-volt interconnecting at the tube, but this results in difficulties in quieting the receiver during transmitting periods.

The layout is generally the same as the original version, although it can be made smaller by using a template shown in the May, 1961, issue of *Ham Tips*.[2] With the latter layout, the converter can be built in a $2\frac{1}{2} \times 2\frac{1}{4} \times 4$-inch Minibox. The 58-Mc. Channel 2 trap shown in the *QST-Handbook* design can be eliminated, as the TV image problem does not exist with a broadcast-band i.f. Adjustment procedure is similar to the higher-voltage versions of the converter.

Use of this 8056 converter with a 50-Mc. Heliwhip antenna has resulted in readable signals being received in areas formerly considered to be 50-Mc. deadspots, when commercially-available mobile transceivers were used. The converter-receiver combination is used daily in communication over the 20-mile run from Victor to Rochester, working with the home station. Consistent communication with K2RTU, Rushville, N. Y., is also maintained, over a distance of 35 miles.

Thanks are due W2YPW for the photographs.

QST

[2] Mendelson, "Nuvistor Two-Meter Converter," *RCA Ham Tips*, Vol. 21, No. 2, May, 1961.

Strays

Hams of the Neenah-Menasha RC (W9JCL, Neenah, Wis.) plan to coordinate communications for the Inland Yachting Association when it holds its annual regatta on Lake Winnebago this summer. W9GSS, W9WSV, W9HHC, WA9CIV are among those working on the project.

—•••—

Picture a tower 3000 feet high. One such has been designed by Navy Consultant Arsham Amerikian. Hams may not want to duplicate it, though — estimated cost is $15 million, or almost $5000 a foot! — *WSQFH and Welding Journal*

—•••—

A new Voice of America transmitter being built at Hughes Communications in Los Angeles will run a quarter-megawatt output from 4 to 26 Mc. The design crew, all hams, are W6QJU, W6USB, WB6JAW, WA6IFZ, K6VTQ, WA6HJV, and W9NLS.

A joint get-together of the Newington Amateur Radio League and the Southington Amateur Radio Association, both Connecticut ARRL-affiliated clubs, was held on April 6, with the above in attendance. The location is the lounge at ARRL Headquarters. (Photo by W1GFE)

7360 Mixers in the 75A-4

Reducing Overloading in Conversion Stages

BY JOHN H. DIEHL, W2QWS

52 Tacoma Ave., Buffalo, N. Y. 14216.

Although this modification is directed specifically toward the 75A-4, the same principles may be applied to the mixer stage or stages in other receivers.

SOMEONE has said that a receiver's performance should be judged not by what it can receive but by what it is able to reject. In quality amateur receivers, sensitivity has certainly been adequate for many years and the modern amateur receiver with a mechanical or crystal lattice filter offers selectivity that is limited only by the bandwidth of the intelligence to be received. A modern receiver would seem, therefore, to insure its owner many QRM-free QSOs unless the interfering signal is actually within the passband of the receiver.

Mixer Overload

Certainly this owner of a 75A-4 was quite happy on the top end of 20 for several years. While the population of the band increased, the same propagation conditions which have caused abandonment of the higher-frequency bands have also lengthened the skip distance so that the watts-per-kilocycle saturation has not been as great as one might expect. Dissatisfaction came with the increase in the local ham population, "barefoot" at first, and later well-shod with high-powered linears, trampling under foot the weak DX and making unusable large segments of the band. Tests with short antennas and attenuators at the input to the receiver revealed that while some signals were not free of excessive distortion products, and even parasitic oscillation on modulation peaks, the principal cause of the

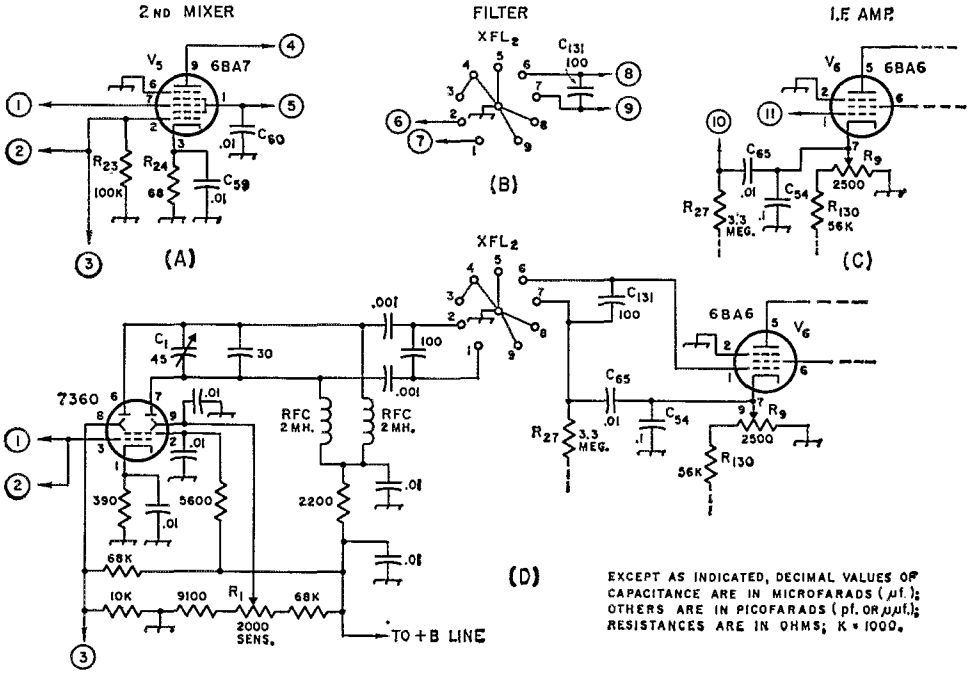


Fig. 1—Revisions in the second-mixer circuit. Original connections are shown for the second-mixer tube at A, to the 3.1-kc. mechanical filter at B, and to the first-i.f. amplifier tube at C. Circled numbers indicate points at which connections to the original circuitry should be broken. Components shown in A (only) should be removed or disconnected. D shows the revised second mixer circuit. Here the circled numbers indicate points where connections are made to similarly-numbered points in the original circuitry. Dashed lines indicate original connections which should not be disturbed. Heater connections remain unchanged. Fixed capacitors of decimal value are disk ceramic; others are mica or NPO ceramic. Fixed resistors are ½-watt composition. C_1 is a 7-45-pf. ceramic trimmer. R_1 is a linear control.

"broad" signals was generation of spurious products in the mixer stages of the receiver. Measurements with a signal generator indicated that the fellow in the next block could not possibly overload the r.f. stage and that we could always resort to the now well-known 20-db. pad in an emergency.

Concentration was focused on the mixer circuits, and past articles in *QST* were reviewed and several promising circuits were tried.[1] At about this time, the Squires article on the use of the 7360 switch-beam tube appeared.[2] Study of the 75A-4 schematic and component location indicated that some version of the Squirescircuit could be incorporated with a minimum of work and that the circuits could be restored to their original form in the event that results were not satisfactory. Preselection in the 75A-4 before both mixer tubes is sufficient to reject unwanted signals separated from the oscillator frequencies by the i.f., and also to prevent any intrusion of a signal on either of the intermediate frequencies. In the interest of simplicity, some of the advantages of the balanced-mixer circuit can therefore be sacrificed while retaining the strong signal-handling ability and low mixer noise of the 7360.

New Circuitry

Comparison of the revised circuits of Figs. 1B and 2D with the original in the 75A-4 manual illustrates the circuit changes. The second mixer has a balanced output, but oscillator injection is to one deflection plate only, with the other at r.f. ground potential. The first mixer (Fig. 2B) is simply a tetrode amplifier with the output switched to ground at the rate of the first-oscillator frequency. Input to the first mixer is tapped down on the r.f. amplifier output by a 12-to-1 capacitive voltage divider. The quiet 7360 mixer permits this reduction in its signal input, thereby affording a 12-to-1 increase in strong-signal protection while maintaining the signal-to-noise ratio. Noise from the r.f. amplifier (50-ohm resistor across the antenna terminals) overrides the mixer noise by a comfortable margin, and the increased gain of the 7360s over the 6BA7s leaves the over-all gain of the 75A-4 unchanged.

Second Mixer

Rework of the 75A-4 is best done one mixer stage at a time, with realignment and evaluation of results before proceeding further. Referring to Fig. 1, changes in the second mixer circuit are quite straightforward. The tube socket must, of course, be rewired. Two terminal strips are added. One of these is fastened to the shield between the mixer stages to mount the resistors for the deflection plates, and the other is mounted on the chassis between the tube socket and the mechanical-filter sockets to hold the 2-mh. chokes and the 45-pf. trimmer capacitor C_1. The

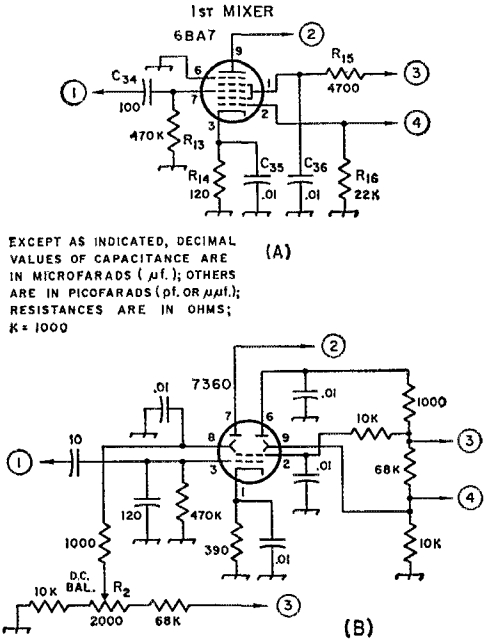


Fig. 2—Revisions in the first-mixer circuit. A shows connections to the original 6BA7. Circled numbers indicate points at which connections to the original circuitry should be broken. All components shown should be removed or disconnected. B shows the revised first-mixer circuits. Here the circled numbers indicate points where connections are made to similarly numbered points in the original circuitry indicated in A. Heater connections remain unchanged. Capacitors of decimal value are disk ceramic; others are mica or NPO ceramic. Fixed resistors are ½-watt composition. R_1 is a linear control.

additional 2-mh. choke was stolen from the Q-multiplier plate circuit (L_{25}) and the latter replaced with a standard 2.5-mh. choke. The 2000-ohm potentiometer R_1 is conveniently mounted in an existing hole in the shield. Note that the arrangement used by the author renders the selectivity switch inoperative, only the 3.1-kc. filter being used. Rebuilding of the switch has been postponed to a later date. When the wiring is complete, the 45-pf. trimmer C_1 is peaked for maximum signal and the 1.5- to 2.5-Mc. variable i.f. tuning is realigned following instructions in the receiver manual. The potentiometer R_1 is set for maximum output on a weak signal. Gain will be found to have been improved by at least 10 db., and it may be necessary to reset R_9, the i.f. gain control, to prevent a.g.c. action on tube noise.

Those who do not have a signal generator will find that the markers from the 100-kc. calibrating oscillator can be used for peaking the tuned circuits. With the band switch set to the 10-meter band, peak L_{18} and L_{22} at 28.9 Mc. and C_{53} and C_{56} at 28.1 Mc. Either the S meter or a v.t.v.m. at the diode load test point (a.g.c. off) may be used as an indicator. A record of the S-meter readings of the 100-kc. oscillator signal on each band can serve as an indicator of receiver per-

[1] Andrade, "Recent Trends in Receiver Front-End Design," *QST*, June, 1962, and many others.

[2] Squires, "New Approach to Receiver Front-End Design," *QST*, September, 1963.

formance before and after changes. Such a record is also useful as a long-term check on receiver sensitivity. This is often reassuring when the band seems dead!

First Mixer

Referring to Fig. 2, revision of the first-mixer circuit requires a 180-degree rotation and rewiring of the tube socket. Coupling capacitor C_{34} is replaced by a 10-pf. mica unit, and a 120-pf. capacitor is shunted from grid to ground. These values are a compromise between gain and overload protection, either of which can be improved at the expense of the other. The new circuit changes the load on the crystal oscillator, and it will be necessary to carefully peak the oscillator coils L_{11} through L_{17} to restore the 100-kc. calibration signals to zero on the dial. Setting of the 2000-ohm potentiometer R_2 is not critical and it may not be needed with most tubes. It is only necessary that d.c. voltages on the deflection plates be approximately equal. Trimmer C_{53} is now peaked as before and the antenna and r.f stage realigned. This procedure is fully described in Section V of the instruction book.

Results

Using a Measurements 65B signal generator (with 50 ohms in series), sensitivity was found to be 0.8 μv. at 10-db. signal-to-noise with 30 per cent modulation at 28.5 Mc. This is a.m. sensitivity. S.s.b. sensitivity measured better by 12 db.[3] Gain distribution was also measured. For output at the detector load equivalent to that produced by 1 μv. at the antenna terminals, the following readings were made. r.f. grid — 7 μv., first-mixer grid — 13 μv., second-mixer grid — 70 μv., and first-i.f. grid — 170 μv. Gain from antenna to second-mixer grid is therefore 70 times. Since the negative bias on the second mixer is 2.5 volts, any signal greater than 35,000 μv. peak at the antenna will drive the mixer grid positive if not controlled by the a.g.c. or rejected by the front-end selectivity. The 7360 displays good linearity up to the point of overload. In actual use, signals below 10 v. are R4 to 5 at a separation of 20 to 40 kc. from a signal which drives the S meter to full scale (approximately 50,000 μv.). A high-level s.s.b. signal such as this from a well-designed transmitter may contain higher-order distortion products of 25 μv. or more at 25 kc. removed from the signal frequency.[4] So we see that there exist certain practical limits to receiver performance at this present state of the art of amateur-transmitter design.

The modified A-4 has now been in use for several months. The receiver front end no longer wilts in the presence of several local signals, and it is possible to copy s.s.b. DX on the low end of 20 when the c.w. station across the back yard is pounding away. The 20-db. pad with toggle switch is still in series with the receiver input, but is seldom used except to check incoming signals for splatter or key clicks. For this purpose it is used frequently! QST

[3] Pappenfus, Bruene and Schoenike, *Single-Sideband Principles and Circuits*, McGraw-Hill, 1964, p. 341.

[4] Ibid., pp. 185-186; p. 358.

Strays

WB2GMN would like to contact past members of the Second Signal Service Battalion stationed at Radio Marina, Asmara, Eritrea, during WW II.

This is just part of the famed W2ZI Historical Museum in Trenton, New Jersey. Maybe you OTs ("young squirts" are welcome, too) will want to make it a part of your summer trip to ARRL. It's open to the public "almost anytime," by appointment. On display are more than 400 items dating from the wireless days of 1899–1925; a collection of Morse and wireless keys, old vacuum tubes of significant types, and papers, photographs, and magazines dating 'way, 'way back. If you plan to visit the museum, telephone or write W2ZI a few days in advance so arrangements may be made. On arrival in Trenton, phone 822-6645 for further directions if needed.

Feedback

There are two errors in the circuit diagram of the audio section of the TDCS transistor communications receiver appearing on page 17 of the November, 1963 issue. In the squelch circuit, there should be no connection between R_6 and the 1N1619; the 10K resistor should be connected between the bottom end of R_6 and ground, rather than as shown.

The headphone jack, J_6, should be connected as follows: the movable arm should go to S_{8B}, the stationary contact should go to the 8-μf. capacitor, and the frame of the jack should be grounded.

— • • • —

In the McCoy article, June 1964 *QST*, page 40, the two sections of L_3 in Fig. 2 should be 32 turns each, not 28.

— • • • —

• QST Article Contest Winner

Power-Less

BY FRANK A. PHILLIPS,* W4LCY

UNDOUBTEDLY, one of the most abused and least observed rules in the amateur regulations is the regulation concerned with power input and its use. To some amateurs the word "power" has lost its original meaning congruent with voltage and current and it has assumed a new meaning depicting status symbol with awe inspiring effects and a tool to be used indiscriminately.

As the regulations clearly state, the use of power is to be used judiciously depending on circumstances. In simple, everyday terms, just what does this mean? It means that if difficulties arise because of adverse conditions that can be circumvented by an increase in power, then the increase of power is justified. In my own interpretation I would take this to mean during the movement of vital or emergency traffic, in purely scientific or experimental work and for educational or informative purposes. Beyond that, there is no valid reason. Mere chatting and other inconsequential operations do not warrant the use of excessive power. There have been altogether too many instances of high-powered stations conducting cross country and even cross town QSOs where QRM was needlessly caused thousands of miles away. Can this inconsiderate practice be defined as an intelligent use of power, or the lack of it? How many times has power been used for argumentative purposes on the amateur frequencies and how often has it been the subject of controversy?

In looking at the present state of the art, there are several reasons why there is no need for the present maximum legal limit, which was more or less a necessity during the days of spark, inefficient antennas and the growing pains of radio. In light of all the improvements in the past twenty years or so, it is quite obvious that high power is in a sense unnecessary. Today we have highly efficient antenna systems, improved methods of radiotelephony as well as other modes and an increased knowledge of the behaviour of the ionosphere and its timely use. There is the matter of frequency congestion and the problem of interference to public services other than the amateur service (BCI and TVI, specifically).

There is also the matter of our "image" with amateurs of other countries. If we are to improve the situation this is one area in which we can reap the most dividends. Our use of high power has always been a source of humorous ridicule and resentment on the part of the foreign amateur. "Why is it that you Americans require a kilowatt to do the same thing we do with 150 watts?" is the most often heard inquiry. From this a more uncomplimentary meaning can easily be deduced concerning our abilities. In retrospect, why do we need all of the power? Is the use of excessive power an excuse for lack of know-how? One sometimes ponders over the fact; did the foreign amateur create his own phone bands out of sheer necessity fostered by congestion, or was it because he was unable to withstand the oppressiveness of power?

Collectively, what would be the beneficial effects of utilizing lower power if it became a reality? I believe that the technical ability of the amateur would noticeably improve simply because he will be compelled to devote more time and concentration to circuit improvement in an effort to coax more out of an existing circuit. Understandably, the more power there is involved, the less we are apt to become concerned about its conservation for useful work.

By the reduction of power level and a consequent outlay of capital, more amateurs would be accorded the same power advantages. Competition would become keener in an effort to achieve higher operating results, thereby improving the skill and capabilities of the operator. To the "paperhanger," certificates would become more meaningful.

Lower power would further introduce the need for better antenna systems and many of the obscurities of transmission lines, matching networks and antennas would be vigorously confronted in an effort to better utilize the signal. When there isn't much to work with, a person will apply more thought to prevailing limitations. It will become mandatory to realize the necessity of applying the proper antenna to a particular situation in order to obtain the desired results. There *is* the practice of using high-angle radiators commensurate to local work.

At the risk of invoking an economic depression in the electronic industry, upsetting hidebound amateur philosophy and provoking antagonism among the brethren, I propose that every amateur take the initiative by limiting the input to his transmitter(s) to a maximum of 250 watts. We as amateurs in upholding and making ourselves worthy of amateur tradition should make the first move rather than to rely on a petition or an order from a regulatory body. Is it possible that we are capable of doing something as constructive as that on our own? Are we the "leading" amateurs? For that "extra" power, let's improve our antenna systems, our knowledge of the ionosphere, the use of our equipment, the use of the lower frequency bands or v.h.f. for local contacts, and our operating skills. QST

* SRI OSD/ARPA R&D Unit, APO 146, San Francisco, Calif.

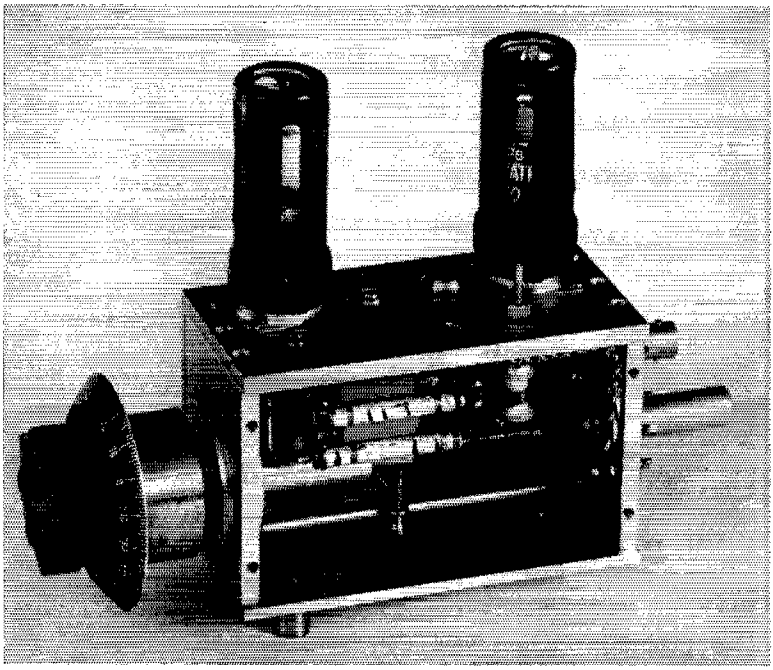


Fig. 1—The completed p.t.o. unit with one side cover removed. The rugged mechanical design is quite apparent in this photo. The small coil above the p.t.o. inductor is for setting the band limits.

A High-Precision Permeability-Tuned V.F.O.

Stable Unit for Receiver or Transmitter Use

BY WALTER HORN,* IIMK

THE need for greater frequency stability and resetability of r.f. generators is steadily increasing for a number of well-known reasons. The VXO can achieve a frequency stability as great as that required in c.w., s.s.b. and RTTY operation, but its range of frequency variation is insufficient for many applications. On the other hand, the stringent requirements for precise frequency control over a wide range imposes highly-severe design considerations on v.f.o. circuits.

In this article we will describe a v.f.o. showing several features believed to be unusual and which result in a high order of frequency stability and resetability with changes in supply voltages, tube characteristics and component aging, together with a rigorously-linear frequency calibration.

These remarkable results have been obtained employing a well-designed electrical circuit, a very rigid mechanical layout and a high-precision tuning mechanism. One thing which must be tolerated with this v.f.o. is its low output level (about 1 volt of r.f.). This may be brought up to a useful amount by means of additional amplification. Low output, of course, is by no means a limitation when the oscillator is employed in conjunction with a mixer to transpose an s.s.b. or other kind of signal to a more suitable frequency.

* 11, Via del Viandante, Mandello Lario, Italy.

The constructional details included in this article are not furnished with the expectancy that there will be many who will wish to duplicate the unit. The chief intent is to illustrate the close attention to detail required in achieving a high order of frequency stability in a permeability-tuned v.f.o. As described, the unit is designed for use as a heterodyne oscillator in a conversion system covering the desired band or bands.

The Electrical Circuit

The schematic diagram of the v.f.o. is shown in Fig. 2. Basically, it is a permeability-tuned Franklin[1] oscillator employing two 6BX6 (EF80) pentodes. The circuit shows excellent stability, the key to which is, as in other circuit configurations, the very loose coupling existing between resonator and driving system.[2] The first tube is provided with a cathode resistor to increase the impedance which the grid presents to C_6. This is highly desirable because the grid conductance in conjunction with the input capacitance affects the phase angle of the equivalent voltage divider, thereby affecting the frequency of the generated signal.

At frequencies near 2 Mc., where the circuit is operated, the load resistance may be made so small with respect to its associated capacitances that the phase shift in each stage is substantially 180 degrees; the operating frequency is then very nearly the natural frequency of the resonant circuit. The chosen arrangement has the remarkable advantage that tuning may be accomplished by means of a variable inductor or capacitor, one side of which is directly grounded. In this circuit it may prove desirable (but not absolutely necessary) to use a tapped coil; this preserves the advantages of a low impedance level without requiring the use of an inordinately large capacitance. Moreover, the tap is critically located to compensate for impedance variations over the tuning range. In this way, a low r.f. output-voltage coefficient is maintained throughout the v.f.o. frequency range.

All usual oscillators present amplitude limiting to a greater or lesser degree. On the contrary, in the described v.f.o., because of coil tapping and the cathode resistor, the signal level on the control grid of the first tube is very low; the tube does not draw grid current and therefore operates as a Class A linear amplifier. Some limiting occurs in the following tube, but to a very low extent. The output signal is therefore almost perfectly sinusoidal. By grounding the cathode of the buffer tube, noise and hum have been minimized. The screen grid of this tube is used as the anode in the feedback loop, while its plate is in an electron-coupled output circuit.

The Variable Inductor

The most critical component of the v.f.o. is the variable inductor. The simplest mechanical arrangement for a variable inductor is the slug-tuned coil. An inductance ratio of about 4 to 1, with a uniformly-high Q, may be obtained by inserting a suitable powdered-iron core into a long, slender solenoid. When such a coil is associated with a fixed capacitance, the frequency variation may be made almost linear with respect to core position. This arrangement has been used in well-known commercial receivers and transmitters, and is capable of meeting fairly-exacting requirements. It also has the advantage that there are no moving contacts in the entire tuning circuit.

The starting point in designing a permeability-tuned arrangement is the selection of the slug to be used in conjunction with the coil. The chosen slug must have sufficient permeability to produce the necessary inductance variation with a reasonable longitudinal displacement. It must also be stable with temperature and aging, and free from possible troublesome effects when placed in a magnetic field. The author removed the slug from the core of a surplus 455-kc. i.f. transformer. This slug is a powdered-iron type, 8 mm. in diameter and 19 mm. in length, and has a 4-mm. hole through its center. Other high-Q ferrite cores were tried initially, but were quickly discarded because of instability resulting from a high temperature coefficient, or because they were sensitive in permeability when placed close to magnetic fields.

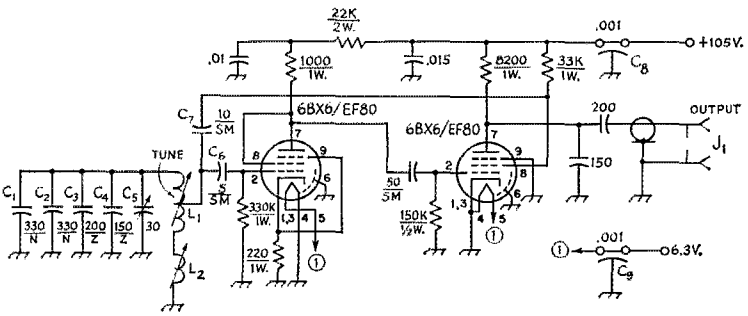


Fig. 2—The Franklin circuit used in the v.f.o. designed by I1MK. Resistances are in ohms (K = 1000). Decimal values of capacitance are in μf., others in pf. Fixed capacitors: N = N750 ceramic, Z = NP0 ceramic, SM = silver mica; others not listed below are tubular or disk ceramic. Component designations not found below are for text-reference purposes.

C_1, C_2—(Centralab TCN).
C_3, C_4—(Centralab TCZ).
C_5—Air trimmer (Johnson 157-3, or similar).
C_8, C_9—Feedthrough capacitor (Centralab FT-1000).
J_1—Chassis-mounting coaxial receptacle (BNC).
L_1—See text.
L_2—0.5 μh.—5 turns No. 28 enameled close-wound on ¼-inch ceramic iron-slug form (Millen 69048 form).

[1] Edson, *Vacuum-Tube Oscillators*, John Wiley and Sons, 1953.

[2] Clapp, "An Inductance-Capacity Oscillator of Unusual Frequency Stability," *Proc. I.R.E.*, March, 1948.

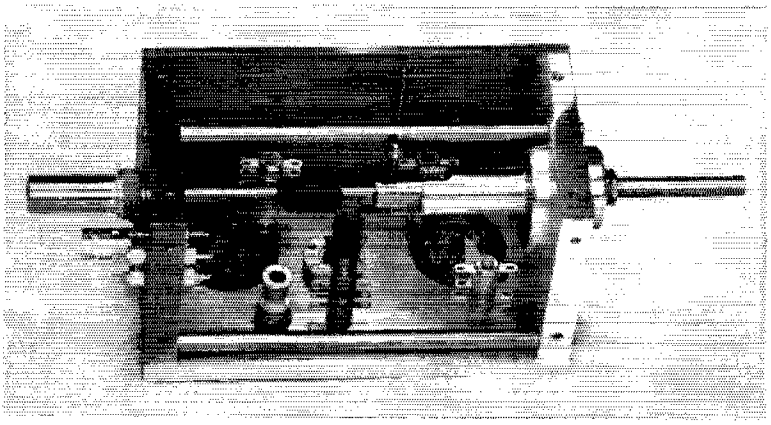


Fig. 3—In this view of the partially-assembled p.t.o. unit, the coil has been omitted to expose the tuning slug mounted on the driving shaft. The front bearing guide is notched for the arm that prevents rotation of the slug shaft to permit full lateral movement of the slug. The knurled aluminum sleeve at the left-hand end covers that end of the slug shaft and the coil spring that prevents backlash.

The second point is the design of the coil. To produce an output frequency linearly related to core travel, the coil must have a special variable-pitch winding. So many factors have influence on the resulting inductance, including unavoidable variable capacitance with respect to ground, and the variable mutual inductance between different coil sections, that a prediction of the tuning curve in advance appears almost impossible. However, by experimentally adjusting coil length, number of turns, winding pitch and core travel, the tuning curve can be made to follow exactly the desired linear shape.[3]

Constructional Details

The v.f o. is so designed and constructed that it has little sensitivity to vibrations in the order of 5 G. Frequency deviation is less than ± 100 c.p.s. under 5 G acceleration at 50 cycles. Bumping or pounding on the operating table does not cause any noticeable frequency deviation.

A factor which must be taken into account in designing the mechanical layout is the size and type of box in which the circuit is to be installed. This is of primary importance in relation to frequency stability and resetability *vs.* mechanical stability. First, the box must have such a size as to permit the tuning tank to be mounted in a position which will insure that the walls are no closer to the coil than by an amount equal to three to four times the coil diameter. This will minimize deterioration of the coil *Q*, and the thermal excursions which inevitably cause the side walls of the box to expand or contract will produce less effect on coil inductance. Circuit components should also be kept away from the tuning tank.[4]

Mechanical layout of the v.f.o. may be seen in Figs. 1 and 3. The v.f.o. is mounted in a frame consisting of a front and a rear plate clamped together by three metal rods. For smooth action of the tuning mechanism, the two plates must be exactly parallel. To achieve this, both plates are milled from an aluminum block, and the three rods are turned down from brass stock. The end plates are 10 mm. thick and the rods are 6 mm. in diameter; their ends are tapped to fit 5-32 machine screws.

The frame supports an upper and a bottom plate, bolted to the end plates by a set of machine screws. The upper plate, a sheet of aluminum 5 mm. thick, supports the electrical circuit, except the tuning coil. The bottom plate is provided with three ceramic pillars to fasten the v.f.o. on a main chassis. The pillars assure thermal insulation of the v.f.o. unit from heat-generating devices mounted on the main chassis. Side walls are simple aluminum sheets having a thickness of 3 mm.

Grounding of zero-potential tube pins is achieved by means of two silver-plated copper rings having 22-mm. inside and 30-mm. outside diameters, fastened against the mounting plate by the same screws which hold the sockets. In making these rings, the material is cut so as to form lugs, on the inside diameter, in a pattern corresponding to the socket pins to be grounded. This assures the shortest grounding path. To the same rings all circuit ground returns must be soldered.

All connecting leads, except those of the tuning coil, are made with No. 14 silver-plated copper wire, and the lengths are broken by standoff insulators so that no length remains unsupported for more than a half inch. This kind of lead rigidity, plus the excellent ground return, assures maximum frequency stability under mechanical vibration. It should be noted that solid construction alone is not enough to insure short- or even long-term stability; the components must also be mounted so that there is a minimum of strain and stress on the frequency-determining parts.[5]

On the rear frame plate are located a BNC coaxial connector, serving as an output terminal,

[3] Arnold, "Transistor V.F.O. with Linear Tuning," *QST*, March, 1960.

[4] Shulman "An Ultrastable Keyed V.F.O." *QST*, Oct., 1957.

[5] Neubauer, "Eine Kleine Anatomie der Steuersender," *DL-QTC*, Jan., 1955.

and two feedthrough ceramic capacitors for connecting the v.f.o. to its power supply.

The Tuning Mechanism

The heart of the unit is the tuning mechanism, most of the essential parts of which can be seen in the photographs of Figs. 1, 3 and 4. The slug is fixed on a stainless-steel rod 6 mm. in diameter. To assure accurate alignment of the slug within the coil, one end of this rod is threaded into a section of stainless-steel rod of larger (10 mm.) diameter which slides back and forth through a close-fitting aluminum cylinder attached to the front end of the v.f.o. box. The opposite end of the larger rod is tapped to fit a lead screw attached to the control shaft which runs through ball bearings. The lead screw is threaded 2 threads per mm. (approximately 50 threads per inch). Turning of the lead screw moves the slug back and forth through the coil (not shown in Fig. 3). The core travel is limited to 12.5 mm., covered by 25 revolutions of the lead screw. The rear end of the rod carrying the coil slug slides in a bearing mounted in the rear end of the v.f.o. enclosure. Turning of the slug shaft with rotation of the control shaft is prevented by a stop attached to the slug shaft. This stop carries a grooved roller which rides against one of the box-assembly rods under tension of a spring.

The front bearing consists of a pair of ball thrust bearings, back to back. Any possible play in the threads of the lead screw is taken up by a spring at the rear end of the shaft.

Moving parts and bearings of the assembly must be machined to close dimensions because upon their precision depends the frequency stability and resetability of the v.f.o.

The Tuning Inductor

The coil, which may be seen in Figs. 1 and 4, is wound on a form 11 mm. in diameter and 40 mm. long turned down from a block of polystyrene. The form is bored out to a slide fit for the powdered-iron slug, and a mounting flange is turned at one end to permit fastening the form to the rear end of the box.

As already mentioned, the coil has a specially-developed variable-pitch winding. Core and coil are designed to work together to produce an output frequency which is a linear function of slug travel. Because core and coil must be matched together, employing a different type of slug will make it necessary to wind the coil with a little different pitch shape.

To tune the 2.5–3-Mc. band with a fixed capacitance of 1000 pf., the required inductance is 4.06–2.82 μh. ($L_{max}/L_{min} = 1.44$). Leaving off 0.5 μh. for the trimming inductor, L_2, the tuning coil must show a maximum inductance of 3.56 μh. and a minimum of 2.32 μh. No. 28 enameled wire is used, and the turns are proportioned as in Fig. 5. With the tuning slug removed, the coil presents an inductance of 2.1 μh. and a Q of 125; inserting the slug raises the Q to 160. In mounting the finished coil, every care should be used to align the form with the slug so that there will be absolutely no friction at any point in the travel.

Examination of Fig. 5 will show that the coil consists of three sections: a first section of 4 close-wound turns, a second section of 17 turns wound with a variable pitch, and a third one of 8 close-wound turns. The winding pitch of the intermediate section follows the law described by the curve of Fig. 5. Frankly speaking, winding this coil is not an easy job. To obtain a constant ratio of shaft rotation to frequency change throughout the range, the intermediate section of the coil must be wound with a smooth and continuously variable pitch and this must present no abrupt discontinuity nor accidental bend. A great dose of patience and perseverance is required.

After completion, the coil must be cemented with high-grade Q-Dope to hold its winding firmly and definitely in place. A number of v.f.o.s like the described one have been built, and in every case the linearity obtained has been better than 0.02 per cent, despite the fact that no mechanical-correcting mechanism has been used; i.e., the actual frequency did not deviate from a straight-line calibration more than ± 450 c.p.s. over a range of 500 kc. (see Table I).

Coil Adjustment

For calibration purposes, a trimming inductor and capacitor, L_2, C_5, are provided; by adjusting inductor and capacitor, frequency end points may

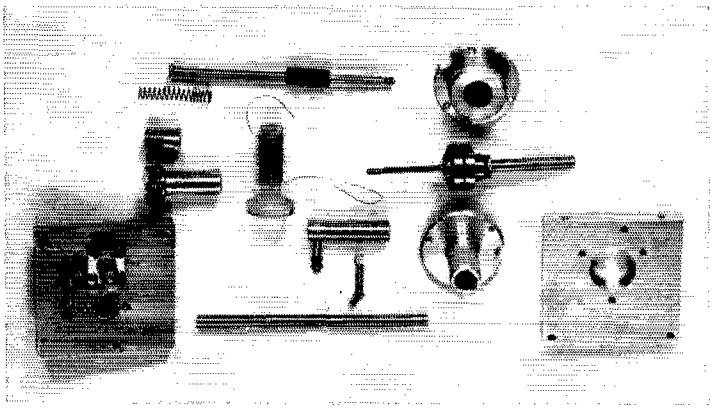


Fig. 4—The various machined components shown here may be identified by comparison with Figs. 1 and 3.

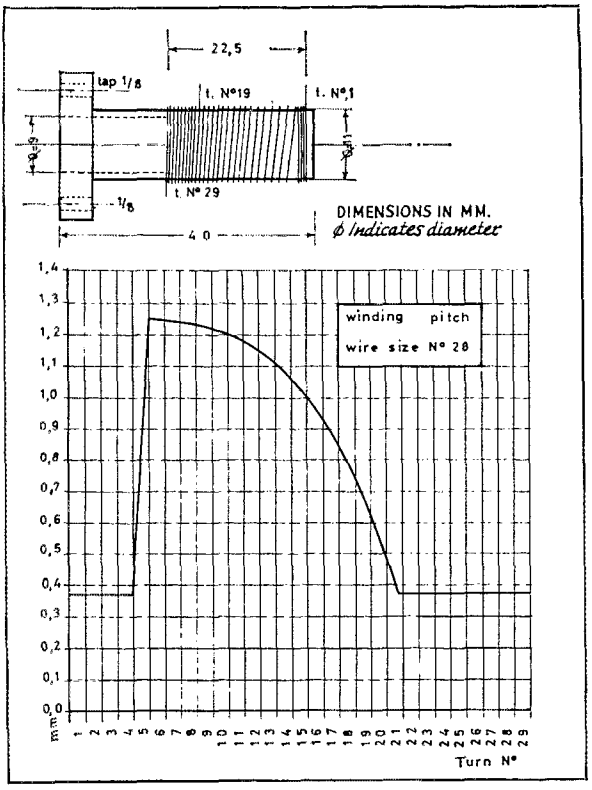


Fig. 5—The sketch at the top shows the dimensions of the coil form, and overall dimensions of the winding. "Tap 1/8" is a European approximate equivalent to 4-40. The graph (left to right) below shows the approximate distance between wire centers for each successive turn, starting at the right-hand end of the form.

be reset in case tubes or components should be substituted.

Because of the small space in the final assembly, a preliminary breadboard setup is advisable.[3] The adjustment consists essentially in changing the number of turns in the first and third section of the coil to get the required frequency spread with a chosen travel of the tuning slug. With the slug almost out of the coil, the frequency should be at the high end of its range; if not, readjust trimmer C_5. Then the slug is moved into the coil by making 25 revolutions of the control shaft. If the frequency is now lower than desired, move a few turns from the third section of the coil to the first one; if the frequency is higher, move one turn or two very carefully from the first section to the third. Since the shaft can rotate more than 25 turns, a little experimenting will be necessary to find which 25 turns give the desired frequency spread together with the required calibration linearity.

When proper tuning range has been obtained, it will be time to check the frequency at intermediate points. If the coil has been wound with appropriate care, an excellent linearity should be obtainable. Don't try to correct any nonlinearity by moving the turns spread out between the first and third coil sections; this will be only a waste of time. It is much better to discard the coil and to rewind a new one with a little different pitch. In case the circuit will not oscillate properly throughout the range with a coil of a given Q, feedback may not be sufficient, because the capacitance of C_6 and C_7 have been chosen too small.

The Dial

As previously mentioned, the tuning range of the described v.f.o. is 2.5 to 3 Mc. Since it takes 25 revolutions of the control shaft to cover 500 kc., the coverage is 20 kc. per revolution. A knob with a 2½-inch dial, marked off with 20 large and 200 small divisions, is attached to the shaft. Every large division corresponds, therefore, to 1 kc. A string-drive system, coupling the control shaft to a slide-rule scale, indicates the 25-kc. portion of the band being covered by each revolution of the tuning knob.

Another solution, especially useful when the available panel space is small, consists in the use of a mechanical counter (speed-gauge type) marked 0–500 and coupled to control shaft by a gear train having a ratio of 1 to 20. To obtain a direct reading in kilocycles, every revolution of the shaft, corresponding to a frequency variation of 20 kc., must advance the counter by 20 digits.

Aside from the chosen scale system, it is strongly recommended that the rotation of the tuning shaft be limited by means of suitable end-travel stops. This will prevent any possible forcing of the tuning mechanism b yond its limits. Since the lead screw is loaded against the plunger carrying the slug rod, forcing of the control shaft can cause permanent frequency deviations. To avoid irreparable damage to the

Table I

Tuning Linearity

Rev. No.	*Cal. (kc.)*	*Measured Freq. (kc.)*	*Dev. (c.p.s.)*	*Dev. (per cent)*
1	2500	2500.000	0	0
2	2520	2520.060	+ 60	+0.002
3	2540	2540.083	+ 83	+0.003
4	2560	2559.810	−190	−0.007
5	2580	2579.900	−100	−0.004
6	2600	2600.010	+ 10	+0.0004
7	2620	2620.078	+ 78	+0.003
8	2640	2640.100	+100	+0.004
9	2660	2659.915	− 85	−0.002
10	2680	2679.729	−271	−0.010
11	2700	2699.695	−305	−0.011
12	2720	2720.046	+ 46	+0.002
13	2740	2740.003	+ 3	+0.0001
14	2760	2759.789	−211	−0.007
15	2780	2679.905	− 95	−0.003
16	2800	2800.180	+180	+0.007
17	2820	2820.071	+ 71	+0.003
18	2840	2840.320	+320	+0.0013
19	2860	2860.450	+450	+0.015
20	2880	2879.984	− 16	−0.0006
21	2900	2899.930	− 70	−0.003
22	2920	2919.941	− 59	−0.002
23	2940	2940.012	+ 12	+0.0006
24	2960	2960.036	+ 36	+0.001
25	2980	2979.982	− 18	−0.0006
26	3000	3000.043	+ 43	+0.001

The figures in the third column of this table were obtained by beating the v.f.o. output against a 20-kc. spectrum derived from a 400-kc. precision crystal oscillator (long-term stability, 10^{-7}) followed by a chain of regenerative dividers. The departure from linearity, which does not follow a precise law, may be caused more by irregularities in the threads of the actuating screw than by imperfect adjustment of coil turns.

mechanism, it is also recommended that an appropriate coupler be used between the control shaft and tuning knob. The coupler, if of constant-velocity type, will not permit end pressure to be exerted on the control shaft, and will allow for some offset between its axis and tuning-knob rotation center. It is obvious that the coupler must be absolutely free from backlash. A coupler loaded with a set of springs is generally appropriate.

Results

After assembling the v.f.o. and adjusting the tuning range, it will be worth while to check the calibration linearity. This can be done with a frequency meter like the BC-221, by checking v.f.o. frequency at several intermediate points within its range. This method, of course, is a time-consuming job. A more suitable procedure consists in beating the v.f.o. output with a 20-kc. spectrum, derived from a standard. Intervals of 20 kc. are the most useful because the v.f.o. covers, in 25 revolutions of the tuning shaft, a band 500 kc. wide. As a consequence, the beats will appear at the zero point of every shaft revolution and the nonlinearity can be measured directly on the control dial. Divided into 20 parts, the dial will read directly in kilocycles.

In our measurements, however, we have used a counter-type frequency meter (Hewlett Packard, type 524 D), and th's setup is certainly the best one to check frequency, stability, resetability and calibration linearity. A beating method,[4] employing a crystal standard, a mixer (or receiver),

Table II

Output Frequency *vs.* Plate Voltage

Plate Voltage	*Measured Freq. (kc.)*	*Frequency Dev. (c.p.s.)*	*Frequency Dev. (p.p. 10^6)*
80	2700.000	0	0
82	2700.051	+51	+19
84	2700.108	+57	+20
86	2700.171	+63	+23
88	2700.226	+55	+20
90	2700.270	+44	+16
92	2700.333	+63	+23
94	2700.390	+56	+20
96	2700.412	+22	+ 8
98	2700.420	+ 8	+ 2
100	2700.401	−19	− 7
102	2700.359	−42	−16
104	2700.318	−41	−15
106	2700.270	−48	−18
108	2700.219	−51	−18
110	2700.156	−63	−20
112	2700.100	−56	−20
114	2700.049	−51	−18
116	2699.993	−56	−20
118	2699.928	−65	−24
120	2699.861	−67	−25

This table shows the change in frequency with oscillator-tube plate voltage, from an initial frequency of 2700 kc. The average deviation is 9 p.p.m. The v.f.o. plate voltage was provided by an adjustable electronically-regulated supply, and the deviation was measured by beating the v.f.o. output against a precision crystal-controlled standard (long-term stability 10^{-7}), and checking with a counter-type frequency meter.

an a.f. interpolation oscillator, and a comparison oscilloscope, would be nevertheless a satisfactory setup for checking v.f.o. performance.

Thanks to the careful temperature compensation (C_1-C_4 inc.), our v.f.o. showed a thermal coefficient of only 1.2 parts per million per degree Fahrenheit and this is, to our mind, a very remarkable performance. Backlash error (the difference in frequency when resetting the v.f.o. from opposite directions of rotation to the same angular position) is limited by mechanical design and careful adjustment to 30 parts per million. Normally such a small error is not apparent on a dial. Changes in plate-supply voltage have very little influence on frequency (see Table II). The point of maximum flatness of the curve showing output frequency *vs.* plate voltage falls around 98 volts. For this reason, a plate-supply voltage of 105 was chosen. The frequency-*vs.*-plate-voltage coefficient is about 9 parts per million per volt variation. Operating the v.f.o. from an 0B2 regulated power supply, the average long-term (24-hour) stability is in the order of 15 parts per million after warm-up. A regulated heater power source is recommended. The frequency is for all practical purposes unaffected by loading at the v.f.o. output terminals. Shorting the output connector results in a frequency shift of less than 5 c.p.s.

Conclusions

The described v.f.o. is certainly not an easy-to-build piece of equipment. Its construction cannot be carried out with simple tools, and probably is quite beyond the practical possibilities of the average ham workshop.[6] Rather than as a description of how to build your own v.f.o., this article is intended as an explanation of difficulties encountered in designing a precision unit and the techniques employed to reach the final result.

Acknowledgment

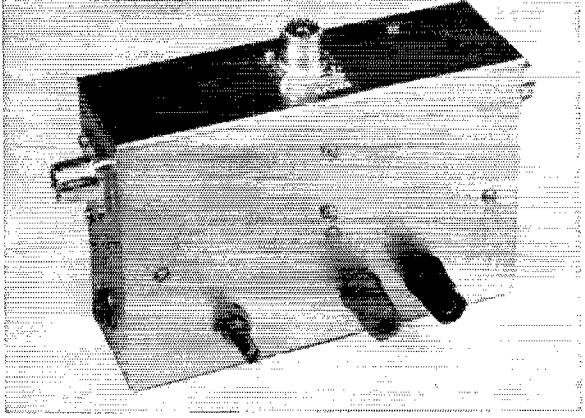
For stimulating and helpful discussions during the design and construction of the v.f.o., the author is indebted to O. Roberto, 11NU, and F. Clamer, 11COF. QST

[6] Exact drawings of the complete mechanical assembly and all machined parts are available from ARRL for 75¢ for a set of six drawings.

Strays

Young Dave Taylor, WB2DDB, a high schooler from Locust, N.J., entered this ultra-compact ham-TV rig in the Central New Jersey Science Fair at Rutgers University in March, walked away with Boys' Grand Prize, Senior Boys' Physics, Army Achievement, and first alternate Navy Achievement awards, as well as a five-day expense-paid trip to the National Science Fair in Baltimore May 5–9. Dave designed the circuitry himself, and kept camera cost to about forty dollars with intense scrounging and careful buying. Here he explains his ATV converter to young Fair visitors. Girls' Division winner Gail Halpern is WA2JSL and daughter of W2GDS (Photo courtesy of the New Brunswick *Sunday Home News*)

(Left photo) K9LKA receives the QST Cover Plate Award plaque from Central Division Director W9HPG (right) at a meeting of the Big Thunder Radio Club in Belvidere, Ill. This award, presented for his article, "The 4-1000A in Grounded Grid" in July 1963 QST, is Larry's second (he was similarly honored for his article in Nov. 1961 QST). K9CCG, president of Big Thunder RC, looks on. (Right photo) Rear Admiral B. F. Roeder, Director of Naval Communications, stands between LCDR Robert E. Mickley (left) and LCDR Charles R. Winnette. LCDR Mickley recently relieved LCDR Winnette as head of the Navy's amateur radio branch and as Chief, Navy MARS. During LCDR Winnette's tour with the amateur radio branch the Navy and Marine Corps entered the MARS system; and the number of Navy ships authorized to operate amateur radio on board increased from less than 12 in 1959 to more than 200 today. It's now CDR Winnette, on duty in London.



The tubeless relay, using the circuit of Fig. 2, is contained in a 4 × 6 × 2-inch box. The binding posts at the bottom are for the battery connections. Each end has a coax fitting and a jack, with the third coax connector on the top edge in this view.

High-Speed C.W. Break-In

With Mechanical

A Keyed Antenna Relay

T.R. Switching

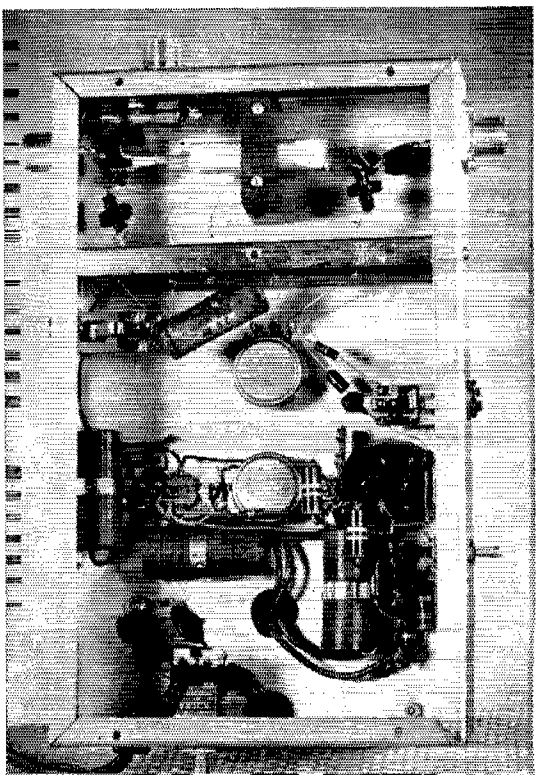
It is pretty generally admitted that using the same antenna for both transmitting and receiving is a good idea. How to do it while getting full c.w. break-in has caused lots of heads to be scratched, over the years. The vacuum-tube t.r. switch, although effective in protecting the receiver from r.f. while the transmitting key is down, isn't always the ideal answer. Depending on the circuits used, it may suffer from signal suck-out by the transmitter tank, or may cause the receiving setup to be dependent on the tank tuning for sensitivity. Worse, the intimate connection between the transmitter tank and receiving circuits can do horrible things to the receiving signal-to-noise ratio, in those cases where the final stage is not automatically biased beyond cutoff when the key is up.

The antenna changeover relay is free from these defects, but none of the relays ordinarily used for t.r. switching is capable of high-enough operating speed to follow keying. Also, more than just speedy operation is necessary. Somehow, the relay contacts have to get closed *before* the transmitter power comes on, must stay closed during the "tail" part of the keying shaping *after* the key itself is open, and then must get back speedily to the receiving position.

Nevertheless, this kind of switching can be done. We have Don McKinley, VE3AU, to thank for the accompanying circuits and photographs of two versions of a t.r. switch that he has used successfully for c.w. break-in at speeds of 40 w.p.m. or more, and at power levels up to 700 watts input. It uses a magnetic-reed switch, a comparatively recent development for high-speed switching. The particular one is a Hamlin type DRG-DTH,[1] single-pole double-throw, with one contact normally closed. This model has a rated actuating time of less than 1 millisecond, depending on the driving force generated by the external coil. The contact-bounce period is rated at an average of 2 ms. for the normally-closed contact and 1 ms. average for the normally-open contact — plenty fast for keying applications.

Fig. 1 shows the circuit VE3AU set up experimentally to determine optimum values. The driving coil for the relay gets its current from the

[1] Hamlin, Inc., Lake and Grove Sts., Lake Mills, Wis.



Internal view of the tube model. The relay is in the shielded section at the top, mounted in a pair of bakelite blocks drilled and sawed in half for a firm fit around the coil (the white cylinder). The reed switch is entirely inside the coil; only the connecting leads show in this view. The coax fitting at the left goes to the transmitter, the one on top to the receiver, and the antenna connects to the one at the right. Layout below the shield partition is not critical.

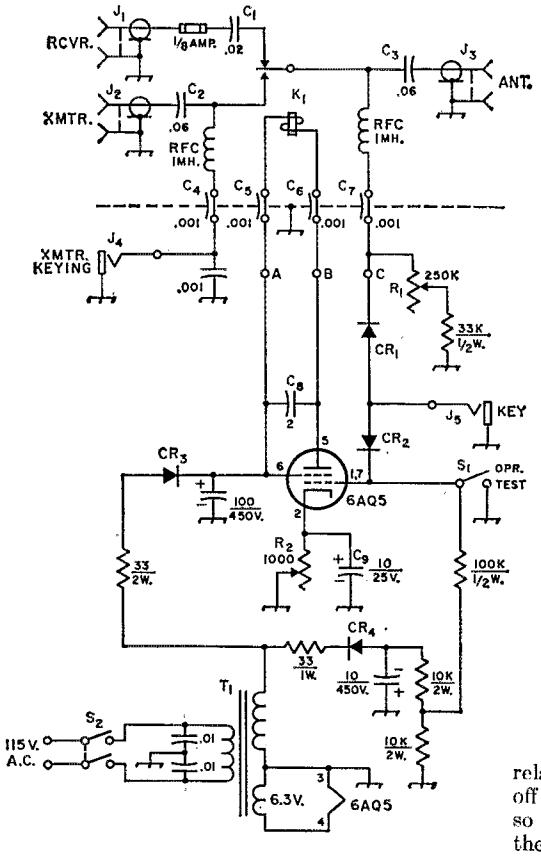


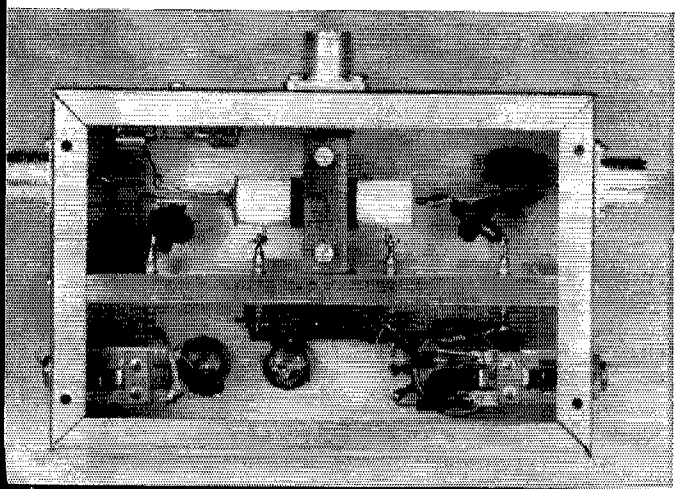
Fig. 1—Keyed antenna relay circuit. Capacitances are in μf.; capacitors with polarity marked are electrolytic, others are disk ceramic except as listed below. Resistances are in ohms.

C_1—0.02-μf. disk ceramic, 1000 volts.
C_2, C_3—0.06-μf. disk ceramic, 1000 volts (three 0.02-μf. units in parallel).
C_4, C_5, C_6, C_7—0.001-μf. ceramic feedthrough (Centralab FT-1000).
C_8—2-μf. paper, 200 volts.
C_9—10-μf. electrolytic, 25 volts or more.
CR_1, CR_2, CR_3, CR_4—Silicon, 400 or 600 p.i.v., depending on keying bias voltage; 1N2071 (Texas Instruments) used in units shown in photographs.
J_1, J_2, J_3—Coaxial connectors, chassis mounting.
J_4, J_5—Open-circuit jack.
K_1—Hamlin type DRG-DTH reed switch with 5000-turn coil (400 ohms); see text.
R_1—0.25-megohm control, linear taper.
R_2—1000-ohm control, linear taper.
S_1—S.p.s.t. toggle.
S_2—D.p.d.t. toggle.
T_1—Power, 120 volts, 50 ma., 6.3 volts, 1.2 amp. (Hammond 262E6, Stancor PA-8421, or equivalent).

plate circuit of the 6AQ5, which has an adjustable cathode bias resistor, R_2, for setting the hold-in current. The value of C_8 determines the hold-in time. The circuit is for use with blocked-grid keying of the transmitter, J_4 being connected to the transmitter key terminals through a patch cord, with the key then going to J_5. (The regular blocked-grid keying system in the transmitter is not disturbed, and is entirely independent of Fig. 1.) A grid-bias supply for the 6AQ5 is included in Fig. 1 in order to give maximum flexibility in adjustment, and CR_1 and CR_2 are gates for separating the d.c. keying voltages on the 6AQ5 and the transmitter.

Note that the d.c. keying circuit of the transmitter is completed through the transmitting relay contacts, with the r.f. suitably blocked off by r.f. chokes. Thus the key is not closed, so far as the transmitter is concerned, until the relay has connected the antenna to the transmitter. The transmitter's keying shaping on "make" prevents the r.f. output from rising rapidly during the short contact-bounce period, so the contacts are safely settled on the transmitting side before the r.f. goes through — at least, this will be true if the "make" is soft enough (as it should be) to wash key clicks off the transmitted signal.

There are some less obvious features to the circuit. The capacitance of C_9 is chosen so that the rise in cathode bias is delayed a millisecond or so when the key is closed. Initially, therefore, the relay coil is hit with a large voltage, making its action more positive. The R_1-33K resistor combination is for the purpose of discharging the d.c. voltage stored in C_7 during the time that the reed is swinging back to "receive" from the "transmit" position, thus preventing a click in the receiver from this cause. The total resistance here has to be great enough to avoid excessive loading of the blocked-grid key-circuit bias, which might upset the keying, but low enough to dissipate the



Inside the tubeless version. Relay-compartment layout is similar to that in the tube model. Components that do not handle r.f. are below the partition in this view.

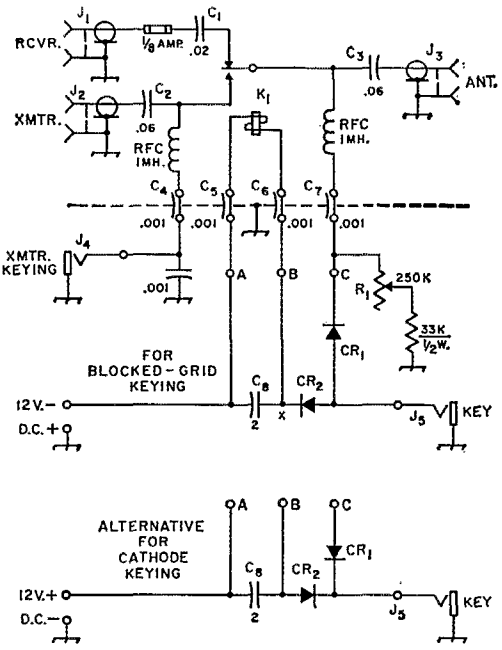


Fig. 2—Tubeless circuit, using 12-volt supply. Component values are the same as in Fig. 1. Alternative diode connections for cathode keying are shown below. Initial adjustment of R_1 in this circuit can be made without keying the transmitter by temporarily grounding point X.

charge before the reed hits the back contact. S_1 permits turning on the relay, without keying the transmitter, for making adjustments to R_1 and R_2. Once set, these adjustments can be left alone, or fixed resistors can be substituted, and there is no further need for S_1.

The ⅛-amp. fuse is a precaution for protecting the receiver input circuit from burnout in case the switch breaks down because of excessive r.f. voltage. This condition might occur should the s.w.r. be high through misadjustment or an accident to the antenna system. Because the close contact spacing leaves no margin of safety in this respect, the fuse should not be omitted.

A Tubeless Model

Another version of the relay circuit is given in Fig. 2. This uses no tube, and takes only a 12-volt d.c. source capable of supplying 30 ma. or so. The only disadvantage, as compared with Fig. 1, is that the dots tend to be a little short at speeds of 40 w.p.m. and more. This can be overcome by using a 22½-volt supply, and feeding the relay coil through a resistor to accelerate the current build-up in the coil. Enough resistance should be used to limit the steady coil current to about 30 ma. The resistor can be shunted by a capacitance of 10 μf. as a further means to speed up the make.

The lower drawing of Fig. 2 shows how the circuit can be rearranged to work with cathode-keyed transmitters. This section substitutes for the corresponding section below the terminals marked *A*, *B* and *C* in the upper drawing.

The Reed Switch and Coil

It should be kept in mind that the reed switches have not been designed for antenna service, and some care should be exercised in using them Primarily they are built for high-speed switching in low-power circuits. The reed and contacts are very close together, the assembly being mounted in a glass tube less than a quarter inch in diameter and 1½ inches long. The reed lead comes out one end and the leads from the two contacts come out the other, with little separation. The tube is gas-filled and sealed. The 60-cycle breakdown voltage is rated at a minimum of 500 volts. VE3AU found that arcing between leads outside the switch can be prevented by coating the contact end and the two contact leads with Dow Corning No. 4 silicone grease. In several months of use at various power levels up to 700 watts there has been no arcing inside, in spite of the close contact spacing (about 0.01 inch). It is obviously highly important to operate the switch at low voltage — meaning that it should only be used in a 50-ohm coaxial line that is well matched.

Actuating coils can be obtained from the Coto-Coil Co., Inc., 74 Pavilion Ave., Providence 5, R. I.; a 5000- or 6000-turn coil should be specified. A minimum of 100 ampere-turns should be

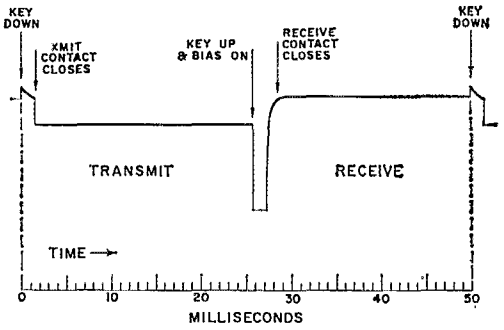
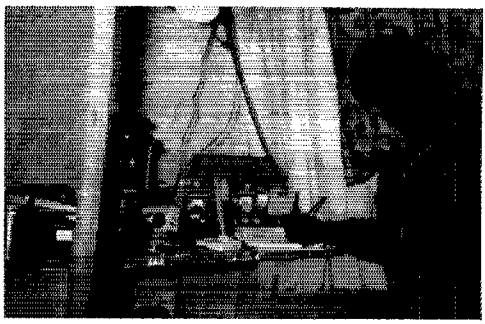


Fig. 3—Scale drawing of oscilloscope-pattern photograph of relay operation on dots at a rate of 40 bauds (25 milliseconds per code element) or approximately 45 words per minute. The switching speed is faster than the recovery time of most receivers unless the time constants in the circuits preceding the detector have been "amputated."

used, and if the coil is homemade it should be wound on a form that will fit snugly over the glass tube and extend a little beyond its end. A suggested winding is 5000 turns (approximately 500 feet) of No. 38 enamel wound in layers over a 2-inch length. If the turns are well "packed," the outer diameter should not exceed ½ inch. The resistance will be in the vicinity of 300 ohms. No. 36 enameled wire can be substituted, but a 5000-turn coil will have a somewhat larger diameter and the resistance will be in the neighborhood of 200 ohms. Either will develop all the magnetizing force required when operated from a 12-volt source. — *G. G.*

One of the better multiop scores in the 1964 V.H.F. SS was turned in by K2SWI. WA2EVX is shown here manning the 50-Mc. position.



It was *cold* in the tent on Squaw Peak, 11,500-foot elevation in Colorado, scene of v.h.f. SS activity by KØHBT/Ø Operator is KØFHQ.

17th V.H.F. Sweepstakes

No Records — But Fine Country-Wide Activity

THE more than 1300 logs submitted in the ARRL V.H.F. Sweepstakes of 1964 show no new records. The paper pile is down slightly from the past two years, as are scores of individuals and clubs in most areas, thanks to an almost total lack of v.h.f. DX over the week end of January 4–5. It might have been a dull contest some years ago, but in 1964 it takes more than poor conditions to quell v.h.f. SS enthusiasm.

At least two entrants made more than 600 contacts. K3IPM/3 set the pace with 631 on 50, 144 and 220 Mc., winning the E.Pa. Section Award and top honors in the highly competitive Mt. Airy V.H.F. Club. Stan worked 85 stations in the first two hours of the contest, and was over the 200 mark in less than 6 hours. There is less than 2 hours time out in his log (night's sleep around 4 A.M.!), but the pace finally caught up with him and he quit at 10 P.M. Sunday. By this time he was safely in the lead, with 31,550 points. This record, by the way, was made with a Technician Class ticket. Out of curiosity about this alleged handicap, we checked the license class of 12 operators who made over 400 contacts. There were 3 Techs, 4 Advanced, 3 Generals, one Extra, one not given.

The other total over 600 was the 633 — 10 — 25,230 effort of the Zephyr V.H.F. Society of Northern New Jersey, where several operators of W2LST held forth from a high location. This was the top multiple-operator score of the contest.

Contact totals and scores are really significant only on a section basis, and this is how ARRL awards are made. Thus, K9TWF, 304 — 5 — 9120, Illinois winner, K8UQA, 392 — 12 — 17,248, Ohio leader, and many other section winners and near-winners deserve special plaudits. In almost every part of the country, it now takes outstanding effort to win ARRL Section wallpaper.

One-band work was exceptionally rewarding this year. Section awards were won by at least 10 operators using only the 50-Mc. band, and 144-Mc. stalwarts captured 7. K2MLB, West Orange, N. J., used his big 6-meter arrays to good advantage in working 362 stations in 14 sections for 17,352 points and the NNJ award. W9ECV/2, Setauket, L. I., poured on the 50-Mc. coal to work 318 in 15, for 15,700 and the NYC-LI win. Incidentally, 12 out of the first 15 high scores in this section were one-band work: some on 6, others on 2. K8MMM, Novelty, Ohio, always a 6-meter threat, caught 294 in 14, for 14,112, placing second in Ohio to K8UQA.

Scores made on 144 Mc. only showed up very well, with 50 enjoying almost no DX openings. W3IBH, Philadelphia, led the 2-meter specialists, as he has done before, with 288 — 10 — 11,250. WB2NNL placed second in Northern New Jersey, with 219 — 13 — 10,074, on 144 only. VE3CIL worked 186 stations on 144 Mc. W1JZD, Groton, Mass., rolled up an impressive 14 sections on 144 Mc.

A surprising number of portable stations were in the fray, their operators, cooks and maintenance men braving snow-covered roads and sub-zero cold to make things interesting for the homebodies. We salute previously mentioned W2LST, and K2GLQ 3, KØHBT/0 (operating from a tent on 11,500-foot Squaw Peak in Colorado), and many other hardy mountaineers. Note how portable work paid off for W6GAG/6 in the form of 470 contacts and 13,160 points, a real accomplishment for the Los Angeles Section under non-skip conditions. Multiop K2SWI, 391 — 14 — 18,768, W2BMW/2, 396 — 9 — 14,668, K2UDA, K2CBA, K1PLR, K6IXA/6,

CLUB SCORES

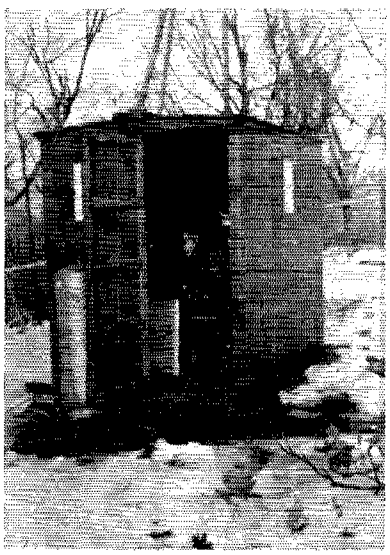
Club	Aggregate	Valid Entries	Certificate Winner
Mt. Airy V.H.F. Club (Pa.)	740,728	98	K3IPM/3
South Jersey Radio Assn.	265,732	60	W2REB
Rochester V.H.F. Group	143,887	109	K2YCO
Mobile Sixers Radio Club (Pa.)	114,221	29	W3AWA[1]
6 Meter Club of Chicago	111,830	40	K9TWF
Reading Radio Club (Pa.)	95,066	54	W3WJC
Central New Jersey V.H.F. Society	71,351	22	WB2BUR
Cleveland 50 Mc. DX Club	66,450	15	K8UQA
Dayton Amateur Radio Assn.	49,969	22	W8KKF
Germantown Radio Club (Pa.)	38,426	10	K3TPS
National Capital V.H.F. Society	37,460	11	W3LCC
Central Michigan Amateur Radio Club	36,861	38	W8BQD
Nipmuc Emergency Radio Corps (Mass.)	35,218	21	K1SLG
Skokie Six Meter Indians (Ill.)	31,988	15	K9RRF
Scarborough Amateur Radio Club	30,054	33	VE3CIL
Gloucester County Amateur Radio Club (N. J.)	25,586	13	W2LVW
Rock Creek Amateur Radio Assn. (Md.)	25,150	19	K3VJH
Lake Success Radio Club (N. Y.)	24,944	13	K2JWT
Springfield Amateur Radio Club (Ohio)	21,207	17	W8KPZ / K8MHJ
1200 Radio Club (Mass.)	20,217	10	W1QIB
Southern California V.H.F. Radio Club	19,658	5	WA6WIZ
Argonne Amateur Radio Club (Ill.)	19,312	16	W9LGI
East Coast V.H.F. Society (N. J.)	16,011	8	WB2DQS
Greater Pittsburgh V.H.F. Society	15,352	14	W3OMY
Delaware 6 Meter Net	15,148	3	K3AZH
Valley V.H.F. Club (Ill.)	14,306	9	K9DWR
5 Towns Radio Club (N. Y.)	14,048	4	WA2YXS
Syracuse V.H.F. Club	13,595	14	W2PFG
MIC ARC (Pa.)	13,504	5	W3ZFM
Metuchen YMCA Radio Club (N. J.)	11,864	3	K2YNT[2]
Aeronautical Center Amateur Radio Club (Okla.)	9438	18	K5YFM
6 Meter Club of Dallas	9408	4	WA5EYO
Morris Radio Club (N. J.)	8808	4	K2SUX
Lake Washington Amateur Radio Club	8472	4	K7RIE
Motor City Radio Club (Mich.)	8107	10	WA8ARP
Fulton Amateur Radio Club (N. Y.)	7836	8	WA2GVH
Waltham Amateur Radio Assn. (Mass.)	7782	3	K1ZQU
Piedmont Amateur Radio Club (N. C.)	7408	3	K4QIF
Decatur Amateur Radio Club (Ala.)	7260	12	K4WHW
Huntsville Amateur Radio Club (Ala.)	7244	7	K4IQU
Dutchess County V.H.F. Society (N. Y.)	6794	4	W2HZZ
North Andover Amateur Radio Club (Mass.)	6393	3	W1LSV/1
Michigan City Amateur Radio Club (Ind.)	5804	6	K9IDE
Opequon Radio Society (W. Va.)	5070	8	K8WXB
Windsor Amateur Radio Club	4424	5	VE3CXK
Arlington Radio Club (Tex.)	3850	3	WA5HKD
Bronx High School of Science Radio Club	3600	3	.....
Tri-County Radio Assn. (N. J.)	3325	3	WA2ASM/2
Triangle Amateur Radio Club (N. C.)	3040	6	WA4FJM
WCAU Amateur Radio Club (Pa.)	3000	3	W3GSC
Northeast High School Radio Club (Pa.)	2832	3	K3ZSN
Whitman Amateur Radio Club (Mass.)	2700	4	K1WYS
Nittany Amateur Radio Club (Pa.)	2540	4	K3AKR
Proviso East High School Amateur Radio Club (Ill.)	1980	3	WA9JYG
Panama City Amateur Radio Club (Fla.)	1256	3	WA4FLJ

[1] W3HFY, opr. [2] WA2KZV, opr.

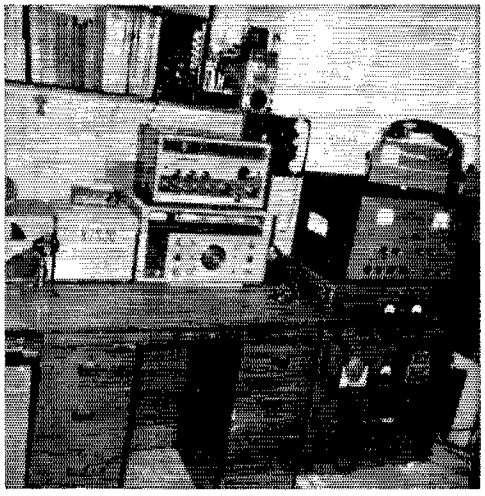
W6ULI 6, WA6WIJ 6, and many other staff-operated stations demonstrate that group entry in a v.h.f. contest can be productive and a lot of fun — win, lose or draw, winter or summer.

Another group effort, the club competition, is going stronger than ever. This feature is, in fact, the fuel that catches fire in the v.h.f. SS, at a time of year when v.h.f. activity would otherwise be at a low ebb. For the fourth year in a row, the Mt. Airy V.H.F. Club of Philadelphia won the gavel award for the top club entry, widening their margin over across-the-river competitors, the South Jersey Radio Association. Third place is held by another repeater, the Rochester V.H.F. Group, who hit this spot for the first time in 1963. Rochester had the largest number of participants, 109, but their situation on the western edge of the high-activity East Coast population center makes a high position in the club standings a real achievement.

Three new clubs appear in the top ten this year. The Reading Radio Club came up from nowhere to 6th place. The Central New Jersey V.H.F. Society shot up from 15th to 10th to 7th in three tries. The Cleveland 50-Mc. DX Club and the Germantown Radio Club are other newcomers.



Cramped, but warm—the 50-Mc. shack of W2LST, Zephyr V.H.F. Society, top-scoring multioperator entry in the SS. WB2AJK at work.



Activity was good in the northwest, according to K7SJQ, Portland, Ore., who worked 105 stations on 50, 144 and 220 Mc. with this neat layout.

Disqualifications

In accordance with V.H.F. SS Rules, the entry of K4HPR has been found invalid.

Soapbox

K2GLQ/3 — "Going to the top of a snow-covered mountain in midwinter is pure idiocy! We took almost 6 hours to plow our way through 2¼ miles of 15-inch snow, on a road that is passable only in summer. All this to learn that one can not pile up a great number of QSOs when the station is set up 60 miles from the nearest activity center, even though on a high mountaintop. Never again in January — at least til next year!" . . . . *K9TWF* — (Illinois Section winner) — "Going to college, I miss a lot of operating time, but the contest allows me to make up a year's operating in one week end. Guess it takes a real contest bug like me to enjoy 32 hours straight." . . . . *W9SID* — "Didn't mean to get started in this, but . . . !" . . . . *W2RHQ* — "There should be awards for c.w.-only operators." . . . . *WB2HSK* — "How about a multiplier for Sixers?" . . . . *W8LCC* — "It was as if an iron curtain dropped around the MDC Section, but it made for a relaxed and enjoyable contest. " . . . . *K7YSE/W8NAF* — "Best I could muster, with having the flu and all. Sure not the contest activity here there is back east." . . . . *WA4FIJ* — "39 QSOs is better than last year, but 1½ per hour is frustrating after the openings in June. Will be on 432 in the June Party." . . . . *WA4MKZ* — "Bad case of Contest Hangover — still hear receiver noise and 'WA4MKZ, this is ———' ringing in my ears!" . . . . *W6GZK* — "Why isn't there a contest that gives the home station an equal chance against those on mountain tops?" (There is, and this is it. W6GZK won the San Diego Section Award. The mountain-toppers were multi-operator stations, not competing with him.) . . . . *W2KXG* — "Best one yet, even though conditions were poor." . . . . *KØKME* — "Contest was really a lot of fun, but there was too little contest interest around Kansas City. In 100 contacts, I received 71 No. 1's!" . . . . *WA2YDB* — "Conditions were quiet, but we weren't!" . . . . *K2HFL* — "My highest contact total, but lowest number of sections!" . . . . *KØVHP* — "Things were fb on 2, but not enough contest activity on 6." . . . . *WA2HNI* — "Surprised to hear so many stations!" . . . . *K8ZES* — "Blew 5U4 after 2 hours. No spare, so built silicon-diode replacement and was back in 30 minutes — with extra watts." . . . . *K2RGF* — "With a Twoer you tune in stations with the rotator!" . . . . *K9FMB* — "Should be more c.w. We worked all out-of-section DX that way!"

— *E.P.T*

SCORES

In the tabulation on the next pages, scores are listed by ARRL divisions and sections. Unless otherwise noted, the top scorer in each section receives a certificate award. The highest-scoring Novice also receives a certificate in each section where at least three such licensees submitted valid contest logs. A certificate also will be awarded to the highest scoring Novice from sections of less than three entries . . . that in the opinion of the Awards Committee displayed exceptional effort; footnotes denote these winners. Columns indicate final score, number of contacts, number of different sections worked, and the bands used. A represents 50 Mc., B 144 Mc., C 220 Mc., D 420 Mc., E 1215 Mc. Multioperator stations are shown at the end of each section tabulation.

ATLANTIC DIVISION

Eastern Pennsylvania

K3IPM/3 31,550-631-15-ABC
W3KKN 23,299-507-13-ABC
W3MFY 20,538-489-11-ABC
W3MXW 20,125-405-15-AB
K3IUZ 17,996-409-12-AB
W3LHF 17,178-409-11-ABC
K3LOM 16,280-407-10-AB
W3OR 15,488-352-12-AB
K3HGA 15,428-406- 9-ABC
K3IUV 15,414-367-11-ABC
W3HFY 14,916-339-12-ABCD
K3ACR 14,544-404- 8-ABC
W3CL 14,436-401- 8-ABC
W3AWA[1] 14,168-322-12-ABCD
W3HKZ 12,894-307-11-ABC
K3JJZ 12,070-355- 7-ABC
W3IBH 11,520-288-10-B
W3SAO 11,520-320- 8-ABC
K3ECF 11,514-303- 9-AB
W3GEW 11,152-328- 7-AB
K3BHK 10,948-322- 7-AB
W3IZU 10,880-272-10-AB
W3FSC 10,846-319- 7-AB
W3CCX[2] 10,692-297- 8-ABC
K3PXT 10,624-332- 6-AB
W3CXU 10,540-310- 7-AB
W3ETB 10,268-303- 7-AB
K3EMR 10,080-280- 8-AB
W3AJF 9826-289- 7-ABC
W3IXL 9756-271- 8-AB
W3GXB 9648-268- 8-AB
W3CFS 9500-250- 9-ABC
K3TPS 9418-277- 7-AB
W3SMK 9324-259- 8-AB
W3JSD 9252-257- 8-AB
W3BAH 9146-270- 7-AB
W3WJC 8862-211-11-AB
K3GAS 8760-292- 5-ABC
K3AUH 8228-242- 7-ABC
K3NMN 8160-272- 5-AB
K3EOD 8128-254- 6-AB
W3ZEY 8018-211- 9-AB
K3KVS 7956-234- 7-ABC
K3HWZ 7704-214- 8-ABC
K3AQH 7667-226- 7-AB
W3FTU 7650-255- 5-ABC
W3OHY 7452-207- 8-A
W3NSI 7392-231- 6-ABC
W3MVF 7200-240- 5-ABC
W3YRT 7200-225- 6-AB
K3HSS 7182-257- 4-ABC
K3FSL 7136-223- 6-A
W3UCA 6868-202- 7-ABC
W3GEC 6800-200- 7-A
K3FDH 6784-212- 6-A
K3HNP 6678-186- 8-A
W3UMI 6336-176- 8-AB
K3MSV 6240-208- 5-A
W3ZTL 6210-207- 5-AB
K3ALK 6020-215- 4-AB
W3ZFM 5992-214- 4-A
K3MGO 5880-147-10-AB
K3VPP 5880-210- 4-A
W3BRU 5850-195- 5-AB
W3DJV 5824-208- 4-A
K3TBY 5695-168- 7-AB
K3KTY 5684-203- 4-A
K3NYQ 5584-179- 6-A
K3SKP 5572-199- 4-A
W3CCH[3] 5400-180- 5-AB
W3AYG 5376-192- 4-AB
K3QMK 5220-175- 5-AB
W3IHT 5200-200- 3-AB
K3ABK 5190-173- 5-A
K3BFA/3 5168-152- 7-AB
W3QXV 4992-192- 3-AB
K3EPB 4760-170- 4-A
W3KXH 4602-177- 3-AC
K3RIT 4592-164- 4-A
K3IWK 4590-135- 7-AB
K3DAQ 4564-165- 4-A
K3WEI 4424-158- 4-A
K3OBY 4420-170- 3-ABC
K3CFO 4396-157- 4-A
W3ELI 4230-141- 5-A
K3ODZ 4068-113- 8-AB
W3BBC 3900-130- 5-AB
W3UKG 3900-130- 5-A
K3WRY 3810-127- 5-A
K3RTR 3666-141- 3-A
K3JXC 3648-114- 6-AB
K3RCV 3640-140- 3-AB
K3ZPL 3640-130- 4-AB
K3CJV 3600-150- 2-A
K3JRO 3600-120- 5-AB
W3CPT 3552-111- 6-B
W3HYO 3520-110- 6-B
W3ZRR 3406-131- 3-A
K3OEA 3400-100- 7-A
W3HAB 3380-130- 3-A
K3DUW 3072-128- 2-A
W3GCR 2886-111- 3-B
K3CEV 2860-110- 3-AB
K3IIJ 2744- 98- 4-AB
W3WZX 2712-113- 2-A
K3SZG 2704-104- 3-AB
W3TDF 2620- 66-10-AB
W3CLQ 2610- 87- 5-AB
W3GSC 2600-100- 3-AB
W3TXO 2548- 91- 4-AB
W3BRY 2424-101- 2-A
K3GOZ 2400-100- 2-A
K3LEA 2380- 85- 1-B
W3QAB 2366- 85- 4-ABC
K3ABS 2310- 77- 5-AB
K3DLS 2236- 86- 3-B
K3PGB 2210- 85- 3-A
K3ZTP 2184- 84- 3-A
K3GZT 2132- 82- 3-AB
K3PVK 2040- 85- 2-AB
W3SNM 2040- 60- 7-A
K3GZU 2002- 77- 3-AB
W3GKW 1794- 69- 3-A
W3TJQ 1794- 69- 3-A
K3GXV 1768- 68- 3-A
K3WQR 1768- 68- 3-A
K3EHQ 1742- 67- 3-A
K3MNI 1716- 66- 3-AB
K3NZF 1680- 70- 2-A
K3MBO 1664- 64- 3-A
K3UGI 1664- 64- 3-AB
W3FQD 1586- 61- 3-AB
K3IFH 1586- 61- 3-A
K3ZLA 1581- 66- 2-A
K3WAK 1508- 58- 3-AB
W3AYO 1488- 62- 2-AB
W3GLI 1488- 47- 6-A
W3WED 1482- 57- 3-B
K3VWS 1474- 67- 1-AB
K3VWT 1474- 67- 1-AB
K3IOJ 1440- 60- 2-AB
K3EMIA 1430- 55- 3-AB
K3TEF 1404- 54- 3-A
K3ZSN 1404- 59- 2-A
K3RYR 1400- 50- 4-A
K3CBE/3 1378- 53- 3-A
W3MCX 1344- 56- 2-AB
W3OHX 1344- 42- 6-A
K3PTO 1344- 56- 2-A
K3EGE 1326- 51- 3-B
K3YIZ 1326- 51- 3-B
K3ZSO 1308- 60- 2-A
K3CXR 1254- 57- 1-AB
W3UQC 1144- 52- 1-AB
W3ITH/3 1128- 47- 2-A
W3EYN 1122- 51- 1-AB
K3NDA 1118- 43- 3-AB
K3GYS 1104- 46- 2-AB
K3PSX 1056- 48- 1-AB
K3CZI 1040- 33- 6-A
K3YNN 990- 45- 1-AB
K3BUM/3 960- 40- 2-B
W3GII 960- 40- 2-B
K3PVL 960- 40- 2-AB
K3ZUX 924- 40- 2-A
K3KJQ/3 880- 40- 1-A
W3DJV/3 825- 38- 1-A
K3SSD 814- 37- 1-B
W3RAV 792- 33- 2-B
K3TSQ 792- 36- 1-B

K3WJQ 744- 31- 2-AB
K3VFS 726- 33- 1-B
K3HIU 682- 31- 1-A
K3KBG 682- 31- 1-A
K3KKM 676- 26- 3-A
W3WOL 660- 30- 1-B
W3BVR 624- 24- 3-A
W3CDS 616- 28- 1-B
K3ALQ/3 594- 27- 1-A
K3EGP 552- 23- 2-AB
K3YJG 550- 25- 1-A
KN3FDP*
528- 24- 1-B
W3MVK 506- 23- 1-B
K3TVY 506- 23- 1-A
K3KRU/3
484- 22- 1-A
K3ODW 484- 22- 1-B
K3MEM 480- 20- 2-A
K3GAY 456- 19- 2-B
W3JKH 440- 20- 1-A
K3VPP/3 440- 20- 1-A
K3HWZ/3
432- 18- 2-A
K3FOS 408- 17- 2-A
K3ZLL 352- 16- 1-A
K3KHV/3
338- 13- 3-A
K3CPG 288- 12- 2-A
W3BQU 240- 10- 2-A
K3NDY/3
208- 8- 3-A
K3TVZ 198- 9- 1-A
K3TZF 198- 9- 1-AB
W3TKQ* 192- 8- 2-B
K3WJE 132- 6- 1-A
KN3ZBW 132- 6- 1-B
KN3FMQ 120- 5- 2-B
K3QDO 120- 5- 2-A
W3DSM 66- 3- 1-B
K3KTY/3 44- 2- 1-A
K2GLQ/3
(K2s AWY GLQ HZN)
14,766-321-13-AB
K3YFD (8 oprs.)
13,376-354- 9-AB
K3WEU (K3s WEU YPL) 7635-256- 5-A
K3QFQ (K3s QFQ SNZ)
6384-228- 4-A
K3YGH (W3s GFN JUZ)
6090-203- 5-AB
K3OKW (K3s ITG KNT LSC) 5040-140- 8-AB
W3VPJ (10 oprs.)
4176-116- 8-AB
K3REF (WA2MTU, K3REF)
3948-141- 4-A
K3MHD (K3s MHD PWM) 3808-136- 4-A
K3TVG (K3s SUI TVG UVJ) 3026- 89- 7-AB

Md.-D.C

W3IZY 6384-168- 9-AB
W4TYH/3
4028-106- 9-A
W3LCC 3600-120- 5-ABCD
W3NG 3300-111- 5-AB
K3VJH 3276- 91- 8-B
W3CQH 3072- 96- 6-AB
K3AMG 2898-108- 3-AB
K3PPB 2470- 95- 3-A
W3CJT 2262- 87- 3-AB
W3AHQ 2080- 80- 3-AB
W3HB 2002- 72- 4-B
K3WTD 1976- 76- 3-AB
K3UMV 1950- 65- 5-AB
K3NNG 1652- 61- 4-A
W3GCO 1632- 68- 2-AB
W3PIH 1482- 57- 3-B
W7JCU/3
1368- 38- 8-B
K3PRP 1326- 51- 3-AB
K3OJH/3
1280- 40- 6-A
W3AIR 1260- 42- 5-B
W3RE 1170- 45- 3-ABD
W3YAG 1118- 43- 3-B
K3UFV 1080- 45- 2-AB
W3RNL 1008- 42- 2-B
W3AX 936- 39- 2-AB
K3VGX 936- 36- 3-B
K8KEQ/3 900- 30- 5-B
KN3ZBQ*
870- 29- 5-B
K3EJF 806- 31- 3-A
K3LFN 806- 31- 3-AB
K3YJE 754- 29- 3-A
W3FNU 744- 31- 2-B
K3DRR 720- 30- 2-B
W3OTC 650- 25- 3-AB
K3ZIB 650- 25- 3-A
W3BNE 600- 25- 2-B
K3GMB 572- 22- 3-AB
W3DHQ 432- 18- 2-B
W3JQN 432- 18- 2-B
K3ZIC 416- 16- 3-A
W3NRG 240- 10- 2-A
W0RDP/3
224- 8- 4-A
K3HFV (K3s HFV IXQ)
8064-192-11-AB
K3ERM/3 (5 oprs.)
6741-161-11-AB
K3EIW (K1WGF, K3EIW)
5640-188- 5-AB
K3UBC (K3UBC, WA4NBM)
5184-162- 6-AB
K3YGG (5 oprs.)
2496- 96- 3-AB

Delaware

K3AZH 5950-175- 7-AB
W3UGV 5598-156- 8-ABCDE
K3ORU 3600-100- 8-AB
W3HC 3458- 91- 9-B
K3QZC 1300- 50- 3-A
K3TNG 728- 26- 4-AB
K3URP 504- 18- 4-AB
K3AFT/3 (K3s AFT IGX) 6360-159-10-A

Southern New Jersey

W2EIF 19,194-457-11-ABC
W2REB
19,110-455-11-AB
WA2EMB
14,800-374-10-ABD
W2OSD
14,174-373- 9-ABC
W2NSF
12,380-311-10-A
W2BLV
12,306-293-11-AB
WA2KOK
12,096-336- 8-AB
W2AXU
11,592-252-13-BC
WB2CDP
10,872-302- 8-AB
WA2JNA
10,374-273- 9-ABC
WA2QZQ
10,234-301- 7-AB
W2ORA
10,080-280- 8-AB
W2LVW 9216-256- 8-A
W2ZUL 8008-286- 4-AB
WA2MGV
6912-216- 6-AB
W2BV 6216-148-11-B
K2OHM 6048-189- 6-A
WA2WWF
6000-200- 5-AB
W2JAV 5950-175- 7-AB
K2EGH 5670-135-11-AB
K2DFE 5440-170- 6-AB
WA2HSP
5436-151- 8-AB
K2FP 5250-175- 5-A
K2QOS 4928-176- 4-ABC
W2OQN 4760-140- 7-AB
K2SQM 4320-135- 6-A
WB2HQI
4290-144- 5-AB
W2EWN 3904-122- 6-AB
W2BAY 3484-134- 3-ABC
WA2WCT
3450-115- 5-AB
W2EXB 3196- 94- 7-A
WA2PMW
3000-100- 5-A
WA2IEK
2996-107- 4-AB
WA2WUJ
2924- 86- 7-A
WN2KVC*
2800-101- 4-B
WN2KVC
2470- 95- 3-B
WA2KWS[8]
2418- 93- 3-AB
K2SXN 2256- 94- 2-A
WA2BLV
2160- 90- 2-A
K2EJW 1680- 70- 2-A
W2ESG 1464- 61- 2-AB
K2KCI 1428- 51- 4-A
W2SDB 1416- 59- 2-A
W2ADA 1380- 46- 5-A
WA2TOW
1378- 53- 3-A
K2PQD 1300- 50- 3-A
W2NSJ 1170- 45- 3-A
WA2WKB
1164- 49- 2-A
W2ZVW 1120- 40- 4-B
K2HBY 1020- 43- 2-AB
WA2EPB 960- 40- 2-A
WA2KAP 960- 40- 2-AB
K2BPX 884- 34- 3-AB
W2VX 780- 30- 3-B
W2HBE 744- 31- 2-B
WA2EIY 728- 28- 3-A
K2TYW 728- 28- 3-A
WA2QHQ 600- 25- 2-A
K2SUN 598- 23- 3-B
K3HWZ/2
576- 24- 2-A
K2IEO 528- 22- 2-B
K2MKD 528- 22- 2-AB
WA2KWM
476- 17- 4-A
W2YNR 468- 18- 3-A
K2GCD 434- 16- 4-A
WA2SFY 416- 16- 3-A
WB2EHY 288- 12- 2-B
WA2SEA 238- 12- 2-A
WB2GPH 264- 11- 2-A
WA2WUN/2
240- 10- 2-A
K2SEV 208- 8- 3-AB
W2QDV 192- 8- 2-A
K2OHM/2
120- 5- 2-A
WA2MGV/2
72- 3- 2-A
K2UDA (K2s MKD UDA)
14,640-366-10-AB
WA2WUN (WA2s TQI WUN)
11,866-349- 7-AB
WB2BNE (WA2WLM, WB2BNE)
10,368-324- 6-AB
WB2IPU/2 (5 oprs.)
5304-207- 3-AB
WB2GBX (2 oprs.)
3332-119- 4-B
WB2GUN (WA2WTA, WB2GUN)
2886-111- 3-A
W2FYS/2 (4 oprs.)
702- 27- 3-B

Western New York

K2YCO 6783-179- 9-AB
K2GUG 5922-141-11-B
W2UTH 5474-161- 7-AB
W2FDI 4992-156- 6-AB
WA2STX
4642-106-12-B
K2JJT 4368-156- 4-A
WA2CJL 3692-142- 3-AB
WA2KND
2904-121- 2-AB
WA2THS
2886-111- 3-AB
WA2USH
2772-126- 1-AB
K2IWS 2695-131- 1-AB
WA2KVN
2640-110- 2-AB
W2PFG 2535- 98- 3-A
K2ISP 2508-114- 1-A
WB2GYZ
2354-107- 1-A
K2BPV 2304- 96- 2-A
WA2UHP
2288-104- 1-A
W2YBK 2266-103- 1-AB
WA2HWC
2200-100- 1-AB
WA2YTK
2200-100- 1-AB
K2RTU 2040- 85- 2-A
W2SNI 1980- 90- 1-A
W2IYR 1968- 82- 2-AB
WA2SCT
1826- 83- 1-A
WA2VOH
1826- 83- 1-AB
W2UAD 1800- 75- 2-B
W2RHQ
1680- 70- 2-ABD
W2SWC 1680- 70- 2-A
WA2SOS 1650- 75- 1-A
WA2KLF
1612- 62- 3-A
WB2DCC
1540- 70- 1-A
WA2JMH
1529- 70- 1-A
WA2TVA
1518- 69- 1-A
K2AVA 1452- 66- 1-AB
WB2BOO
1452- 66- 1-A
K2HCD 1452- 66- 1-A
W2RIS 1430- 65- 1-A
WA2UFV
1408- 64- 1-A
WA2OXJ
1320- 60- 1-A
K2ZFV 1320- 60- 1-A
W2VVG 1254- 57- 1-AB
W2QY 1248- 52- 2-B
WA2RNQ
1248- 52- 2-A
K2ZRX 1248- 52- 2-AB
W2CTA 1232- 56- 1-AB
W2DBS 1232- 56- 1-A
K2UXF 1188- 54- 1-AB
WA2ZWO
1166- 53- 1-A
K2CEH 1152- 32- 8-B
WA2HUW
1144- 52- 1-AB
K2JA 1144- 52- 1-A
K2SKO 1144- 52- 1-A
WA2MLV
1128- 47- 2-AB
K2DPW 1122- 52- 1-AB
WB2FKE
1122- 51- 1-A
WA2MRL
1122- 51- 1-AB
K2QWD 1120- 40- 4-A
WB2HSK
1111- 51- 1-A
WA2AQW
1100- 50- 1-A
K2BRE 1100- 50- 1-A
WA2UGE
1100- 50- 1-A
WA2YCM
1100- 50- 1-A
WA2YPT
1056- 48- 1-A
W2ALL 1032- 43- 2-AB
VE3DFY/W2
1032- 43- 2-B
K2EAY 1012- 46- 1-A
WA2GVH 990- 45- 1-AB
K2UDR 972- 81- 2-AB
WB2EUE 968- 44- 1-A
WN2JFL* 968- 41- 1-B
K2VBK 968- 44- 1-A
WA2ZWM
924- 42- 1-AB
WB2DRN
902- 41- 1-AB
WA2ENW
902- 41- 1-A
WA2GRT 902- 41- 1-AB
WA2IYZ 902- 41- 1-A
WA2SPT 902- 41- 1-AB
W2ZUX 902- 41- 1-AB
WA2ZXT 902- 41- 1-A
WB2CMR
880- 40- 1-AB
WA2JMR 880- 40- 1-A
W2UXP 858- 39- 1-AB
WA2ZTN 858- 39- 1-A
WB2GEG 852- 36- 2-B
WA2YFM
836- 38- 1-A
WA2GCF 814- 37- 1-A
K2YMM 803- 37- 1-B
WB2FAN 792- 36- 1-A
WA2RAY 792- 36- 1-A
WA2ADG 770- 35- 1-A
WA2MVK
748- 34- 1-AB
WA2YUA 748- 34- 1-AB
W2PHT 726- 33- 1-A
WA2YME
726- 33- 1-A
WB2ABB 704- 32- 1-A
WA2ZXU 704- 32- 1-AB
WB2GNC 682- 31- 1-A
K2OIG 682- 31- 1-A
WA2AII 660- 30- 1-B
WB2JAR 660- 30- 1-A
K2OUE 660- 30- 1-A
K2PKK 660- 30- 1-AB
W2RUJ 660- 30- 1-B
WA2ZHT 660- 30- 1-A

W6NLO, K6QPV AND WB6BAL FOUND THEY HAD COMPANY ON WINTRY MT. PINOS

WB2CEK 638- 29- 1-A
WB2GEJ 594- 27- 1-A
WA2JBT 594- 27- 1-A
WA2YSC 594- 27- 1-A
W2JVD 572- 26- 1-A
WA2KMI 506- 23- 1-A
WA2STJ 484- 22- 1-A
WA2MUN
462- 21- 1-A
WB2BZI 440- 20- 1-A
K2AJL 418- 19- 1-A
K2VYH 374- 17- 1-A
W2EDE 352- 16- 1-B
K2OPC 352- 16- 1-A
WN2LTY 330- 15- 1-B
K2PKI 308- 14- 1-A
WN2HAI 264- 12- 1-B
W2FUL 242- 11- 1-A
WN2KYQ
242- 11- 1-B
WN2GAC 220- 10- 1-B
WA2TDF 220- 10- 1-B
K2CCL 198- 9- 1-A
WA2IEL 198- 9- 1-B
W2MTG 198- 9- 1-A
WB2CZH 176- 8- 1-A
WA2ZHW
176- 8- 1-A
K2BBJ 154- 7- 1-B
WA2FVG 154- 7- 1-B
K2KLP 154- 7- 1-B
W2PJO 154- 7- 1-A
WB2ECL 144- 6- 2-A
K2DSN 88- 4- 1-A
WB2KFC/2
66- 3- 1-A
WB2DWP 44- 2- 1-A
WA2YUE (2 oprs.)
3770-145- 3-AB
WA2YRH (2 oprs.)
3146-143- 1-AB
WA2LHM (WA2LHM, WN2IHF)
2222-101- 1-A
WA2SOO (WA2SOO, WB2s KIN LNP)
1738- 79- 1-AB
WA2UTM (2 oprs.)
792- 36- 1-A

Western Pennsylvania

K3UQD 4536-126- 8-A
W3OMY 4484-118- 9-AB
K3JTH 2240- 70- 6-AB
W3UMY 1530- 51- 5-AB
W3BWU 1344- 42- 6-A
K3AKR
1274- 49- 3-ABC
K3WNZ 1104- 46- 2-A
K3VPI 1008- 42- 2-A
K3WOD 946- 43- 1-A
K3NOA 888- 37- 2-AB
K3QBI 840- 35- 2-A
K3TRN 840- 35- 2-A
W3DJM 650- 25- 3-A
K3POG 572- 22- 3-ABC
K3ILD 416- 16- 3-B
W3KJM 408- 17- 2-AB
K3UIC 352- 16- 1-A
K3IFK 336- 14- 2-A
K3LYO 286- 13- 1-A
K3TTP 232- 6- 1-A
KN3ZGH 130- 5- 3-B
K3LWT 88- 4- 1-A
W3VI (6 oprs.)
2346- 69- 7-A
K3PHI (K3s BBO PHI)
1624- 58- 4-A
K3PCJ (K3s NSV PCJ)
1272- 53- 2-AB
K3FWM/3 (K3s FWM ZEN) 66- 3- 1-A

CENTRAL DIVISION

Illinois

K9TWF 9120-304- 5-AB
K9RVA 8190-273- 5-AB
K9IOG 6990-233- 5-A
K9ZWU
6570-219- 5-ABC
K9ZWV
6540-218- 5-ABC
W2EDL/2 (5 oprs.)
2860-110- 3-AB
K9PAJ 5712-204- 4-AB
W9EET 4816-172- 4-AB
K9RVG 4544-142- 6-AB
WA9FIH
4536-162- 4-A
K9TUL 4500-150- 5-AB
WA9KBP[6]
4368-156- 4-A
K9UYK 4080-122- 7-A
K9RRF 3836-137- 4-AB
K9DWR 3696-132- 4-A
K9ZOO 3584-112- 6-A
K9DMW
3528-126- 4-B
W9LGH 3495-117- 5-B
K9YOA 3304-118- 4-AB
WA9HFS
3164-113- 4-A
K9YHH 3052-109- 4-A
K9BDJ 3015-101- 5-AB
K9YHF 2850- 95- 5-AB
WA9FEF
2828-101- 4-AB
K9JSG 2716- 97- 4-A
W9AVB 2704-104- 3-AB
K9UZL 2700- 90- 5-AB
WA9IPX
2660- 95- 4-A
K9TMN 2632- 94- 4-AB
W9AFA 2548- 91- 4-A
WA9BWB
2170- 95- 3-AB
W9RVG 2340- 90- 3-A
K9HPW 2220- 74- 5-B
K9BVW 2210- 86- 3-A
WA9JWN
2128- 78- 4-A
K9PUJ 2100- 75- 4-A

K9DKI 2080- 80- 3-A
WA9JSW
2054- 79- 3-A
K9TYH 2016- 72- 4-A
WA9IIZ 2010- 67- 5-B
W9AA/9*
1924- 74- 3-B
W9AVE 1898- 73- 3-B
K9KGI 1820- 65- 4-A
K9RUN 1820- 70- 3-A
K9UFA 1716- 66- 3-AB
K9DTB 1568- 56- 4-A
K9AMG 1512- 54- 4-A
WA9CWJ
1512- 63- 2-AB
WA9EOQ
1392- 58- 2-A
K9FHM 1378- 53- 3-AB
k9VVZ 1296- 54- 2-AB
WA9GYX
1224- 51- 2-A
WA9APO
1176- 42- 4-A
K9RBI 1144- 44- 3-AB
WN9IRZ*
1128- 47- 2-B
W9CEJ 1120- 40- 4-B
K9ALR 1104- 46- 2-AB
W9ZBW 1066- 41- 3-AB
WA9JYG
1056- 44- 2-A
WA9EYT
1040- 40- 3-AB
K9PBN 1032- 43- 2-A
K9FBL 1012- 46- 1-AB
W9WJL 1001- 39- 3-B
K9SZT 960- 40- 2-A
K9WNK 960- 40- 2-A
WA9ERC 936- 37- 3-AB
K9RIN 936- 39- 2-A
WA9FIY 864- 36- 2-A
K9SST 840- 35- 2-A
K9FFR 792- 33- 2-A
K9TBZ 756- 27- 4-B
WN9IRY 744- 31- 2-B
WA9CXR 728- 26- 4-A
WA9JCO 696- 29- 2-A
W9CRN 672- 28- 2-B
W9BJX 600- 25- 2-A
K9VUX 598- 23- 3-B
K9KMK 588- 21- 4-A
K9ARA 552- 23- 2-A
WA9DLI 552- 23- 2-A
W9BYD 550- 25- 1-B
K9DNW 528- 24- 1-A
K9LGE 506- 23- 1-A
W9DJR 504- 21- 2-B
W9SKD 504- 21- 2-B
W9YIG 432- 18- 2-B
WA9FGO 408- 17- 2-A
WA9DLH 384- 16- 2-A
WN9KQD
330- 15- 1-B
WN9IRX 308- 14- 1-B
K9IYV 308- 11- 1-B
WA9BHR 288- 12- 2-A
K9OEE 280- 17- 4-B
WA9FRE 276- 12- 2-A
WA9CXB/9
264- 12- 1-A
WA9GNE 242- 11- 1-B
W9GQY 220- 10- 1-B
K9MEB 220- 10- 1-A
K9UQN 220- 10- 1-B
W9DWE 198- 9- 1-A
WN9HIR 132- 6- 1-B
W9QVE 132- 6- 1-B
K9ZAM (K9s COU ZAM)
7860-262- 5-ABD
K9GBG (K9GBG, WA9EVF)
7392-264- 4-AB

K9VHC (K9s DOC VHC, W9NZF)
4654-179- 3-AB
K9FMB (K9FMB, W9VWY)
4488-132- 7-B
W9FVB (W9s AFA FVB)
4060-145- 1-A
K9FKA (K9s FKA UFD, WA9DUH)
3081-119- 3-A
WA9ERB (WA9s BTE ERB) 1742- 67- 3-A

Indiana

K9QCB 4920-164- 5-ABC
WA9GNC
2678-103- 3-A
WA9DRR
2366- 91- 3-B
K9WZB 2160- 72- 5-B
K9CIF 1876- 67- 4-A
WA9CYG
1820- 70- 3-A
K9IDE 1624- 58- 4-B
W9TWU 1128- 51- 4-B
K9JTZ 1392- 58- 2-A
K9IYY 1106- 39- 4-A
WN9ILU*
1066- 41- 3-B
K9AIP 1040- 40- 3-AB
K9JSI 988- 38- 3-AB
K9QWJ 672- 28- 2-A
WA9CWE
440- 20- 1-AB
WA9HQP 390- 15- 3-B
W9BRF 216- 9- 2-A
W9BZN/9 (12 oprs.)
8636-254- 7-AB
WA9ANX (6 oprs.)
7924-283- 4-AB
K9YPE (K9YPE, W9FWK, WA9HAR)
4290-165- 3-AB
WA9FLH (WA9s FHS FLH) 3120-120- 3-AB
W9BF (5 oprs.)
3000-100- 5-AB

Wisconsin

W9DHQ 3145- 93- 7-AB
K9HBT 3026- 89- 7-AB
WA9IMR
2996-107- 4-AB
K9YGR 1749- 80- 1-A
W9SID 1664- 64- 3-A
W9TQ 1064- 38- 4-B
WA9FNS 418- 19- 1-B
W9GJJ 22- 1- 1-A
W9AAZ (6 oprs.)
6202-222- 4-A
WA9FPH (multi-opr.)
1992- 83- 2-AB

DAKOTA DIVISION

Minnesota

K9PWR 1308- 55- 2-A
K9OST 1104- 47- 2-A

DELTA DIVISION

Louisiana

W5UQR 784- 28- 4-A
W5JFB 198- 9- 1-A

Mississippi

W5FWE/5
840- 30- 4-A

Tennessee

WA4IRX
1248- 48- 3-A
WA4KVR/4
1134- 41- 4-AB
K4FPV 588- 25- 2-A
WA4SLI 384- 16- 2-A

GREAT LAKES DIVISION

Kentucky

K4RZK 3610-140- 3-AB
WA4JBJ 1404- 54- 3-A
WA4LDJ (10 oprs.)
4620-165- 4-AB

Michigan

W8RQD 4172-149- 4-AB
K8BGZ 3696-132- 4-AB
W8CKK 3692-142- 3-AB
W8LJV 3042-117- 3-AB
K8YRN 2888-111- 3-AB
K8VEX 2655- 89- 5-A
W8AEF 2604- 93- 4-A
WA8DZP
2380- 85- 4-B
W8YRH 2340- 90- 3-B
K8AZL 2324- 83- 4-A
K8ZQE 2190- 73- 5-B
W8OCK 2106- 81- 3-AB
KSBZV 1872- 78- 2-AB
WN8HTL*
1872- 78- 2-B
WA8ARP
1820- 70- 3-AB
K8CEB 1534- 59- 3-B
K8WII 1508- 58- 3-A
K8ZJY 1430- 65- 1-AB
W8RXY 1378- 53- 3-B
W8FSZ/8
1339- 52- 3-AB
WA8BNQ
1320- 55- 2-AB
K8ZNP 1056- 48- 1-AB
W8VWY 948- 40- 2-B
K8ZJU 912- 38- 2-B
WV8BCI 864- 36- 2-B
K8DHN 806- 31- 3-A
W8FEV 770- 35- 1-AB
WA8FIZ 754- 29- 3-A
W8APL 744- 31- 2-AB
K8SGA 720- 30- 2-B
W8MPD 660- 28- 2-B
WA8COR 616- 22- 4-B
W8CQB 605- 28- 1-B
WN8JJE 572- 26- 1-B
W8RZJ 528- 22- 2-B
WA8GCO 506- 23- 1-AB
K8TCU 484- 22- 1-B
W8AHV 462- 21- 1-B
WN8HYS 440- 20- 1-B
K8JNZ 440- 20- 1-AB
K8UJC 396- 18- 1-AB
WN8IPX 374- 17- 1-B
W8JZV 374- 17- 1-B
K8BZY 330- 15- 1-AB
W8FSZ 330- 15- 1-B
W8HKL 330- 15- 1-B
K8ATU 286- 13- 1-A
K8HXW 286- 13- 1-AB
K8LNB 286- 13- 1-B
W8SSK 264- 12- 1-A
K8YGW 264- 12- 1-B
WA8DQK
242- 11- 1-AB
WA8IBU 242- 11- 1-B
W8ZGW 242- 11- 1-B
K8ZRX 220- 10- 1-A
W8VVR 176- 8- 1-B
K8ZQH 176- 8- 1-AB
W8BRV 154- 7- 1-B
K8ICI 154- 7- 1-A
W8FZ 132- 6- 1-B
K8TIW (10 oprs.)
4500-150- 5-AB
W8BHF (4 oprs.)
2910- 97- 5-A
K8ZKM (K8s CRM ZKM) 2834-109- 3-AB
WN8ICX (WN8s TCX KBJ KOS)
2288- 81- 4-B
WA8BQM (K8TKC, WA8BQM
2236- 86- 3-AB
WN8LFR (W8ATC, WN8LFR)
2058- 74- 4-B
WN8JHF (2 oprs.)
1170- 46- 3-B
WA8FLR/8 (WA8FLR, WN8IEU)
1128- 47- 2-B

Ohio

K8UQA
17,248-392-12-AB
K8MMM
14,112-294-14-A
K8TOL 4094-213- 9-A
WA8BCA*
7412-218- 7-A
WA8EIC
7236-201- 8-A
W8KKF 6760-260- 3-AB
K8ZES 6426-189- 7-ABC
WA8DSN
6344-244- 3-AB
W8JRN 4186-161- 3-AB
W8KPZ 4056-156- 3-AB
K8MHJ 4056-156- 3-AB
K8KTX 3920-123- 6-AB
K8HRR 3892-139- 4-AB
K8PNV 3432-132- 3-AB
K8PLD 3424-108- 6-B
W8MOW
3332-119- 4-A
K8KNU 3094-119- 3-AB
W8ZOF 2600-100- 3-AB
K8GDV 2392- 92- 3-AB
W8LOF 2236- 86- 3-AB
K8NUE 2054- 79- 3-A
WN8HXS*
2002- 77- 3-B
WN8IKN
1976- 76- 3-B
W8DPW 1920- 80- 2-AB
K8BPC 1896- 79- 2-AB
W8ENH 1820- 70- 3-B
WA8GCR
1800- 60- 5-A
K8IIS 1794- 69- 3-B
K8ALO 1770- 59- 5-B
K8ZSZ/8 1736- 62- 4-A
K8TUY 1632- 68- 2-AB
W8LDWT 1586- 61- 3-B
WA8CWF
1560- 65- 2-B
K8ZFD 1512- 54- 4-A
W8YCP 1469- 57- 3-AB
W8EHW 1456- 52- 4-AB
K8KDW 1456- 56- 3-AB
WA8INI 1430- 55- 3-B
W8TYL 1404- 54- 3-AB
W8GAT 1210- 55- 1-A
K8YPV 1196- 46- 3-A
W8KSE 1144- 52- 1-AB
WA8IMB
1128- 47- 2-A
WA8HHZ
1080- 45- 2-B
WA8HVK
1080- 45- 2-B
W8HBI 1050- 35- 5-A
K8HSC 960- 40- 2-A
WA8DRC 924- 42- 1-A
WN8KJN 924- 42- 1-B
K8JCG/8 910- 35- 3-A
K8DEO 888- 37- 2-AB

K8PXX 840- 35- 2-A
WA8HCC 812- 38- 2-AB
K8ANJ 784- 28- 4-A
WA8BIE 768- 32- 2-B
W8HBJ 754- 29- 3-B
WA8DOM
726- 33- 1-AB
WA8CSJ 704- 32- 1-AB
K8UMN 648- 27- 2-A
WA8EZS 638- 29- 1-B
K8LEA 552- 24- 2-A
W8SK 528- 24- 1-A
K8WQE 517- 25- 1-B
WA8KTK 308- 14- 1-B
W8PTF 308- 14- 1-BB
W8WUZ 242- 11- 1-A
W8OG 240- 10- 2-B
K8YVA 168- 7- 2-B
W8OKB 88- 5- 1-B
WA8AKK (W8UU, WA8AKK)
4550-175- 3-AB
W8LT (8 oprs.)
1172-150- 4-AB
WN8IYH (WN8s IYH KGS) 2550- 85- 5-B
WA8HPY (WA8s CSJ HPY) 2114- 76- 4-AB
WA8CRG (WA8s BOG CRG) 1680- 70- 2-A

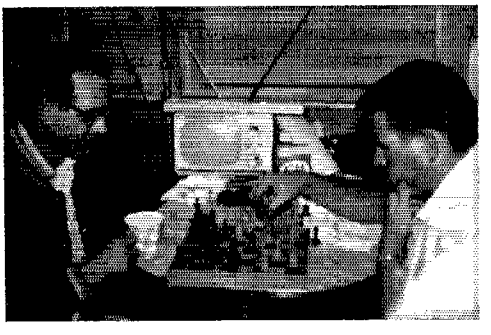
HUDSON DIVISION

Eastern New York

K2YRZ 4680-130- 8-B
WB2BML
3688- 84- 6-A
W2HZZ 2660- 70- 9-B
WB2GSK
2355- 79- 5-AB
W2LWI 2070- 45-13-B
W2HF 1280- 40- 6-BC
W2CTH 1960- 49-10-AB
WA2ZPD
1860- 62- 5-B
K2BGU 1748- 46- 9-AB
K2GCH 1632- 48- 7-AB
WB2FXB
1064- 38- 4-B
WB2EFT 806- 31- 3-A
WA2HAQ 552- 23- 2-AB
WA2DRP 504- 21- 2-A
K2UKE 432- 18- 2-B
WN2IFW 352- 16- 1-B
WN2IQL 286- 13- 1-B
K2CBA (K2s CBA ISA TMB)
13,152-274-14-ABCD

N. Y. C.-L. I.

W9ECV/2
15,700-318-15-A
K2JWT 5880-147-10-ABC
WA2YXS
5716-131- 8-B
WB2DZH
4832-151- 6-A
WA2NZA
4500-125- 8-A
W2TUK 4464-140- 6-AB
WA2OOL
4454-131- 7-B
WB2CNT
4352-136- 6-B
W2KXG 4170 139- 5-B
W2RPZ 3520-110- 6-B
K2OTZ 3392-106- 6-B
W2NBI 3094- 91- 7-B
WN2LGR*
2820- 94- 5-B
WB2BAY
2760- 92- 5-AB



(left) This imposing array of gear is the 6-meter position of K2GLQ/3, High Knob, Eastern Pennsylvania Section. K2AWY rolling up the points. (right) With a capable staff of assistant operators taking over K6MDG/6, WB6DRX (left) and K6MDG enjoy a bit of diversion in one of the camper-type vehicles employed by the v.h.f. sweepstakes expedition to Santiago Peak in the San Diego Section.

WN2HFE
2400- 75- 6-B
WA2IKN
2030- 73- 4-B
WA2DRK
1802- 53- 7-B
WB2BQJ
1710- 45- 9-AB
WB2FCB
1695- 57- 5-B
WA2ZCK
1680- 56- 5-B
W2AGT 1496- 44- 7-B
W2QAN 1484- 53- 4-AB
WN2LUU
1470- 49- 5-B
WN2IQB
1414- 51- 4-B
WN2LAI
1344- 48- 4-B
W2TNI 1326- 51- 3-B
W2BNX 1260- 45- 4-B
K2PWG 1188- 33- 8-A
W2CWD 1144- 44- 3-B
WA2QCF 988- 36- 3-AB
WB2GDD
924- 33- 4-A
WB2FZV 840- 30- 4-A
WA2TKL 784- 28- 4-A
WA2EUS 780- 30- 3-
BD
WA2OUM
750- 25- 5-B
W2ZSD 728- 26- 4-AB
WN2KTX
624- 24- 3-B
WB2JEY 616- 22- 4-A
WA2RWV
598- 23- 3-B
WB2CSH 450- 15- 5-B
WA2UKI 396- 18- 1-A
WB2FCP 384- 16- 2-B
WA2YKH
364- 14- 3-B
WB2ATZ 280- 10- 4-A
WA2DWZ
264- 12- 1-AB
WA2VFD 96- 4- 2-A
W2YSI 96- 4- 2-B
WN2IKI 48- 2- 2-B
K2SWI (7 oprs.)
18,768-391-14-ABC
W2BMW/2 (11 oprs.)
14,668-396- 9-AB
WA2YDB (WA2s YDB YHS) 4488-132- 7-B
WB2ICU (WB2ICU, WN2LQH)
3090-103- 5-B
WA2TZB
2850- 95- 5-B
WB2ESZ (WB2s ESZ FLP) 2592- 81- 6-AB
WB2AUH (WB2s AUH GME) 1246- 45- 4-AB

Northern New Jersey

K2MLB
17,352-362-14-A
W2NNL
10,074-219-13-B
WB2BUR
9284-211-12-A
WB2CWG
9030-215-11-A
WA2VPI 8056-212- 9-AB
W2GKR 7701-227- 7-AB
WA2KRX
7452-207- 8-AB
K2HFL 7308-203- 8-AB
K2YNT[9]
6650-175- 9-B
WA2JSW
6480-180- 8-AB
WB2DQS
6264-176- 8-ABC
K2RGF 5200-130-10-B
WA2WAJ
5100-150- 7-AB
WB2GMR
5094-144- 8-AB
WA2QCQ
5024-157- 6-A
WA2JVO
4480-112-10-AB
K2RMD 4480-140- 6-AB
WA2UDT
4320-120- 8-AB
WA2HNI
4182-123- 7-B
K2KIB 4047-107- 9-
ABCD
WN2GKI*
3904-122- 6-B
WA2WIL
3672-102- 8-B
K2SUX 3502-103- 7-B
WN2KDD
3264-102- 6-B
WN2LEB
3024-109- 4-B
K2HHS 2985-100- 5-B
W2EEW 2924- 86- 7-B
WA2VAZ
2720- 85- 6-A
WA2CMG
2550- 75- 7-AB
WA2ASM/2
2415- 81- 5-B
K2TTI 2312- 68- 7-B
WB2LIG
2304- 72- 6-A
WB2IXE
2250- 75- 5-A
WB2EFU
2224- 70- 6-AB
WA2REM
2176- 64- 7-B
WN2KLD
2080- 65- 6-B
WA2EDF
1860- 62- 5-AB
K2LME 1860- 62- 5-B
WB2ADV
1740- 58- 5-B
WB2EZY
1610- 59- 4-AB
WA2KZP
1512- 54- 4-AB
WA2NQE/2
1456- 52- 4-A
WA2UHE
1290- 43- 5-A
WB2AWT
1196- 46- 3-B
WA2ZSN
1176- 42- 4-AB
WA2IJI 1136- 36- 6-B
KL7ELA/2
1120- 40- 4-B
WA2VEB
1120- 40- 4-B
WA2ZDA
1092- 39- 4-AB
W2SMJ 1066- 41- 3-
ABC
WA2PTN 992- 31- 6-B
WN2LLK/2
910- 35- 3-B
WA2WSI 896- 28- 6-B
WN2KQD
888- 37- 2-B
WA2YJV 884- 34- 3-B
WN2JMT 858- 33- 3-B
WA2CCF 644- 23- 4-AB
W2SMF 616- 22- 4-A
WA2IQU 504- 21- 2-A
K2DMI 494- 19- 3-B
K2MHP/2
476- 17- 4-B
K2JRP/2 468- 18- 3-A
WB2IMT 462- 21- 1-B
WA2FNN
432- 18- 2-AB
W2LRO 416- 16- 3-B
WA2VTE 360- 12- 5-B
WA2UZH 144- 6- 2-B
WA2KZV 120- 5- 2-B
WA2TCE 110- 5- 1-B
W2LST (multi-opr.)
25,320-633-10-ABC
WA2VLR (4 oprs.)
18,260-415-12-AB
W2SXO (2 oprs.)
9320-233-10-AB
K2MPD (K2s JRP MPD, W2AGK)
1980- 66- 5-A

MIDWEST DIVISION

Iowa

WA0BRU 220- 10- 1-A
WØDRE 154- 7- 1-A

Kansas

KØKME 2388-100- 2-A
KØVHP 1176- 49- 2-AB
KØGTZ 1128- 47- 2-AB
KØGIC 1008- 42- 2-AB
WA5GAX/0
900- 45- 1-AB
KØRNZ 984- 41- 2-B
WAØDZI 192- 8- 2-A

Missouri

WØLFE 416- 16- 3-B
WAØCHD (WAØs CHD CHE) 624- 26- 2-A
KØBYR/Ø (KØs BYR CWP) 312- 13- 2-A

Nebraska

WAØDJK 576- 24- 2-A

NEW ENGLAND DIVISION

Connecticut

W1RJA
12,048-251-14-AB
W1HKL 9639-230-11-B
W1HDQ[10]
7848-165-14-ABD
K1FKW 4872-116-11-B
K1LYP 4428-123- 8-B
W1WHL 4320-108-10-AB
W1PHR 3743- 99- 9-AB
K1ONX 2700- 75- 8-AB
K1QGC 2584- 68- 9-B
K1YON 2080- 52-10-A
W1MEH 2064- 43-14-B
W1IKE[10]
1786- 47- 9-B
K1RTS 1290- 43- 5-B
K1MDZ 1232- 44- 4-B
K1PVT 1170- 45- 3-AB
K1PAI 1128- 47- 2-B
K1LSP 1088- 34- 6-B
K1FUY 960- 30- 6-B
W1RFJ 960- 40- 2-AB
K1OAV 900- 30- 5-B
K1SXF 888- 37- 2-B
K1QNF/1[10]
768- 32- 2-B
W1AJS 598- 23- 3-AB
W1AW[10,11]
576- 24- 2-AB
W1DZA 528- 22- 2-B
K1QPN 528- 22- 2-B
W1YDS[10] 130- 5- 3-A
K1PLR (K1s IKE PLR VM1)
12,308-362- 7-AB
W1LUA (7 oprs.)
9856-224-12-AB
K1YFE 1 (K1s KQY YFE) 4180-110- 9-AB
K1PKQ/1 (K1s NKT PKQ) 3173- 84- 9-AB
K1TRS (K1s TBA TRS)
2656- 83- 6-AB
K1VIK/1 (K1s FDZ VIK) 1708- 61- 4-AB
WA1ANP (WA1s ANP API) 480- 20- 2-A

Maine

K1OYB 336- 14- 2-AB
K1KKK 288- 12- 2-AB
K1MTJ 672- 28- 2-AB
W1MHL/1 (4 oprs.)
2576- 81- 6-AB

Eastern Massachusetts

K1YDG 7714-201- 9-AB
W1QIB 7020-176-10-AB
WA1ACQ
5776-152- 9-A
W1JZD 5640-118-14-B
K1QOG 5080-127-10-AB
K1ZQU 4794-141- 7-AB
K1CHY 4352-128- 7-AB
K1DIR 3800-100- 9-A
K1WEI 3232-101- 6-B
W1OOP 2930- 73-10-
ABCD
W1LSV/1
2737- 81- 7-AB
K1WYS 2340- 78- 5-A
K1PIV 2304- 72- 6-A
K1KKS 2278- 67- 7-A
K1PLX 2220- 74- 5-A
W1EUZ 2130- 71- 5-B
K1JQQ 2006- 59- 7-A
K1ZNU 1920- 60- 6-B
K1JSE 1836- 54- 7-A
K1YJC 1800- 60- 5-A
K1ZNR/1
1792- 56- 6-B
K1DVX 1760- 55- 6-B
W1JSM 1708- 61- 4-AB
K1WOV 1650- 55- 5-AB
K1DRB 1600- 50- 7-AB
K1VHD 1568- 49- 6-B
W1BL 1344- 48- 4-B
K1ZUA 1312- 41- 6-B
K1HSI 1280- 40- 6-A
KN1FOM*
1274- 49- 3-B
K1OUY 1230- 41- 5-A
K1SVF 1148- 41- 4-A
K1CQX 962- 37- 3-BC
K1KYB 930- 31- 5-B
K1ZGH/1 780- 6- 5-B
KN1FJM 754- 29- 3-B
W1JVL 689- 27- 3-BC
W1BHL 676- 26- 3-B
WA1ACQ 572- 22- 3-B
K1ELA 546- 21- 3-B
K1PKG 468- 18- 3-B
K1PQY 420- 15- 3-B
W1RSR 416- 16- 3-B
KN1FTO 264- 12- 1-B
K1NTU 260- 10- 3-A
K1WNJ 240- 10- 2-AB
KN1FTQ 220- 10- 1-B
K1OQQ 198- 9- 1-A
W1CTR/1
132- 6- 1-AB
K1UMP 72- 3- 2-A
K1UMI 48- 2- 2-A
K1UMI 48- 2- 2-A
WA1BNA (4 oprs.)
11,670-291-10-AB
K1HDH (4 oprs.)
5436-154- 8-A
K1UEA (4 oprs.)
1582- 57- 4-AB

Western Massachusetts

W1VNH 8400-200-11-
ABD
K1SLG 1536-126- 8-AB
W1DXS 4250-125- 7-A
K1ODW 3604-106- 7-AB
K1KQK 3366- 99- 7-AB
W1FY 1860- 62- 5-B
K1VPD 1410- 47- 5-B
K1RKF/1[12]
1408- 44- 6-B
K1ULZ 1400- 50- 4-AB
K1FYE 1024- 32- 6-B
W1JWV 1014- 39- 3-B
K1ROZ/1 750- 25- 5-B
W1UWX/1
510- 17- 5-AB

New Hampshire

W1MAS 5480-137-10-AB
W2NSD/1[13]
5280-121-12-A
W1FZ/1 5220-145- 8-
ABC
W1BXM 4180- 95-12-B
W1PBT 2926- 77- 9-B
K1JRL 1590- 53- 5-AB
K1JDV 1545- 52- 5-AB
KN1ZWF*
1120- 40- 4-B
W1SWX/1
110- 5- 1-B
W1HPM (10 oprs.)
8136-227- 8-ABC
W1ALE (W1s ALE YQH) 6120-153-10-AB

Rhode Island

K1PAM 630- 21- 5-A
W1OP (K1s JIV LPL)
10,032-264- 9-AB

Vermont

K1RSJ 1290- 43- 5-B
W1EXZ 396- 17- 2-AB

NORTHWESTERN DIVISION

Idaho

K7UGD 396- 15- 9-AB

Montana

W7CJN 132- 6- 1-AB
W7OIO 132- 6- 1-AB
K7YNW 66- 3- 1-A
K7YNX 66- 3- 1-A
K7YOW 66- 3- 1-A

Oregon

K7SJQ 2520-105- 2-
ABCE
K7GWE/7
2352- 98- 2-
ABCD
K7WXW
1008- 42- 2-AB
K7EAU 480- 20- 2-A

Washington

K7RIE 6448-248- 3-AB
K7JCA 5486-211- 3-AB
K7JRE 1309- 61- 1-A
W7ANI 1100- 50- 1-A
K7UWB 572- 26- 1-A
K7JZP 360- 15- 2-AB
K7UWB 352- 16- 1-A
K7YGP (K7s UJQ YGP)
924- 42- 1-A

PACIFIC DIVISION

Santa Clara Valley

K6DTR 4500-150- 5-AB
WA6QQH
1932- 69- 4-B
WA6IPI 1530- 51- 5-A
WA6UAM
1040- 40- 3-B
WA6VIN/6 (WA6s UJX VIN, WB6IXQ)
2100- 75- 4-B
K6RJE (multi-opr.)
1596- 57- 4-AB
WB6BIG (WA6ZLV, WB6HIG)
728- 28- 3-AB

East Bay

WA6NXC
2886-111- 3-AB
K6IXA/6 (K6IXA, WA6ZBX)
7365-246- 5-AB
K9CCD 6 (2 oprs.)
4860-162- 5-A
WA6KLL (5 oprs.)
1575- 53- 5-BC

San Francisco

WA6WIJ 6
4350-145- 5-AB
WA6YYM
3690-123- 5-B
K6VXI 1118- 43- 3-AB
WB6FBS 910- 35- 3-A
WB6CKT 468- 18- 3-B

Sacramento Valley

K6PWH 1176- 42- 4-AB
W6HBU 6 (7 oprs.)
2790- 94- 5-ABC
WN6FGM (WN6s FGM IFZ) 481- 19- 3-B
W6GDO (W6s GDO TEE) 448- 16- 4-ABC
WB6AGM (K6s SBL SFA, WB6AGM)
390- 15- 3-B

San Joaquin Valley

W6OVR 1350- 45- 5-
ABC
WN6GUX (WN6s GUT GUX) 1080- 36- 5-B

ROANOKE DIVISION

North Carolina

K4QIF 3304-118- 4-
ABD
W4ACV 2730-105- 3-AB
K4MHS 2352- 84- 4-
ABD
K4YYJ 1752- 73- 2-
ABD
W4WDH
1404- 54- 3-AB
W4HJZ 1092- 42- 3-AB
WA4EIG 748- 34- 1-AB
W4RRK 528- 22- 2-B
WA4FJM 418- 19- 1-AB
W4FDO 330- 15- 1-AB
W4BZL 242- 11- 1-B
W4RZS 242- 11- 1-B
WA4ICU 132- 6- 1-B
WA4QJA 77- 1- 1-A
W4VON 44- 2- 1-B
WA4SHA (9 oprs.)
3172-122- 3-AB
WA4RSY/4 (K4s FMC HCK SWN)
2430- 81- 5-AB
W4LEN/4 (4 oprs.)
1764- 72- 2-AB

South Carolina

WA4LTS
1152- 36- 6-A
K4JDY 616- 22- 4-AB

Virginia

K4VWH 7854-179-12-A
W4LTU 3312- 72-13-B
WA4JWC
1950- 75- 3-AB
W4TZI 1166- 53- 1-
ABD
WA4PJT 888- 37- 2-B
K4NOV 728- 28- 3-A
WA4JMO 234- 9- 3-A
WA4NSE 182- 7- 3-A

West Virginia

W4DOE 8
5338-157- 7-A
K8DRK 8
1680- 56- 5-AB
WA8EHL 8
1664- 52- 6-A
K8WXB 1600- 50- 6-AB
W8AEC 1110- 37- 5-B
K8WVP 1020- 34- 5-AB
WA8CTS 390- 15- 3-B
K8SDG 390- 15- 3-AB
K8QYC 44- 2- 1-B
WA8DOY 22- 1- 1-B
WA8DAU 8 (4 oprs.)
1344- 48- 4-A
WN8JCC (3 oprs.)
494- 19- 3-B

ROCKY MOUNTAIN DIVISION

Colorado

WØAZT 1274- 49- 3-AB
WØWYX
1248- 52- 2-AB
WAØHFK
1100- 50- 1-A
KØZAQ 968- 44- 1-A
WAØDGL 374- 17- 1-AB
WAØBBP (WAØs BBP CQO) 2232- 93- 2-AB
KØHBT/Ø (4 oprs.)
1608- 67- 2-A
WØIJR (KØISL, WØIJR)
550- 25- 1-A

New Mexico

W5CYZ 1012- 46- 1-
ABD
W5CK 726- 33- 1-AB
W5KDT 704- 32- 1-B
WA5ETF 660- 30- 1-B
WA5FPS 660- 30- 1-AB
WA5CWS 638- 29- 1-
ABC
K5KJW 352- 16- 1-AB

Wyoming

K7VTM 216- 9- 2-AB

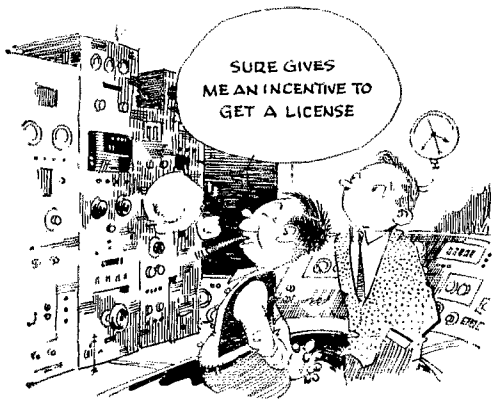
SOUTHEASTERN DIVISION

Alabama

K4IQU 1820- 70- 3-AB
WA4PJV
1248- 52- 2-AB
K4WHW
1248- 48- 3-A
WA4OGQ
1104- 46- 2-A
K4VJL 1104- 46- 2-AB
WA4EBS
1032- 43- 2-A
W4YFN 960- 40- 2-AB
W4YRM 936- 39- 2-A
WA4GGG
864- 37- 2-A
K4EAO 744- 31- 2-AB
WA4PHF 744- 31- 2-AB

(Continued on page 164)

"Keep It Down To Five— Eh, Charlie— Old Buddy"



BY JOHN G. TROSTER,* W6ISQ

"OK CHARLIE, well let's start out here in the yard. I'll show ya the antennas, then we can go inside and see the shack."

"There's the stacked arrays I was tellin' ya about. See on the outside top and bottom of the sandwich are the four-element 20-meter jobs. The 15- and 10-arrays are stacked inside. Nice neat package, don't you think?

"Well, actually, it was pretty cheap. It was the 120-foot mast that shook me up a little. By the time I paid the shipping from Boston, the crane operators, cement contractors, and all that, the price of the antennas was nothin' — even throwing in the steeplejacks who climbed the thing.

"I tell ya though, Charlie, it's that three-element, 40-meter job on top that really does it, don't ya think? Kind of a nice climax to a pretty smart set of sky wires. Right? Of course, as I get the time, I'll stick a second 40-meter job down below under the 20s.

"Then that perky little two-meter affair up there on top like a star on a Christmas tree. Yeah I know, they're hard to count from down here, but there are 36 elements in that one. I know, but I like to start out simple.

"One thing bothers me though, Charlie. I still got a little room up there and maybe I ought to tie another 20-meter job in there. Think it would do any good when the sunspots hit zero?? No, I won't worry about doubling up on the 15- and 10-meter arrays till the next cycle starts. More economic that way, wouldn't you say?

"OK, let's go in the house and see the shack.

"You can see I got things racked up according to function. This rack is all receivers. Just got this one up here yesterday. I thought maybe I'd only have one regular receiver and one standby. But then I saw this one in the store and I said to myself, 'old boy, ya might just as well' — so, now I got three receivers. That's the way sometimes, eh Charlie?

"And, of course, the transmitters. This rack is for the exciters. See here. Each band has its own exciter with all its own knobs and dials and stuff like that. Then in the next three racks are the finals for each band. I debated whether or not I should put the exciters and finals for each band all in the same rack — but I think I'll try it this way for a while. I don't need to get to the finals much since they're all automatically tuned and the like.

"Oh yes, ya don't see any power supplies, do ya? Well, they're all in the basement. Don't like to keep that much voltage running around loose, ya know — haw!

"Then here on this side of the console are the control and test-equipment panels. These switches control the various transmitters and these are the scopes for the rigs. And these are bridges and meters and variacs and recording units and the like. And here is the special line to the phone company.

"Oh, this over here? Well I call this my 'little toy.' Cute, don't ya think? Little 75-watter — just for kicks. Oh, I guess I'll use it now and again —

"Where is what? Key? Right here in my pocket! I keep this place locked tight, you can bet your Yagis! Ohhhh — a radio key — that kind. Well, ahh, must be one here someplace. Maybe the dog . . . I been suspecting Marge's mangy mutt of some strange things around here. Probably thought it was a T-bone or somethin' and buried it. I'm gonna shave that poodle one of these days!

"Well then, it's lucky you brought along your own code key and oscillator for us to use.

"Yeah, Charlie, guess I'm as ready as I'll ever be. Kinda nervous, though — like the last coupla times.

"But ya know, Charlie, I'm sure all them other fellas who gave me the test before were sending a lot faster than 5 w.p.m. I'd of got it if they had stayed at five, but I swear they jumped to 7 or 8 w.p.m. at least!

"Oh, don't you worry about the ol' General Class, Charlie. Once I get on the air my code speed will jump 10 — 12 — 13 — 14 overnight. You'll see — if I could only find where that pooch buried that darn key —

"Ya know, Charlie, if that tower was just a little higher, maybe I could squeeze four of them twenty-meter jobs on the thing.

"OK Charlie, all ready, I guess. Send me some of that dot-dash stuff. But — ahhh — keep it down to five, eh, Charlie, ole buddy?" QST

* 45 Laurel Avenue, Atherton, California.

Experiments With Oscar III

BY HARLEY GABRIELSON,* W6HEK,

AND ROBERT TELLEFSEN,* W7SMC/6

MANY challenging experiments are possible with Oscar III. In addition to a translator, there will be both a three-channel telemetry beacon and a coherent (continuous unmodulated carrier) beacon in the satellite. While many amateurs will be interested mainly in communicating through the satellite, experimentally-inclined amateurs will want to conduct experiments taking advantage of other capabilities of the satellite.

As examples of what has been accomplished using simple equipment, consider the following Oscar I and II results:

1) The signal acquisition and loss times of the satellite were recorded, and the data reduced for use in making orbital predictions. Further refinements in data reduction made it possible to determine the operating range of any reporting station.

2) The *time of closest approach* (t.c.a.) and the *slant range* to the satellite at t.c.a. were determined by measuring the Doppler shift of the beacon signals.

3) The envelope modulation of the received signal provided a clue to the roll rate of the package as it tumbled through space.

4) The internal temperature of Oscar I was monitored and the data used as a guide in establishing the external temperature-stabilizing surface treatment for Oscar II. The resulting internal temperature of Oscar II was well within the design requirements.

5) The gain and power level requirements for the Oscar III translator were established partly from data derived from numerous signal strength observations of the Oscar I and II signals.

Similar experiments can also be performed with Oscar III.

Listener Reports

Listener reports are just as appropriate today, during amateur radio's first steps into space, as they were fifty years ago when reports in the "Calls Heard" column of *QST* helped chart the earliest steps of amateur radio. Reports of stations heard through the satellite will be useful in evaluating the effectiveness of the satellite as a communications relay facility. The reports will also help in determining the number of stations that can communicate through Oscar III simultaneously.

It is expected that some observers will be able to make tape recordings of the full 50-kc. spectrum passing through the satellite translator. Lacking wide-band recording facilities, a team effort could accomplish the task. Five stations in the same general area could split the recording chore, each recording a 10-kc.-wide channel (plus an identifying time signal) on ordinary home tape recorders.

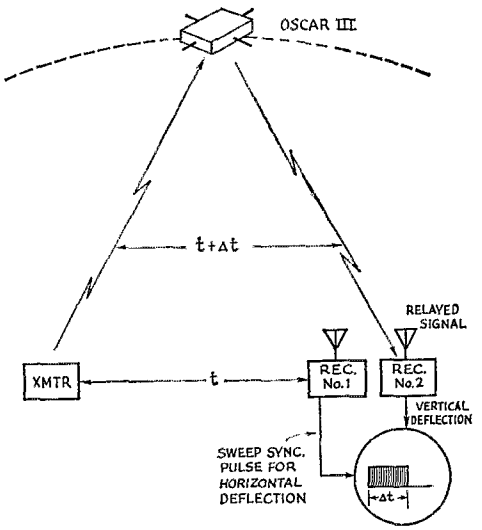


Fig. 1—Range measurement based on observing the time difference between a direct signal and the same signal relayed through the satellite.

Signal recording is only part of the job. The tapes should then be played and replayed until all signals on them have been identified and timed. By tabulating all stations heard, and locating them on a map, each observer can establish his own range of coverage through the Oscar III translator. Tabulations of results from many observers can be fed into computers at Project Oscar headquarters to provide basic data in analyzing the performance of the translator.

Range Measurements

The presence of a translator in Oscar III makes it possible to determine the ground-station-to-satellite distance at any time during a pass by measuring the time needed for a signal to travel from the ground to the satellite and back again. There are two basic techniques, *phase shift* and *pulse delay*, neither of which involves the Doppler effect.

* Project Oscar, P.O. Box 183, Sunnyvale, Calif.

In the first method, an audio tone is transmitted to the satellite, and the phase shift over the round-trip path is measured. The phase shift will be measured in degrees, which can be converted to delay time, and from delay time to distance.

A second means of determining distance through phase-shift measurements is to use a variable-pitch tone. By altering the pitch of the tone so that the delay on the satellite-returned tone is 360 degrees, the distance to the satellite will be equal to a half wavelength at the lowest audio frequency exhibiting this effect.

The pulse technique of range measurement is similar to radar. It is relatively simple and can be used by any observer, whether or not he has a transmitter.[1] The only requirement is that some local station within direct-wave reception distance be transmitting c.w. keying (pulses) to the satellite. The keying pulses received *directly* from the transmitting station are converted (by the receiving station) to d.c. pulses. The trailing edge of each keying impulse is used to trigger the sweep of an oscilloscope, and the return signal from the satellite is applied to the vertical deflection plates of the scope. The time from the beginning of the sweep to the trailing edges of the keying impulses returned from the satellite represents the pulse delay due to the longer satellite path. To this delay time add the distance in miles between ground stations divided by 5.35 microseconds per mile. This gives the true time from transmitter to satellite to receiver. To derive the distance to the satellite, simply divide the true time by 10.7 microseconds (the time required for a radio signal to travel one statute mile out and one mile back). This procedure will give the distance from the satellite to a point midway between the two ground stations. However, when the two stations are within 10 miles of each other the error will be negligible. This pulse technique to determine distance is illustrated in Fig. 1.

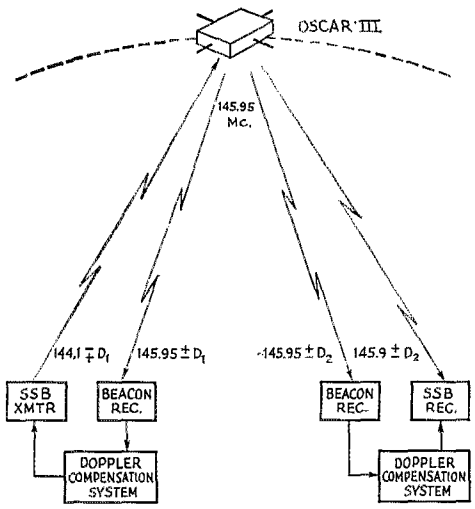


Fig. 2—The c.w. beacon signal serves as a reference for correcting for Doppler shift on the transmitter-to-satellite (D_1) and satellite-to-receiver (D_2) paths.

[1] With any narrow pulse technique, due attention must be paid to the problems of receiver overload and blocking.

Those amateurs making range measurements by the pulse method can expect the maximum time measurement to be the order of 11,000 microseconds (0.011 seconds), representing a range of approximately 1000 miles. A station sending constant dots at 20 w.p.m. transmits about 10 characters (dot plus space) per second. On this basis, a single dot would last about 50,000 microseconds — ample time for an oscilloscope trace to return to its starting point for each keying impulse.

Satellite Frequency Monitoring

During the first two Oscar experiments, it was assumed that, if unusual propagation conditions were to occur, someone would be listening and would observe them. So far, only one verifiable case has occurred — EA4AO received the signals of Oscar II over a distance of 4500 miles.

We therefore propose that club groups organize round-the-clock monitoring watches on the Oscar III frequencies. Although it may be impractical to maintain these watches for the entire period of satellite life (estimated at two to four weeks), it should be possible to set up a 48-hour watch over a weekend. Not only is it important to record observations of reception over unusual distances, but it is also important to record instances where the beacon signals were *not* heard when they should have been! This is particularly true for stations in extreme northern and southern latitudes, as it would be evidence of ionospheric disturbances.

Observations in Isolated Areas

There should be no shortage of participation in using Oscar III over North America, Europe, and Australia. However, the traffic-handling capabilities of the satellite are unlikely to be strained elsewhere, since other areas (the mid-Pacific islands, and the polar areas, for example) have very little two-meter activity. As a result of the low level of activity in these regions, stations that do manage to operate on two meters may be able to make significant achievements.

Over Europe, the available translator output power will be shared by many stations. Yet at Wake Island or any other low-activity area, a transmitting station could have the satellite translator all to himself, and his signal would be radiated from orbit at the full one-watt p.e.p. output. This will be the most favorable situation for observing any unusual propagation phenomena. We recommend that stations in such a situation use 144.100 Mc. as a calling frequency.

When no signals are passing through the translator, it is operating at its maximum sensitivity, and the best opportunities for extreme-range contacts will occur. When the satellite is being used for such contacts, the contact duration will probably be quite short, and skillful operating will be required.

An alternate experiment suitable for geographic areas with little two-meter activity involves the running of QRP tests in an attempt to determine the lowest power which can be used to communicate through the satellite.

Doppler Shift Cancellation

Single-sideband signals relayed through Oscar III will be difficult to copy due to the rapid change in frequency caused by the Doppler effect. There will be exceptions to this general rule, but they will be rare. When the satellite passes midway between two stations in a direction perpendicular to a line joining them, the Doppler effect will be cancelled. This cancellation is also true for stations in the same local area. This happens because the magnitude of the Doppler shift from transmitter to satellite just equals the magnitude of the shift from satellite to receiver. The frequency inversion designed into the satellite effectively cancels the Doppler frequency shift in these instances.

In the general situation, however, there will be a residual Doppler shift appearing on all signals received from the satellite. It is possible to cancel the Doppler shift at the ground stations, by using a frequency-control system based on signals received from the coherent beacon in the satellite. The control system would raise the amateur's transmitter frequency and tune his receiver lower in frequency as the Doppler effect lowers the apparent frequency of the coherent beacon. A typical system is illustrated in Fig. 2. It should be possible to adjust this system to give nearly perfect cancellation. The Doppler cancellation system would cause the transmitted frequency to appear constant at the translator input. At a receiving station, the receiver would cancel the Doppler shift occurring between it and the translator.

High-Speed Traffic Handling

Frequency-shift-keyed (f.s.k.) teletype signals passing through the translator will be adversely affected by the Doppler effect in the same way that s.s.b. signals will, but audio-frequency-shift keying (a.f.s.k.) should work with little difficulty. Even with a.f.s.k., the short time duration of contacts will require skill in operating and in the precontact adjustment of equipment. Plans to pass teletype traffic through the translator are already being made.

The main problem of using standard 60 w.p.m. teletype to handle traffic through the satellite is that this standard speed seems too slow for the short contacts that are possible. A relatively simple and direct means exists to increase the transmission rate of teletype signals sixteen times, requiring only a pair of ordinary home tape recorders. This system is shown in Fig. 3. Low-frequency a.f.s.k. signals (133 and 186 c.p.s.) are recorded at 1⅞ inches per second and played back at 7½ i.p.s. to give an effective speed of 240 w.p.m. The low initial audio frequencies are necessary because multiplying the words-per-minute figure also multiplies the frequencies of the original audio notes. This speeded-up signal may be re-recorded at 1⅞ i.p.s., and when it is played back at 7½ i.p.s. it will represent a speed of 960 w.p.m.[2] The audio frequency notes will be 2125 and 2975 cps, and can be used to modulate an a.m. transmitter.

When the 960 w.p.m. signal is received and recorded at a distant station, it is only necessary to reverse the recording process to return to 60 w.p.m. a.f.s.k. That is, record fast and play back slow.

There are two ways in which this high-speed capability could be used, depending upon transmission conditions. If a fairly clear, low-noise circuit is possible, an hour of 60 w.p.m. copy could be sent in a single 4-minute transmission. If QRM and QRN are bad enough to cause excessive copy errors, 15 minutes of copy could be

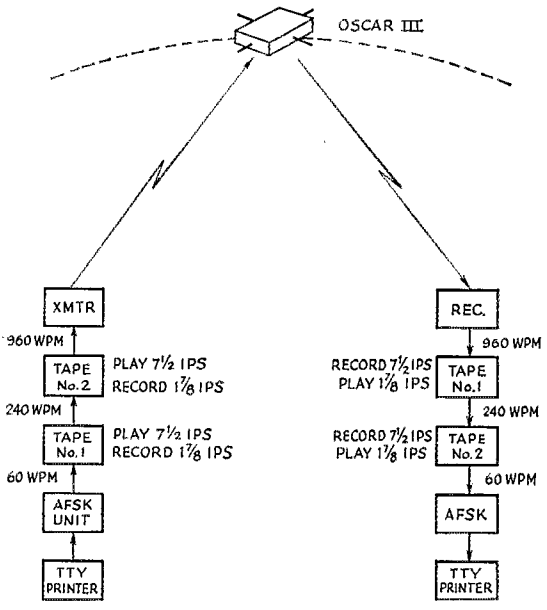


Fig. 3—Optimum use of the short time available during a pass can be made by prerecording RTTY on magnetic tape and playing it through the satellite at high speeds for recording at the far end of the circuit.

recorded on tape four times and still be transmitted in the same 4-minute period. Then when the receiving station prints out his copy, he will have four copies of each message and should be able to put together an accurate copy of each piece of traffic.

A similar high-speed transmission technique can be adapted to c.w., using either an a.m. or s.s.b. transmitter. An audio frequency around 150 c.p.s. keyed at 20 w.p.m. becomes a 2400 c.p.s. signal keyed at 320 w.p.m. when multiplied sixteen times. If this keyed tone is used to modu-

[2] Amateur RTTY is restricted to 60 w.p.m. by FCC ruling. Project Oscar is corresponding with the FCC with the view of obtaining special permission for high-speed RTTY experiments with Oscar III.

late an s.s.b. transmitter, a high-speed c.w. signal will result, or in an a.m. transmitter, tone-modulated c.w. (A2) will be produced. In either case, the Doppler effect will not seriously impair the results. If the receiving operator adjusts his b.f.o. to give a beat note around 10 or 11 kc., the maximum possible Doppler shift (8 kc.) will still leave a tone of about 150 c.p.s. after the signal is slowed down during playback. The receiving operator determines the final playback pitch when he sets the b.f.o. pitch during the recording period, and selects the playback speed. If 20 w.p.m. is too fast to copy, slow it down to 10 w.p.m.

Oscar III Experiments

We have mentioned only a few of the experimental possibilities presented by Oscar III. There are others, such as the use of slow-scan TV, polarization observations, antenna pattern measurements, and more. We have not discussed the three-channel telemetry system, because it will be dealt with fully in a separate article by Art Walters, W6DKH. We hope that the experiments mentioned here will stimulate readers to formulate other experiments. Let us know about the ideas you come up with.

Oscar headquarters is willing to act as a clearing house for any experimental programs planned in connection with Oscar III. We will maintain a file of names of individuals and groups who have expressed interest in these or other projects so that groups or individuals with similar interests can be placed in touch with each other.

In any event, time is of the essence — lift-off is approaching. Some of these experiments will require extensive preparation if they are to be successful. Here's *your* chance to take an active part in a space experiment. QST

High Claimed 1964 DX Competition Scores

THE final *QST* report on the February and March 1964 ARRL International DX Competition will be a revealing glimpse of what can happen when determined DX'ers challenge theoretically poor conditions. Tremendous single and multioperator scores were achieved by the world's most competent contest DX'ers. Country totals per band seem incredible in view of low sun spot numbers. DX and W/VE stations alike must generate an ionosphere of their own — there's hardly any other conclusion!

The Fall *QST* report will contain final corrected scores, including many DX scores still in transit. The following tabulation shows only those *claimed* c.w. scores over 200,000 and phone totals over 100,000. Following the call is the score *claimed*, multiplier and number of contacts.

C. W.

Single Operator

W3GRF.....734,502-323- 757
W4KFC.....718,584-316- 764
W8FGX.....658,665-315- 697
W4DHZ/4....628,056-286- 732
W3BES.....554,400-280- 660
W8VSK.....543,780-270- 672
W3MFW.....517,068-271- 636
KP4AOO.....517,059-073-2361
W3PZW.....511,038-267- 638
YV1DP.....492,048- 68-2412
YV5AGD.....465,690- 86-1805
K2DCA.....459,330-251- 610
CE1AD.....454,320- 72-2104
W1BIH.....441,636-247- 596
KP4BJU.....437,400- 72-2025
W9IOP.....419,922-246- 569
W9ERU.....408,000-250- 563
W2AYJ.....401,709-259- 517
W2WZ.....395,226-234- 563
W4JDR.....381,018-251- 506
K8LEE.....380,728-218- 582
W2GGE.....380,700- 225-566
W4BCV.....370,656-234- 528
KP4CC.....362,871- 69-1753
HK3RQ.....357,445- 67-1793
WA2OJD.....357,060-220- 541
K1NOL.....352,944-228- 516
W4LSG.....350,325-225- 519
G4CP.....342,113- 59-1822
W4MCM.....341 925-235- 485
VP9L[1].....327,540- 53-2060
KG6AAY[2]....324,608- 64-1706
W6EPZ.....301,620-220- 457
W8ZJM.....293,700-220- 445
W5WZQ.....293,436-234- 418
W3MCG.....288,360-205- 464
W3IYE.....285,690-214- 445
W2VJN.....283,404-226- 418
K6ERV[3].....278,568-212- 438
K3KPV/3[4]....277,263-189- 489
DL7AA.....275,280- 62-1483
W6KG.....268,755-205- 437
W5BRR.....266,220-204- 435
W3HHK.....257,085-197- 435
W3MVB.....256,704-191- 448
W1BPW.....253,305-195- 433
W7PGS.....247,426-193- 428
CN8FW.....246,240- 48-1710
GW3JI.....245,616- 56-1462
VE2NV.....244,100-200- 408
DL1KB.....244,122- 61-1334
W6IBD.....238,095-195- 407
F8IH.....237,840- 60-1366
JA1BRK.....237,384- 56-1413
HB9JG.....234,630- 55-1425
W6WX.....234,000-195- 400
W2HO.....230,724-174- 442
JA1VX.....227,988- 54-1410
W6GRX.....222,300-195- 380
OK1ZL.....220,365- 59-1245
W4DXI.....219,852-197- 373
W3MSR.....216,648-177- 408
W1JYH.....214,620-196- 365
W3BIP.....210,930-178- 395
K5HRR[5].....210,816-192- 366
WA6QGW....210,684-181- 388
K2LAF.....209,681-178- 898
OZ3FL.....205,128- 56-1221
W5CKY.....202,920-190- 356
KØMIC[6].....202,200-200- 337
W1FZ.....200,724-172- 389
PJ2AE.....200,256- 64-1043

Multiple Operator

W3MSK....1,259,268-404-1039
W6VSS.....1,074,807-389- 921
W4KXV.....883,116-333- 884
W1BU.....833,856-344- 808
K4LIQ.....711,762-313- 758
W3WJD.....708,666-329- 719
W3VKD.....645,816-284- 758
W3TMZ.....630,480-296- 710
W3GHM.....548,274-274- 667
WB2APG.....500,625-267- 624
W4BVV.....497,154-266- 625
W3WPG.....430,353-253- 567
W3GRS.....429,963-251- 571
W3ADO.....402,426-237- 568
W6RW.....397,401-249- 532
WØNFA.....388,416-238- 544
W3MWC.....351,900-221- 510
KZ5FC.....320,552- 68-1576
W8SH.....300,675-211- 475
W3KFQ.....271,830-205- 442
DJ5BV.....251,930- 59-1443
HA5KBI.....246,480- 60-1372
ZL2AWJ.....244,416- 64-1273
WØYTQ.....237,690-190- 417
SM6CKV.....235,306- 58-1356
W6DFY.....213,173-181- 411
KP4AXM....211,410- 58-1236

PHONE

Single Operator

K2HLB[7].....430,992-219- 660
YV5BIG.....381,150- 77-1650
YV5AGD.....366,252- 92-1327
W4BVV.....347,454-194- 597
KP4AOO.....343,557- 59-1941
TG9SC.....304,854- 62-1639
VP7CC.....253,332- 62-1362
W4KWY.....240,300-178- 450
W4BCV.....229,621-169- 453
HK4EB.....222,525- 69-1070
W4RLS.....211,224-156- 452
TI2EW.....209,040- 65-1080
W3BES.....199,080-168- 395
VP3HAG.....183,420- 62- 971
W4PRP.....173,952-151- 384
W2WZ.....161,046-138- 389
W6RW[8].....141,705-141- 335
DL1KB.....140,940- 45-1044
K6OHJ.....115,656-122- 316
VE2UX/3....113,724-117- 324
W5KTR.....110, 130-135- 273
OA4PD.....109,560- 44- 830
K9PNV.....109,242-126- 289
W3ZVJ.....107,463-113- 317
KX6BU[9].....104,370- 49- 710
VK3ATN.....103,785- 51- 679
K8AHV.....101,625-125- 271
W3ADO[10].....100,983-123- 273
W5AJY.....100,188-132- 253

Multiple Operator

W3MSK.....978,039-271-1203
YV5AHG.....840,960- 80-3549
W8NWO.....346,428-206- 546
W3WJD.....322,877-197- 550
KP4AXM....298,351- 61-1637
DL4OV.....265,318- 53-1819
GW3NWV....181,917- 51-1189
W3GHM.....156,156-113- 364
W8NGO.....146,320-145- 372
G3KFX.....136,920- 40-1143
KØBJK.....134,274-139- 322
W3GRS.....119,808-128- 312
W3MWC.....103,329-129- 267

[1] W2YTH, opr. [2] K6SDR, opr. [3] W7WJB, opr. [4] K3MNJ, opr. [5] K5ABV, opr. [6] K6LSG, opr. [7] W2VCZ, opr. [8] W9WNV, opr. [9] WA6HRS, opr. [10] KØDQI, opr.

The Aurorascope

BY DAN TOMCIK,* K8ZQE

A Low-Cost, Easy-To-Build, Portable Telescope for Monitoring Sunspot Activity

Regardless of your interests in ham radio, your results are determined to a considerable degree by solar activity. You don't have to be an astronomer to check on sunspots, yet very few amateurs do it. Here is a simple and inexpensive gadget you can build that will enable you to see what is going on up where radio conditions are made.

With sunspot activity near the minimum of the current cycle, a look at the smoothed sunspot chart leaves the v.h.f. man somewhat less than enthusiastic about the possibility of auroral-type band openings. What is often forgotten is that the sun's activity deviates greatly from the average or smoothed index, and peak activity in the low portion of a cycle can be as great as a peak at maximum. Good auroral openings occur throughout the eleven-year cycle. True, the number of openings is reduced, but since we have this fact to live with, the only solution is to make the most of the openings when they do occur.

If left to chance, the possibility of missing a good portion or all of an aurora opening is high. Daily monitoring of the sun's activity is indicated as the best solution to predicting the approach of auroral activity. The sudden appearance of sunspots of considerable size on the solar disk always precedes auroral phenomena by as much as twenty-six hours. The appearance of large spots does not always guarantee that an opening will result, but at least half the battle is won when spots do appear, since the necessary conditions are present which may trigger an aurora. It is well to remember that new spots near the center of the disk are more likely to indicate auroral possibility than those at the sun's eastern horizon. The spots at the horizon may be due to the sun's rotation bringing them into view. The magnetic storm associated with these spots may have been in progress for some time on the rear surface of the sun. Storm *beginnings*, with their high electromagnetic activity, generally indicate auroral possibilities.

*R.R 2, Box 723, Buchanan, Mich.

Fig. 1—K8ZQE takes a quick look at the sun with the Aurorascope. In the background is the author's home-built 6-inch reflecting telescope.

Since most radio amateurs are not also amateur astronomers, they may not realize how easily and inexpensively a high-quality sun telescope can be built from surplus lenses. The author, being both, decided to combine the two avocations and design such an instrument. The resultant device we call the Aurorascope, a projection telescope which produces an image of the sun two inches in diameter, more than enough to observe sunspots of any consequence. The optics cost only $4.10 at current surplus prices, and are available from The Edmund Scientific Company, Barrington, New Jersey. Catalogue numbers are given under Fig. 2.

Description

Since a sun telescope does not need high light gathering power (a function of the objective lens diameter), a good color-correcting achromatic lens was chosen having a diameter of approximately 1⅜ inches. The focal length of this lens is 7 inches, and it comes mounted in a 2-inch-diameter brass cell. Color correction in the optics is necessary if a high-quality image with minimum color halo is desired. The relatively small objective diameter also limits the amount of heat at the principal focus and thus protects the eye

lens from damage, even without the use of a heat-absorbing filter in the system. The eye lens is also an achromat, with a diameter slightly under ½ inch and a focal length of 2½ inch. The physical arrangement of the optics was chosen so that a comfortable viewing position can be assumed with the telescope held between the knees for steadying purposes, as in Fig. 1. The configuration requires a flat mirror to reflect the projected image to the viewing screen. This mirror should be a first-surface type; that is, one whose reflecting surface is the top surface. Care should be used when handling this type of mirror since the silvered surface is unprotected and subject to scratches and finger marks. The mirror specified has the corners cut off, but this is of no consequence since the reflected image is elliptical at its surface.

The housing is made from ¼-inch plywood throughout, except for the two blocks which hold the objective tube. Other materials such as pressed hardboard can be used if desired. The objective tube is cut from a 2-inch-diameter cardboard mailing tube. Here again, aluminum or other tubing of approximately this diameter can be used.

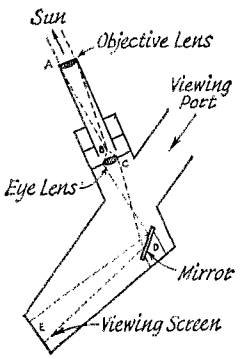


Fig. 2—Cutaway view of the sun telescope. The objective lens, A, is aimed at the sun. The sun's image is formed 7 inches below at point B and transmitted through an eye lens, C, to a mirror, D. From the mirror it is reflected down to a viewing screen, E, at the lower left. The projected image on the viewing screen, some 2 inches in diameter, is seen by looking into the viewing port. Part numbers of the various optical components are as follows: A—40429, C—6387, D—536, all from Edmund Scientific Co., Barrington, N. J. Alternate parts are: C—6388, 6384 or 6389, and D—40040.

The basic optical layout is shown in Fig. 2. The sun's rays enter the Aurorascope through the objective lens and the principal image is formed 7 inches behind the lens at point B. The eye lens is placed a little behind the principal image at point C. The sun's diameter at the primary focus is 0.009 times the focal length of the objective lens, or 1/16 inch in our case. The eye lens magnifies this small intense image due to the throw distance CD plus DE. The throw is 22 inches, producing a 2-inch-diameter image on a white cardboard viewing screen at E.

Construction

A 7-inch-long section of the mailing tube is first coated on the inside with flat black paint. The objective lens is attached to one end, using vinyl electrical tape. If an aluminum tube is used, and you have access to a lathe, threads can be cut on the inside surface at one end to accept the threads on the lens mount. If this is done, the tube length should be increased so that the distance from the front surface of the brass cell to the open end of the tube is about 7½ inches. The lens is mounted so that the spanner wrench slots in the cell are toward the outside.

Next, the plywood housing parts are cut as indicated in the accompanying drawings and all parts except one large side are assembled, using glue and wire brads. The two ¾-inch-thick blocks which hold the objective tube have holes bored exactly on center, and of a diameter such that the tube fits snugly in them for focusing purposes. The eye lens is held in a counter-bored ¼-inch hole with a piece of thin brass stock having a ⅜-inch hole drilled in it for the passage of the light. The brass holder is secured with a small wood screw, and the counterbore is ½ inch in diameter, large enough to seat the lens. The surface with the greater curvature should face toward the mirror when properly mounted.

The first-surface mirror holder is held with two wood screws and large washers through oversized holes in the housing. This permits alignment of the optics before the screws are seated.

The entire inside of the box should be painted a flat black before installation of the optics. The mirror is glued to the wood block with any appropriate adhesive, with the silvered surface up.

To align the optics, it is necessary only to sight through the small hole at the viewing screen location and center the image of the eye lens in the mirror before tightening the two screws holding the mirror block. It may be necessary to shim the block one way or another to properly center the image. Do *not* point the telescope at the sun when aligning the mirror or severe eye damage will result. A white cardboard viewing screen 4 inches square is then secured in place with glue or transparent tape.

The project is completed by installing the remaining side, using brads or electrical tape around all edges.

Using Different Optics

If it is desired to construct an instrument giving a larger image, or with lenses having focal lengths different from those recommended, the following formula can be used to determine the throw distances necessary for a given image size:

$$T = f_e\left(\frac{D}{0.009 f_o} + 1\right)$$

where T = throw in inches
f_e = focal lengnth of eye lens in inches
D = diameter of image in inches
f_o = focal length of objective lens in inches

If a larger image is desired using the recommended lenses, the formula reduces to:

$$T = 10.6D + 0.67$$

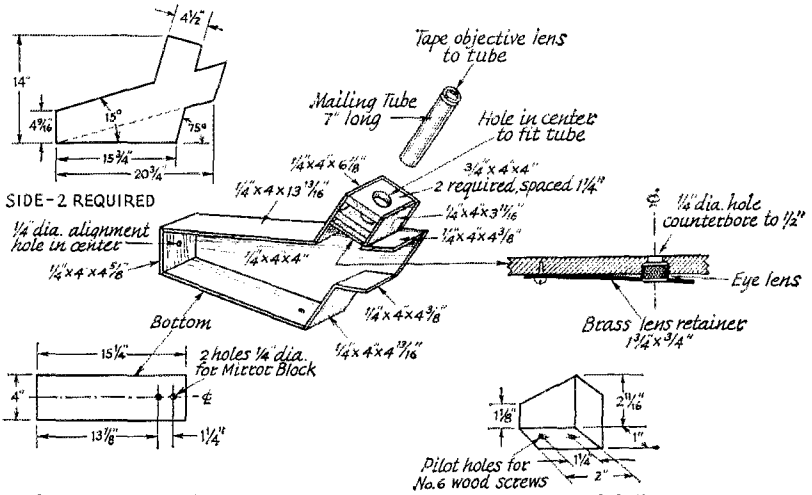


Fig. 3—Structural details of the Aurorascope.

The distance between the objective and eye lenses should be about equal to the sum of their focal lengths, and the mirror should be large enough to reflect the entire solar disk with some to spare on all sides. The eye lens focal length should be kept greater than ½ inch to assure that the entire disk will be observed.

Conclusion

It is best to observe the sun within a period of several hours before or after noon. The operator holds the Aurorascope between his knees while in a sitting position, with the objective tube pointing toward the sun. Approximate alignment with the sun can be achieved by noticing the shadow of the objective tube on the housing surface where the two meet. When the shadow completely disappears, the tube is pointing directly at the sun. While looking in the viewing port, slightly adjust the position to bring the solar disk to the center of the screen. Focus the image by sliding the tube in or out as needed.

With a little practice, the whole operation, including observation of the sunspots, will take less than 15 or 20 seconds. Day-to-day observations will show the progress of the spots to the sun's western horizon due to the 25-day rotation period. When you sight some new large spots, point your beam north that evening or the following one, and look for me on two-meter c.w. I'll be looking for you! QST

Strays

Lightning damage is rare in the region around Las Vegas, Nevada, according to K7ICW, but it can happen there. Lightning struck the ungrounded ground-plane 2-meter antenna of KN7WPQ on April 1. The charge ran down the coaxial line into the hamshack burning up most of the equipment. Moral: Ground antenna installations, even 2-meter ones, regardless of whether or not you're located in a thunderstorm area.

Odd coincidence: KN7WPQ had gone off the air the night previously, when his Novice ticket ran out!

—•••—

On April 1, 1964, stations WWVB and WWVL began broadcasting continuously from 1630 UT Wednesdays to 2230 UT Fridays. On Saturday, Sunday, and Monday these stations broadcast from 1630 to 2230 UT; and they alternate operation on successive Tuesdays. Frequencies are of course 60 and 20 kc., respectively.

—•••—

Calling all genealogists — again: It's W6QCY, not W5QCY, as we said on page 148, March 1964 *QST*, who's looking for other hams interested in genealogy through amateur radio and IBM directory. His address is 1901 Morgan Avenue, Claremont, Calif.

—•••—

Sorry, but templates are *not* always available for equipment described in *QST* articles. If templates have been made up, we will mention that fact in the article. If the article doesn't mention templates, we haven't got 'em.

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. This month's winning entry, by W4LCY, appears on page 21.

Complete rules and some subject ideas appeared on page 49 of *QST* for February.

Here is what a corner of KL7DQL's shack looked like after the earthquake.

And yet, in this emergency which affected communications in the entire United States and Canada, the KL7s showed up in droves. True, some of them were ill-prepared, both in equipment and skill, to handle the tremendous volume of traffic which descended on them. Despite this and other drawbacks, the nation's presses and other news media, as well as officialdom, have been ringing with praises of the amateurs' performance during the aftermath of the earthquake.

This writeup is more concerned with what *was* done than with what *should* have been done. One could write a book on the latter, because hindsight is always better than foresight. Our analysis of reports received (48 from KL7s, hundreds from others) shows a grand total of 314 Alaskan amateurs participating in the emergency operation in one way or another. Considering the potential total, this is a whale of a lot of hams. (There are about 1200 licensed amateurs in Alaska.) Reports from the other 49 states show a total of over 1600 amateurs taking

The Alaska Story

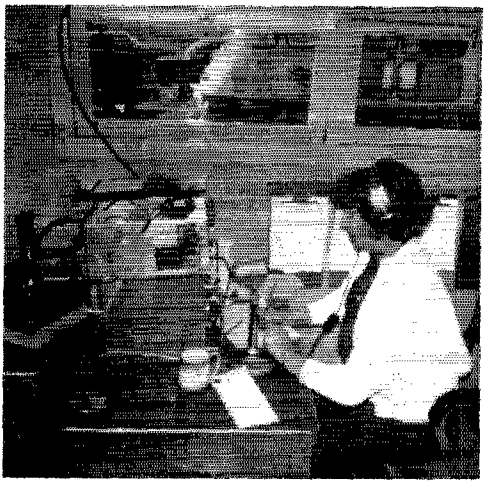
A Summary of Reports of Outstanding Amateur Performance in the Earthquake Emergency

BY GEORGE HART,* W1NJM

ALASKA is a big place. It sprawls over four time zones — as many as the entire remaining continental U.S. — and in most of its area there are few if any roads, population is sparse or nonexistent and communication is limited. An earthquake of whatever severity in some parts of the state could have gone almost without notice. But the one that occurred on Good Friday, 1964, took place in one of Alaska's few population centers and struck its largest city, Anchorage. Had the same thing happened in the San Francisco or Los Angeles area (which it *could* have!), deaths would have mounted into the thousands; for this was the strongest earthquake ever recorded in the northern hemisphere.

Earthquakes are almost entirely unpredictable. That is, we know they are more apt to occur at one place than another, in a general way, but usually they come on completely without warning. When it happens, everybody is caught by surprise. In an organizational sense, Alaska was not "ready" for a communications emergency. Some good c.d. organization exists in Anchorage, but otherwise it couldn't have happened in a worse place.

* National Emergency Coordinator, ARRL.



This emergency station at the Anchorage International Airport was operated continuously for 144 hours following the 'quake. That's KL7BLL at the controls. Other operators were KL7s AUV CLY (who owns the 2-meter rig) and DQL.

part in the Alaskan traffic-handling in one way or another. Any way you look at it, it was a *big* operation. Personal inquiry traffic got so thick on the networks that it had to be piled up on the west coast, awaiting outlets, as the traffic flowed *from* Alaska in a steady stream. National Traffic System nets were unable even to begin to handle the load. No communications system could have done it. Western Union, the Bell System, the military and all others were hopelessly bogged down. Only when the outgoing traffic slowed down was it possible to take care of the personal inquiries, most of them by that time obviated. Red Cross estimates that something like 70,000 such messages were stacked up at one time, awaiting an outlet into Alaska.

Disaster Area Reports

Of the 48 reports received from Alaska, 28 came from stations in what can be considered the disaster area — from Anchorage southward over the Kenai Peninsula. Kodiak Island was also affected, but we have no direct reports from there. It is impossible, from the mass of reports received, to get up a concise, chronological story of the development of amateur emergency communication. We'll just have to take the reports as they come, Anchorage area first, then other Alaska reports, then reports of other U. S. stations who contacted Alaska, then all remaining reports. Some will have to be omitted entirely; some will be cut to the bone. Most critical comments will have to be omitted, so we can concentrate on the facts.

KL7ERL set up gear at St. Mary's Rest Home in Anchorage, where emergency power was available. First call on 14,100 kc. was answered by W7CSW. Traffic was handled with W7CSW, K7JHA and W6MVL, mostly with K7JHA, who "is a real traffic man" (he is manager of RN7, NTS). While handling this traffic into and out of Anchorage, about 2100 GMT Mar. 28, the traffic was interrupted by a second earth shock, but no damage.

KL7ESR operated for 72 hours after the 'quake, on 80- and 20-meter sideband. Traffic was handled with KH6USA and then with KL7FBA at Elmendorf Air Force Base, who relayed all traffic into a net which he had set up. KL7FBA was operated by W7BDJ. All traffic was press releases and priority messages to Governor Eagan in Juneau.

KL7EJM at Soldatna put in 27 hours on 75 and 2 meters, part of which was spent in preparing messages for transmission and copying incoming messages. Contact was made with *KL7s* EAN EOU WAF EKO APH EKS EPL EOA and CHL.

KL7AUV and *KL7BLL*, a husband-and-wife team in Anchorage, spent from 20 to 28 hours on 75 and 2 meters on emergency power on the state c.d. net handling traffic for c.d., State Dept. of Aviation, FAA, various air lines, police and fire departments, Salvation Army and the armed services. "To our knowledge," says Jack (or maybe it was Margie), "the amateur . . . carried at least 80% of *all* communications the first two days."

KL7DVY reports he operated 20 hours on two meters, relaying messages from the Alaska Native Hospital to c.d. headquarters in Anchorage.

KL7EAN operated 75 hours on 75 and 2 meters in the Sourdough Net, handled about 300 messages, mostly originals to the "outside."

KL7CPO in Spenard used his 3-kw. emergency generator to good effect on 20 meter sideband, also spent some time at KL7USA, Fort Richardson, repairing their gear. KL7USA was operated 24 hours a day for a full week. Much traffic was handled with W5PAA in Oklahoma.

One of the best NTS liaison stations was *KL7PI*, whose report mentions only that he spent 36 hours on 40 and 20 meter c.w., handling traffic for civil defense. With whom? With *KL7s* ENC BR ESA, W5IGW, *W6s* ASH CIS, K7JHA, *W7s* DZX JHR DIS and VE7BDJ.

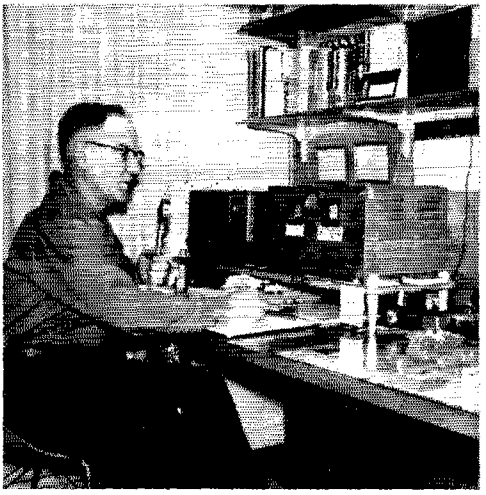
KL7COI runs an FAA radio station at Eklutna, not far from Anchorage, and was all set up with emergency power. He operated about 29 hours on 20-meter c.w., handling traffic with W7AMZ and K6RAU. VK3DQ and ZL3GA assisted in "establishing and clarifying" traffic when frequency got congested.

KL7ENC and *KL7BAP* in Homer, another married team, spent some 38 hours on 75-meter phone and 20-meter phone and c.w. Local telephone service was almost completely disrupted and there was no long distance service because of destruction of the toll center in Anchorage. According to Ed, KL7ENC, c.w. and s.s.b. did the biggest job in bridging the gap. He appends a long list of stations with whom traffic was handled — *two* long to include here.

KL7ARY, Spenard, says that the power failed with the first shock and he was off the air until a neighbor set up a generator for him. Meanwhile, he assisted at KL7CKQ and KL7ENT. All traffic from KL7ARY was outgoing to the "lower 48." All messages carried instructions to be delivered by collect telephone. Senders were asked to request recipients in the "lower 48" to notify others so that only one message per person was filed. Some 300 messages were handled in this manner.

KL7EOU, KL7EJM and KL7EAN set up equipment at a bowling alley in Soldatna, on the Kenai Peninsula south of Anchorage, because emergency power was available there. At first KL7EAN's rig was used, then KL7EJM's rig was installed using the call KL7EOU and KL7EAN got on from his home. VE6NH/KL7 was the principal operator from KL7EOU. Contact was maintained with KL7WAF on two meters. Fifty hours of concentrated operation in the Sourdough and other nets resulted in a good job being done from KL7EOU.

Operation continued around the clock at W6CXO, American Red Cross Western Area headquarters in San Francisco. Shown above during a tense moment are (at left, front to back) W6GHI, W6GGC, K6QKY; at right, WA6TXY (on telephone) and W6JWF.



KL7EIP operated from Juneau, handling health and welfare traffic both into and out of the disaster zone.

A very interesting report from KL7BZO and XYL KL7CZU tells of some of the important kinds of traffic handled. One concerned a patient at Providence Hospital with gas gangrene, for whom a special piece of equipment was needed. W7AY, with whom contact was made, did the "leg" work and finally located the necessary gear at a hospital in Seattle, and arrangements (all by amateur radio) were made to fly the patient from Anchorage to Seattle.

Civil defense originated some messages going to the "lower 48" detailing some of the damage done and requesting supplies. Owners and operators of large industries originated messages with similar information and requests. Messages were received from officials of undamaged cities offering assistance, and Fairbanks sent 700 loaves of bread. The Salvation Army helped set up an amateur message center, where messages to the other states were filed, messages from the other states received and delivered by teen-age messengers. A good job by Ken and Edith Koestler, KL7BZO/CZU.

KL7FB, at Elmendorf AFB, handled some 1500 messages of a military, civilian and personal nature, during the emergency. The commander of the unit responsible for the operation sent a letter of congratulations for the job done by the amateur service, to ARRL President Hoover.

KL7ALA in Spenard operated 48 hours from his home and 98 hours at c.d. headquarters, handling traffic for c.d. and the Salvation Army.

KL7EMP reports he wasn't able to do much, but that KL7EKB working as civil defense net control, did a great deal from his home in Spenard and also from c.d. headquarters in Anchorage, handling hundreds of health and welfare messages to the lower 48.

KL7MF, FCC Engineer in Charge for District #23, spent some time on 40 and 20 meters, phone and c.w., and says the cooperation from the rest of the states was wonderful.

KL7BR operated eight to ten hours on 40- and 20-meter c.w. and handled over 200 messages, most of them *incoming* health and welfare inquiries. Propagation conditions prohibited more extensive operations.

KL7ESW in Cape Yakataga tells us about KL7EPL in Valdez, who lost his home and a son in the disaster but was on the air less than five minutes afterward trying to contact Anchorage civil defense. "All our communications are out here," he told KL7ESW. "Buildings are falling in, water and sewer lines are broken and everything is coming apart." KL7EPL remained in town after it was evacuated, including his family, for over 70 hours, handling crucial communications without regard to his personal welfare or suffering.

KL7DRW, RACES officer for Anchorage, forwards a fine, detailed report of what went on from his vantage point, indicating that in Anchorage itself amateur (RACES) communication was far from disorganized. As soon as the ground had stopped heaving, he tells us, amateurs started gathering their equipment together and putting it into operating condition. Mobiles proceeded to points within and outside the city as directed by a mobile at c.d. headquarters on two meters, to such places as hospitals, Public Works, Defense Communications Agency, military installations, radio stations and other strategic points. Within ten minutes after the initial shock, some of these stations were activated.

But night was approaching, it started to snow, travel was already hazardous because of broken pavement, gas and water lines and fallen buildings. The entire city was without electricity and only one telephone in four was operative. A high-frequency station was activated at c.d. headquarters, operating on emergency power, and contact made with OOD in Everett, Wash., the nearest federal office. Meanwhile, other Anchorage stations started to get on the air and call in to ask for information and instructions. The commander at Elmendorf AFB maintained contact with c.d. by an amateur two-meter circuit.

The remainder of the night was pretty much a nightmare, the report goes on, as tidal wave warnings were being given to other cities, often in the blind. By daylight, amateur radio communication was becoming more and more dependable and was being more and more depended upon, and new operators started to come on to relieve those who had stayed at their jobs all night. The operation settled down, and the days that followed saw many vital messages passed, such as requests and orders for medical supplies, flight information for the Civil Air Patrol, and thousands of messages for individuals notifying loved ones elsewhere in Alaska and the other states of their situation. Amateurs served continuously for a week, then gradually as normal services were restored the nets began to secure and operators returned to their normal duties, subject to immediate recall should more severe tremors occur.

KL7DRW's report lists many amateurs in Anchorage and vicinity who assisted in the over-all operation.[1] He fears that many were inadvertently omitted, but perhaps other reports will pick them up.

KL7EKO in Kenai put in about 35 hours of actual operation on 20- and 80-meter phone, passing 65 messages out of the area to the other states. He was on the air an hour after the earthquake, meanwhile driving through town to assess the damage.

[1] Omitting all stations already mentioned above: *KL7s* ZF HMD/mm ELG EKS APH/mobile EKO EDK ETZ BZB ENV EKU ETD AN IS PJ ZR AIR AHH AKC AKW APV AQU BCH BDG BIM BJD BJW BTP BXK CAH CCL CDG CUK CHO CHV CMQ DDM DDQ DFE DGA CLY DLA DQL DQD DVE DVH DGO EOJ ECW EMG EMY ENQ ERY EVD EQO EQQ ERH ERU EDU TDZ CII, W6VKB/KL7, K7KIU/KL7, WA6MSO/KL7, K5GUG/KL7.

His telephone, one of the few working, averaged a call every six minutes the first three days.

KL7ZF was at his job in the railroad depot in Seward when the 'quake struck. He set up his amateur gear at the General Hospital, where emergency power was available. First contact was KL7PI in Fairbanks, who relayed a message to civil defense via KL7CAH in Anchorage. From that time on for three days, he and KL7CJD were on a 24-hour basis, operating in the Alaska Sourdough Net. When electric power was restored, they returned to the regular KL7ZF location and were soon back on again, although there was no water or heat. There was also no means of communication with the outside world except their amateur station, and they were kept mighty busy for six days. On the sixth day they got some relief assistance from KL7EBK/KL7 in Douglas, and finally succeeded in clearing the hook just a few hours short of a week from the disaster. KL7ZF has special words of commendation for KL7CAH in Anchorage and the following stations outside Alaska: K6HLO, W7CSW, W9JNX, W6GHG, W7DIS, "and many others."

KL7DQL in Spenard operated mostly in the 2-meter RACES net, but did spend some time from his mobile on 75 meters. Travel was very difficult, with wide cracks in the streets making them impassable in some places.

KL7DZE operated for seven days after the disaster on 20 and 75 meters, mostly the former, on a.m. phone, putting in about 30 hours all told. His principal activity was sending out messages for the Red Cross and Salvation Army. Messages were sent to him by auto, because no communications were available in Anchorage. His report, like so many others, says little about what he did, much about the other amateurs who were active.

An interesting report and batch of clippings from *KL7EKZ* tell us that power in Anchorage was restored within 24 hours, water and sewage within a week except for the heavily-damaged Turnagain and downtown area. A city policeman with a multitude of duties, he was not able to participate much as an amateur.

Other Alaska Reports

Although the earthquake was felt within about a 300-mile radius of the assumed epicenter in Prince William Sound south of Anchorage, in many places the tremors caused little or no damage. Many amateurs in Alaska not affected by the earthquake responded to our request for reports and information.

KL7DG, who lives in Anchorage, was on business in Juneau when the earthquake occurred. Naturally, he was concerned with what was going on, and listened at a receiver in his hotel, without being able to transmit. He tells an interesting story:

"It was less than an hour after quake time in Anchorage. KL7ENV of Juneau was directing emergency traffic on the Sourdough Net (3892 kc.), under control of KL7CAH. KL7EBK of Juneau was also handling emergency matters. KL7DRZ had established contact with W7UMU in Seattle and was also working W7UEM. The only station in Anchorage immediately at quake time was KL7ESR, who was caught in his automobile north of Anchorage. Heard from W7UIA that Public Health Services not needed in Anchorage at present time. A relayed message from W7UMX to KL7ENV in Juneau. A message from KL7APH of Kodiak relaying a message from town of Kodiak to the Navy Station 7 miles away via KL7ENV in Juneau, who sent it back to the Navy Station by teletype. KL7DB of Juneau offered assistance, as did KL7RU in Ketchikan and KL7CQF of Haines."

A report from the Communications Officer at Galena Air Force Station mentions that many of the "remote site" stations fanned out on each side of a net on 14,285 kc. handling outbound traffic and accepting incoming traffic. About 168 of these were airlifted to Elmendorf by jet fighters to be delivered in Anchorage.

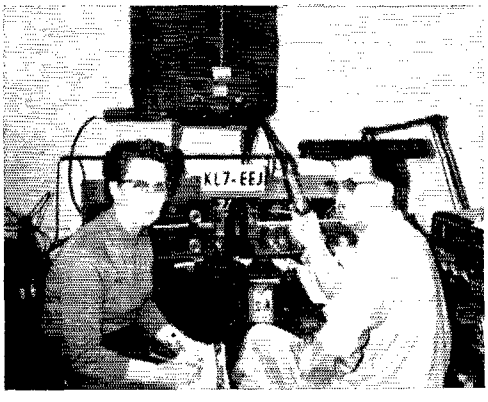
KL7CVB was at an FAA installation in Northway, near the Canadian Border, when the quake occurred. Little damage was sustained there, but communication was disrupted. Unable to get information regarding the airstrip at Valdez over normal circuits, the ham rig was fired up and the required info was obtained from an emergency net NCSd by KL7ENV in Juneau.

KL7EQH at Yakutat handled a few messages for that town and gave some outgoing ones to the Southeast Alaska Net.

One of the more active stations in Juneau was *KL7ELM*. On the air at 2010 PST March 27, this station remained active almost continuously until April 1, acting as a relay station for traffic in and out of several points in Alaska, including Anchorage and other points in the disaster area. A total of 537 messages were handled while all other means of communication, except official military, were cut off.

KL7TEK reports from Fairbanks, which was not damaged by the earthquake, that he handled considerable personal welfare traffic into Anchorage from Fairbanks and other states. Much of this traffic was undeliverable; KL7CNX tried to deliver some of it in person in the stricken Turnagain area of Anchorage, but was prevented by police from going in.

KL7EFN is the station of a military radio club at Shemya Island, far out on the Aleutian chain, farther from Anchorage than many points in the other states. First alerted on Friday, Mar. 27, minutes after the earthquake, initial contact was established with K7DKD. The station originated more than a hundred messages from personnel at the 79th A.S.A. assuring relatives on the mainland that they were safe, and accepting messages from the "lower 49." These messages were put on the mail plane for Anchorage the next day. WA6BTK was the operator at KL7EFN.

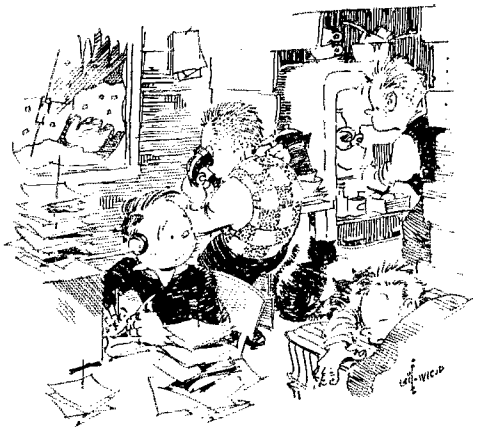


KL7EEJ put in 53 hours handling health & welfare traffic with the assistance of his XYL (at left). This station is located at Galena, 400 miles north of Anchorage on the Yukon River.

Operating at *KL7DNE* on St. Paul Island, one of the Pribiloff group west of the Alaskan mainland, K9ASL spent eleven hours handling direct and written traffic for personnel at the Loran station there, although the Pribiloffs suffered no damage from the earthquake. Incoming messages for the mainland were accepted only when no delivery date was specified.

KL7DTR at Ketchikan operated long hours relaying messages to the disaster area but has no idea how many of them were delivered.

The report from *KL4ZJ*, Fairbanks area, on behalf of her OM, KL7AEQ (he would never get around to it, she says) is almost worthy of a feature article alone. This is true of so many of the reports received! Although Fairbanks was not damaged and did not lose power, Flo tells us that the power in Anchorage went off after the first tremor because of an automatic device in the electric generators which cuts off all power in such a contingency. It's



hard to say who was first on the air thereafter, as stations started getting back on with emergency power. KL7ENV in Juneau assumed control and did an extremely capable job of handling early disaster reports, particularly tidal wave reports which were promptly handed over to the Coast Guard. In Fairbanks, C.D. Communications Officer KL7BET and KL7DIY assigned monitoring frequencies, particularly 3850, 3892 and 3866 kc., known Alaska net frequencies. KL7ENV was assisted by KL7DTH during the first 12 hours as disaster reports poured in. The first call for help from Anchorage came from KL7CQS/mobile, for medical aid and supplies. KL7CQO and K5GEG, both mobile in Anchorage, were on describing damage and destruction until their gasoline supplies ran low. KL7BFB on Fire Island relayed a few important messages into Anchorage on a landline still available. KL7EPL in Valdez was back on the air 30 minutes after the disaster, although he had just lost his 15-year-old son when the entire city waterfront disappeared in a huge submarine landslide. KL7ELS at Hinchenbrook Island served as liaison to Valdez that first night. KL7EKU in Cordova told of a collapsed radio tower, damage to the waterfront and roads; KL7EAN reported from the Kenai-Soldatna area. KL7APH/mobile gave an eye-witness account of the arrival of the huge seismic tidal wave that all but destroyed Kodiak. KL7AEQ (including KL7DCF and KL7AZJ as operators) was assigned as Fairbanks representative in the 75-meter c.d. net. This group stood by all night, passing any information received directly to c.d. headquarters on two meters, whence it was relayed to news media in Fairbanks, thence to the wire services for dissemination worldwide.

By morning, disaster reports from the major towns were in. KL7CAH, NCS of the Sourdough Net, was back on the air and, assisted by XYL KL7BJD worked superhuman hours for a solid week, relieved from time to time by *KL7s* BJW AN and ZR. Reports on the condition of roads, railroads, warehouses and dock facilities were gathered, data on the status of state and federal property were collected, backup communications for military operators were provided and messages from mayors, other city officials, the governor and even the Secretary of the Interior were relayed.

By Saturday night it became necessary to relieve KL7EPL in Valdez, the only active ham in the town. KL7EMH offered her mobile and, loaded with equipment and supplies, an expedition consisting of *KL7s*, EMH, DEJ and DIA made the 12-hour drive over damaged roads and bridges to Valdez. They remained for three days. KL7DIA not only stood regular watches but also repaired most of the radio equipment in town.

KL7ZF at Seward was on the air from time to time, as power obtained from city hospital would permit. This town had just about been wiped out.

The c.d. net carried no "health and welfare" messages in the early stages. Amateurs not otherwise occupied buckled down to taking care of thousands of outgoing messages, and as local telephone systems were restored incoming messages were accepted. Military stations KL7WAH and KL7FAF were active in this phase. *KL7s* AC DJI PE and DUW were participants in Fairbanks, but this is only a partial list. The 75-meter band remained open for the first 24-hours after the earthquake, which was a great and unexpected blessing. When the band deteriorated later, traffic between Fairbanks and Anchorage was relayed by KL7IS-DDB at Lake Minchumina and KL7ECO-ENO in Fairbanks. KL7DIS at Galena also assisted, being able to bounce two-meter signals off Mt. McKinley and contact both Fairbanks and Anchorage on two meters.

Two complete teletype stations were set up in Fairbanks, one at c.d. headquarters and another at the home of KL7ENZ. A crew of electronics technicians, consisting of *KL7s* EUN EVV ETR EVX and DNW, drove to Anchorage to set up a similar station there. One of the stations in Fairbanks used equipment borrowed from KL7CNC and the Engineering Dept. of the University of Alaska, operating 24 hours a day with the call KL7KC, taking some of the burden off KL7AEQ. This was set up and operated by *KL7s* CUS BIL AND and EUY. Many other amateurs served through the small hours on the demanding shifts at c.d. headquarters.

Reports from the "Lower 48"

Where to begin? Response to the ARRL Bulletin over the OBS system has been so overwhelming that it just isn't possible to summarize all reports received. We have gone through the stack and taken out certain reports which seem inconsequential, then gone through them again, and again. This section of the Alaska story is devoted to what was left after the third or fourth culling. We regret having had to leave *anybody* out. It was absolutely necessary.

One of the biggest operations outside of Alaska itself was at the Aeronautical Center Amateur Radio Club, W5PAA, in Oklahoma City. Sponsored by the Federal Aviation Agency, this station was alerted early in the game to the need for establishing contact with the FAA's regional office in Anchorage. Unlike many amateur stations, who seemed to think that the best way to do this was to get on the air and call "CQ Alaska," W5EHC, an old hand at this sort of thing, monitored the 80, 40 and 20 meter bands for several hours to determine if such contact was feasible; by 0230 CST Mar. 28, the monitoring watch was discontinued. A few hours later, W5EHC organized an emergency communications team at W5PAA. There was no shortage of manpower at W5PAA, but contact with Alaska was not easy. Once it was established, first official agency traffic was cleared, then about 40 semi-official messages and about 220 welfare messages were handled before operation was suspended at midnight Mar. 28. From that time on, W5PAA operated strictly with volunteer operators, and before the station secured on April 1, a total of 2942 messages had been handled. All these messages had been carefully screened; there was no "junk" among them. W5EHC mentions a number of amateurs for their outstanding contribution to the operation at W5PAA, and others for their assistance from their home stations.[2]

We find ourselves in the position of giving a thumbnail sketch of a thumbnail sketch of the operation of K6BPC, a station built and equipped by the city of Paramount, Calif., and operated as c.d. and AREC headquarters in the area. The station was activated by SEC K6YCX at 0530Z on Mar. 28, but it was soon determined that Alaskan stations were not yet organized to handle traffic and the station was secured at 0930Z. Activating again at 1700Z, operations began in earnest as the switchboard was flooded with calls. Contacts were established in Alaska, with W5PAA, and schedules set up for handling the traffic through the various nets of the National Traffic System. Operation continued on all bands and all modes, including RTTY, until April 6. A quick tot of the messages handled by K6BPC comes to 4013. Following were the staff at K6BPC: *K6s* TFM JQB LDM YUL HIT GYF, *W6s* FNE QAE LVQ LQZ NSH, *WA6s* DJB AJT TWS GAG KVS ROF CDV, *WB6s* BYL IEK.

W6AM says his 25 acres of rhombic antennas oriented for coverage on 16 directions got a workout during the emergency. For over five hours an RTTY sked between K6BPC and KH6USA was relayed over W6AM with hardly a break or repeat.

K6GHU and K6KCI were in contact with Alaska every day for a week after the earthquake and handled quite a few messages. A Santa Barbara resident supplied an Anchorage telephone directory, which was quite useful.

[2] At W5PAA, not already mentioned in the cut caption and elsewhere, were *K5s* YEM UIM OCX, *W5s* NQF HXL HXT TMY JES AA BUX, WN5HWH. Other assisting amateur stations: K3DKH, *K6s* BPC NCT, WA6MOV. *K7s* FCB FER, *W7s* AG LDR, K8DYX, K1QHM/KL7, K8BJF/KL7, KL7DQC, K5VRF/KL7, KL7USA.

One station who did a lot of work was W6ASH, Wally Reid of Los Altos, Calif. Wally started operating Friday evening, strictly on the c.w. bands. At first he handled only a few messages going to Alaska, via KL7ERL/KL7, then a newspaper article mentioned he was in contact with Alaska and his telephone started ringing. *K6s* YOL EJF, *W6s* KIN JQE and WA6TOG were enlisted to assist; but by Saturday the traffic *from* Alaska was so heavy that most of his originations had to be shelved. Much of the traffic received was telephoned long distance collect, but there was too much of it to deliver it all this way. No one objected to the collect call. Altogether, W6ASH spent a total of 124 man hours and handled a thousand messages during the emergency.

W7CSW also handled quite a bit of traffic on 20-meter c.w. First contact was with KL7ERL/-KL7, who appears to have been one of the first KL7s on c.w., then KL7EUB, KL7ZF/KL7, KL7EBJ/KL7, and KL7MF. W7CSW received many letters of thanks and one of commendation from the mayor of Spokane which he values highly.

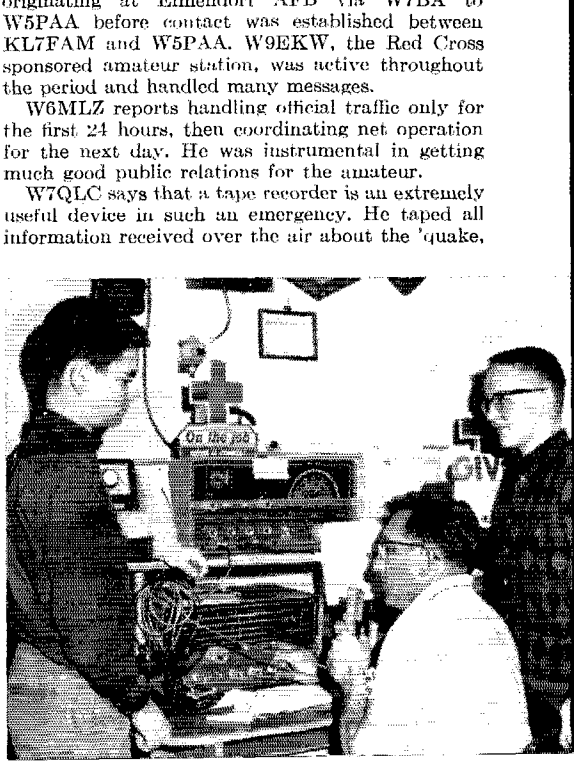
Two independent networks which were active during most of the emergency were the Transcontinental Relay Net (TCRN) and the Weather Amateur Radio Net (WARN), ramrodded by W3CVE and W4BVE respectively. Both managed to give a good account of themselves. W3CVE reports a total of 270 messages handled.

W7DIS of Portland, Ore., said he found the phone bands jammed with confusion on Friday night so he concentrated on c.w. First contact was with KL7PI. In no time, word got around and W7DIS's telephone began to ring. Although he discouraged originations and finally accepted some only with the understanding that they might be delayed, he wound up on April 13 having handled 1371 third party Alaska messages, all on c.w.

There was quite a bit of activity in the Milwaukee area, as reported to us by EC K9KJT. From March 28 thru April 2, 42 amateurs of the Milwaukee AREC were involved in the handling of message traffic concerning the Alaskan tragedy. W9GPI handled some "high priority" messages originating at Elmendorf AFB via W7BA to W5PAA before contact was established between KL7FAM and W5PAA. W9EKW, the Red Cross sponsored amateur station, was active throughout the period and handled many messages.

W6MLZ reports handling official traffic only for the first 24 hours, then coordinating net operation for the next day. He was instrumental in getting much good public relations for the amateur.

W7QLC says that a tape recorder is an extremely useful device in such an emergency. He taped all information received over the air about the 'quake,



W9AB, club station of the Michiana Amateur Radio Club of South Bend, Ind., handled some 300 messages to and from KL7s during the emergency. That's WA9HEC operating, K9DVZ at left and an SWL assistant.
South Bend Tribune Photo.

noting on the counter the location of information about each locality; then when someone inquiring called, he simply played it back to them on the telephone.

Many individual reports have been omitted entirely, but we hope we have picked up the calls of every participant reported to us, for listing at the end of this article. If not — well, we're human!

National Traffic System

Not much has been said above about the part played by NTS during the emergency. Actually, the system was very much in operation, although Alaska has not previously been noted for its representation in the Seventh Region Net (RN7), of which it is a part. Nevertheless, RN7 went on continuous operation and contact was made with Alaskan stations as possible. At first some traffic for Alaska was handled, but as the situation developed it became necessary to stack such traffic in order to take care of traffic coming down.

Although NTS emergency procedures had not at this time been specifically delineated, the system in general swung into action to support the situation. The Pacific Area Net and nets were activated as the traffic situation required, and NTS nets elsewhere in the country went on extra or special sessions as seemed required by their respective managers. However, the extent and quantity of traffic being originated was such that it was just not possible for any one system to handle it all. Special schedules were made with "iron men" and club stations and Alaska stations to take care of much of the overload. RN7 Manager K7JHA states that their participation added to the confu ion, but it was an organized kind of confusion, the aim being to handle as much as possible without hope of being able to handle it all.

Whatever else can be said, it is definitely a truism that March traffic on NTS ended with a high peak, and April traffic started off with a bang! NTS has nothing to be ashamed of, despite the groaning of some of its leaders, for its performance in this emergency. For the most part, it just continued to operate, tried to handle the big traffic load in its stride and discovered that this was impossible. With some pre-planning, much more could have been accomplished, and if we are permitted to do the necessary planning we'll be better prepared next time; not perfect, but better.

Publicity

More than any emergency in many years, the Alaska earthquake has afforded the amateur good favorable publicity. This emergency was tailor made for the purpose, and, tragic as it was, it came at an opportune time, when the status of amateur radio is under scrutiny, both by us amateurs and by our government and foreign governments. The front cover of this month's *QST* contains a montage of just a few of the newspaper clippings received, and those received were just a few of the ones which actually appeared. In addition, good coverage was afforded on radio, TV and other media. There are only about 250,000 people in all of Alaska, but it seemed that everyone in the "lower" 48 states had a relative or friend up there that he was concerned about. We amateurs served many of these people, and they won't soon forget it. This is something we can be proud of; at the same time we bear in mind that what we did is only a small fraction of our real potential with some real dedication, effort and preparedness.

Miscellany

As we write the conclusion of this article, we are conscious that many details of this operation have been completely omitted. Some of this is understandable, because we cannot write about that which we have not heard. Some of it just had to be blue-pencilled on an arbitrary

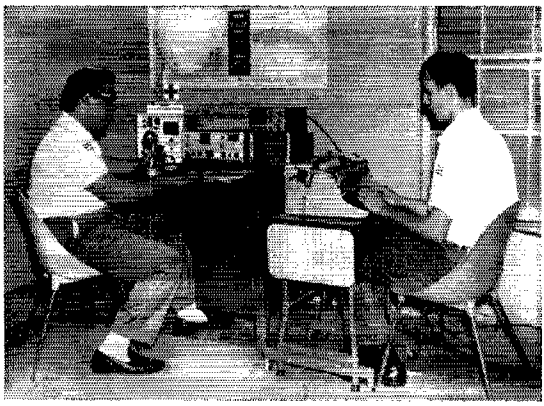
This is part of the crew at W5PAA, station of the Aeronautical Center A.R.C., where an outstanding job was done handling Alaska traffic for the FAA and others. From left to right are W5NQF, W5AZO, W5EUL, WA5FFL (rear), W5EMP (front), W5UYQ, K5YTB, K5PBE, KL7EUM, W5EHC, K5LIL, W5LOW, W5JES, K5YEM, KL7DRG, W5UZX. *Official FAA Photo.*

decision of triviality. Some, indeed, that we have already written will have to be cut to fit the space available. If the precious detailed report you submitted has seemed to have met this fate, while others you feel are not so important as yours were included, please bear with us. It isn't easy to compile this kind of a report. Meanwhile, here are the call letters of the remaining stations known to have had a part in the Alaskan emergency that were reported to us but have not previously been mentioned.

KL7s AFR AIZ AKB AKO ALJ AM AMH AMS ANT AOJ ASR AVD AVT AVX AWR AZN BAR BCS BF BFD BJC BJI BJV BLZ BNL BNY BP BPL BRX BT BUS BVY BW BX BYA CCI CDE CDH CDJ CEV CEW CGE CGF CHG CHQ CHT CJD CJF CKC CMQ CNQ CNW CNX CRR CSF CSR CUY CVX CWO CYD CYL CYU DA DBT DEX DGZ DIR DJE DJX DJZ DKS DL DMQ DNE DOB DPJ DQW DR DRU DT DTJ DTK DTO DUE DUF DUJ DUW DWE DX DXZ DYK DZF DZH DZI EAO EBH EDC EDH EEL EEO EEY EFG EFH EIS EJL EKQ ELF ELS EMA EMQ EMT END ENE EOB EOT EPS EQP EQV ERD ERG ERI ESA ESC ESF EST EUA EUW EUX EVT EWG FAI FAR FB FBD FBI FBK KBU FDA FW IR JHA JL KC KNE KRE LM MU PE PKS RMT SC SR SVO TE TGA TGN THD UW VJD WAI WAS YO.

Stations operating portable KL7: K1AII K3BIZ K4AWR *W4s* LKC QBN *W5s* CDB OEG K5VR W6DQ WA6OTB *W7s* HAH HMD LAN SFX *K7s* KYA RAR *K8s* DJF VJF WØYXY.

Stations who were reported as having been in direct contact with Alaska: *W1s* FAI KUX/6 KWX VP, *W12s* JBR RAU, WB2AIZ, *W3s* BFF CUL ELI GNQ URS WEU, K3QMF, *W4s* KEN/6 RBZ SIY/5, *K4s* AKP/6 BDF FZJ HYL ICA IGN KYU LAN NRZ SMB SOM UMD VFY, *W14s* ECY EPF HCI HCL IJH IRR KLT MBZ OQG RCL, *W5s* AIR DNE DRW EY/6 FJG FRW/5 KC VW ZPD, *K5s* CRM GGG HXR HZR ILL JLI PEV UOD *W15s* ABA BSB BSD BUC BUV FVH, *W6s* AUQ AUT AYN BF BN EUK HLH HLM JF JJP JKJ JNX JTA JXY KLG KOB LED LIP LNH LYC MSW NAZ NCP OFS OJW OYJ OYV PHT PLS PWG QOE QR QUC QVO RKP RVN TMX UNF VNM VOZ VRC VTF WRJ WTV WXG YCX YGJ YH YJT ZZC, *K6s* ALL BFX BYS CBZ CCY CRZ CYG DH DVD DZV EOO EQP FDG GEF HCF HVP KCH LIT LFH LS LWE NCG OBA OJJ OSG OZV PRT QIB QJM QQE QWO RBO RIR RMT RUA UGW USN UTO ZZB, *W16s* EDI EUZ FCR FEF FFS GFY HFU HSQ HUF IPG ITI JUL KDZ LMF OBC OET OJY PIR PKF QPM RCY RTF SDS SMT SYS TEV URZ WAS YAL YNL YPV ZVR, *WB6s* CIN CGA FBN FJA/KH6 FQO FUI FVZ GGS GLD IEA, *W7s* AC ADS AEC AEP AIB AQB AUB AV AVT BEW BFI BGH BRG BOZ CBB CMO CUL CWC CZY DEJ DJA DKD DON DQM DXN DXV DXX EFF EFJ EHW FCH FCU GC GGV GHD GKG GOU GPM GWA HCO HGJ HJU IBQ IDI IG IKG JAY JEN JHA JUT JWJ KCZ KWX LEB LIO MBO NAF NJF NPM OEB OES OFK OOF/6 PHG PHO PJO POH PSD PZO RNK RXM SFF SXP TLB TPG UGO UIT UL UWT UX VAS VDR VET VNI VRO VWO WBC WHX WNH WOK YH ZGC ZOH ZT, *K7s* AM ASV AV AYQ BAZ BVM BYH CAZ CHG CZM DAH



WA5AOO and WA5AXS operate Galveston County AREC station W5MTI, sponsored by Galveston County (Tex.) Red Cross.

DTR DWT EGJ EGX EXT FCU FDB FER GJN HNT HSF HRW HWW INQ ISW JBZ JUT KAK KWO LOQ LWY MAS ML MLO MSL MZC NDY NHV NKK NTG NTS NZO OGF OKL ONZ OQF PKV PMM PQM PTK PXA PXD QBR QEO RJV RMT ROE ROH SWL TBR TCL THD TNE TNP TSD TTW UHR UNO UXF VCK VGW VJJ VON WBC WFL WTN ZED ZIK ZQA ZRF ZUW, W8WA, *K8s* HPO KWB/KH6, *W9s* BJH BUQ FST GDM PXX SWD ZIB, *K9s* ASL BCQ EBA FXV JXE, *W10s* BVL CHY DTY FEQ GQT GWZ HCI, *WØs* BDY EQ KCK NWX PQ SIN TSN WWU, *KØs* MBU PQW, *W10s* BES CRQ/7 EBH FAS FIN HTZ, *KH6s* AX DDS DJI GF, KR6MB, KC4USX, KA2HQ, *VE3s* CTJ EO NG UR, *VE4s* UK UM, *VE5s* GO GU, VE6VG *VE7s* AZ BDF QN, *VE8s* AO and EW.

The following stations were also reported as being active during the emergency: *W1s* AVY DEO ESG FYE IMY JGR LES MBL NF NFK OKG OTG PEX SA WI YNE ZLX, *K1s* EIC EIR JMV KSG NKV OKG OYP QAH SDX SSH WJL WKH WXN YDY, *W2s* CZR EW HYM ICZ KYA NW PQC QHH QWS RUF, *K2s* EBX HAN/4 MGE MGR MHX QNX SBV/Ø SJN UBG UHD, *W12s* ALF BIT DHF FYE GPT JZE LQO MHY OOO OCA QEG RGR TAQ UOO VKK VYS YBL ZAK, *WB2s* CSS DEP FXB, *W3s* BHK ECP GJD JSA MVB QV VAM/6 VAN/6 VR WV, *K3s* BGX CVG DKH DFS HNP KZB/6 MQE NPV OHR PIE QDD QJJ QNT QOK RGB SGD SGE SMT TDR UFY WEV YPL, WA3ACN, *W4s* ACY AKC BEW BKC BMC BUZ CJD/7 CPI DLE FP FQP HBQ IHY IKM IYT JD KIS KXM MLH MXU MZK NLT NML OVO PIM PLL PNM PQL RHZ RQP SEH UTW VFY VWW WKP WNC WXB YER YJM ZBA/6 ZBU ZCU ZIR, *K4s* ANJ BSK CRU CWZ GHS GHX IAG INC JVV KRG KJD MSM MSS NAA NSU PVZ QCI QMT RHL THT TNS UIZ ULT VIJ WOP ZTT ZXS, *W14s* ALB AVM AWG BAW BRW BSO CJV DAD EUL EXA EXC FXE HCW HEN HFE HGN IHJ IUM KDE PDS PFQ, *W5s* AFL AKR AP BAR CRA DRZ EHC ERY EUV FQG FWZ GZU IGW IWG JA JCY JMY JVJ KFI KJH LCI MGA MOY NUQ OMS PDO QVE

(*Continued on page 160*)

A Complete Mobile Package

— *Part II* —

BY L. JACQUES FILION,* VE2AES, W6

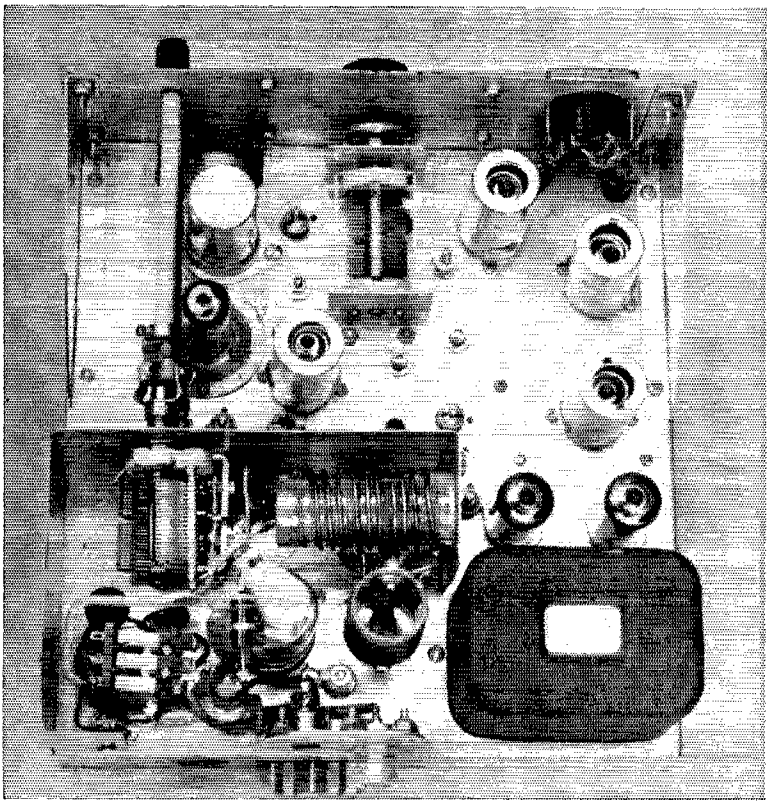
The first part of this article, which covered the circuitry, appeared in the June issue. This second and concluding part covers the construction and adjustment.

As WITH other compact equipment, a certain amount of patience is required in the layout and assembly. Each step should be checked and double-checked as the construction progresses, since it may be difficult to compensate for errors after the unit is completely assembled and wired. The photographs should be studied carefully,[1] and the placement of components followed as closely as possible. This is not to say, however, that a fair fraction of an inch is of significance so long as there is room for all components.

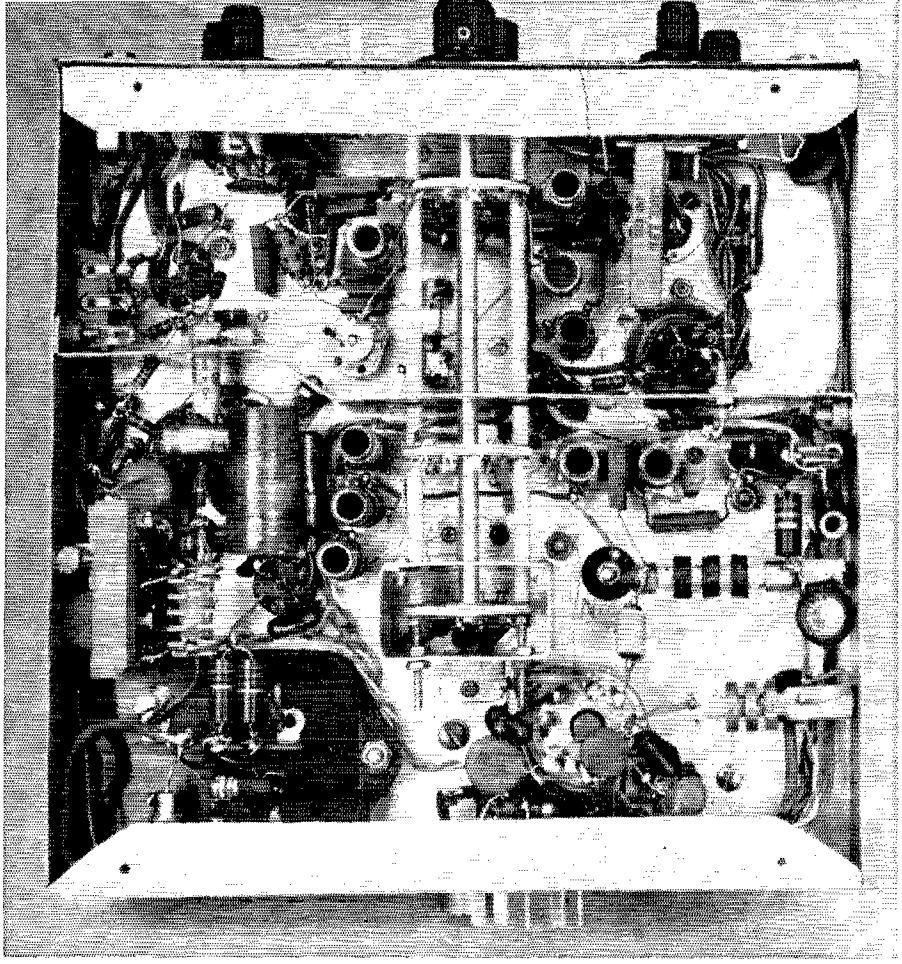
The transmitter, converter and power supply are constructed as separate units which are eventually tied together electrically and mechanically to comprise a single package. Before making any start on construction of the unit, it is recommended that one first determine what he will use as the housing for the transmitter, and make a chassis to fit this enclosure. It is probably

* 16100 Sunset Blvd., Apt. 13, Pacific Palisades, Calif.

[1] 8 × 10 glossy prints are available from ARRL at a cost of $1.50 each, postpaid.



Top view of the transmitter chassis. The v.f.o. tuning capacitor C_1 is centered on the chassis and mounted on aluminum brackets that will raise the shaft to mate with the hub of the v.f.o. dial. The v.f.o. coils are then grouped around the capacitor. The 6CL6 v.f.o. tube is to the right of the tuning capacitor, and the 5763 driver tube and 0A2 regulator to the left and rear of this capacitor. The electrolytic capacitor between the 0A2 and the drive control, R_1 (the latter may be seen through a cutout in the chassis), is the one near the 0A2 in Fig. 1. The output-stage components are behind the shield at the lower left; C_6 is mounted directly over C_7 on the forward wall of the shield which also provides a mounting for L_6. L_7 is mounted on a short insulating post attached to the chassis. A metal bracket at the rear of the chassis serves as a mounting for both the coax output connector and the receptacle for connecting the input of the converter to the change-over relay in the lower left corner. The audio components are mounted along the right-hand side of the chassis, with the 12AX7 nearest the panel, followed by the 12AU7, modulator tubes and transformer.



Bottom view of the transmitter chassis. The lateral shield partition separates the v.f.o. and buffer/multiplier circuits. In the top compartment, L_1 and C_2 are to the left of the switch. To the right of the switch are, from top to bottom, L_4, L_2, and L_3. C_3 is under the switch. In the lower compartment, from top to bottom, to the left of the switch, are the L_5 coils for 20, 40 and 80 meters. The coils for 15 and 10 are to the right of the switch, above the tubular neutralizing capacitor mounted in a rubber grommet. Notice that the last section of the band switch, S_{1D}, is enclosed in a shield.

wise not to attempt to use a box of dimensions smaller than those given previously. I used a discarded cabinet from a c.b. transceiver (General Service in Canada), and made the chassis from 16-inch aluminum transcription records after removing the acetate coating. Since these records are usually hard to come by in these days of tape transcriptions, it will probably be necessary for most others to use regular sheet aluminum approximately 1/16-inch thick. Provide flanges or lips at the front and back of the chassis for attaching the power-supply and converter units to the bottom of the transmitter.

Select or make chassis for the converter and power supply that will, when combined, match the bottom area of the transmitter enclosure. The power-supply chassis should be shorter than the converter chassis to allow space for the transistor at each end. In the original model, the converter chassis is 2 by 9 by 5 inches, while the power-supply chassis is 2 by 8 by 4 inches. Both of these are standard items from Payette Radio Ltd., 730 St. James Street West, Montreal, Quebec.

Do as much of the wiring as possible as the components are mounted.

The iron-slug forms for the converter coils were obtained from Etco Electronics, 464 McGill St., Montreal, Quebec. They come in the form of a surplus replacement kit for 21-Mc. i.f. circuits (25 forms for $1.49).[2] The planetary drives used for the converter and v.f.o. tuning controls were obtained from the same source (part No. HM-105), and may also be obtained from Arrow Electronics in the United States. Space limitations precluded the use of a tuning dial on the converter. However, this has not proven to be as much of a disadvantage in practice as might be expected. If one wishes to know in what part of the band he is tuning at any time, he can turn on the v.f.o. (S_3 in the TUNE position) and tune the v.f.o. to the receiving frequency. The frequency can then be taken from the v.f.o. dial.

[2] Minimum mail order $5.00.

Transmitter Adjustment

Firing up the transmitter is always an exciting moment. But before turning on the power supply, it is recommended that the various tuned circuits be adjusted to their approximate respective frequencies with the aid of a grid-dip oscillator. Then only slight touching up will be required after power is applied.

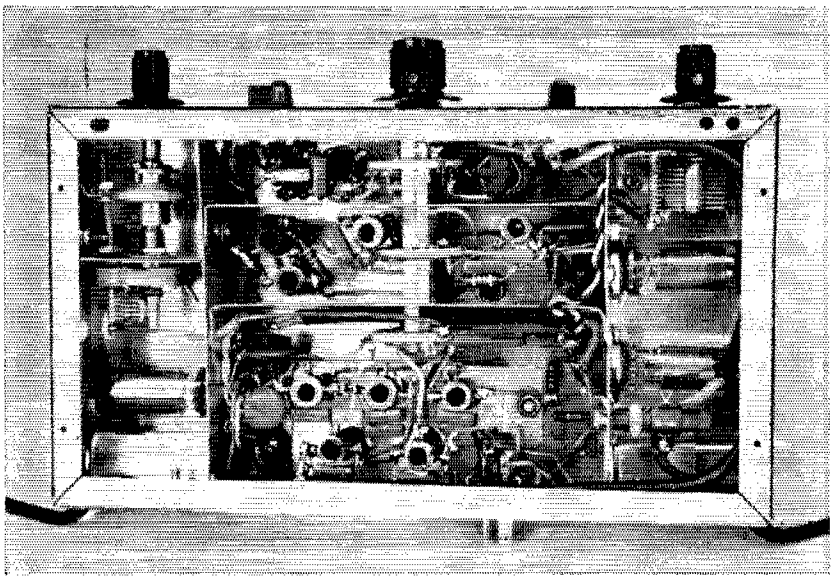
The v.f.o. circuits are probably the fussiest to adjust. The two circuits can be adjusted to cover the proper frequency ranges, and the dial calibrated by listening to the v.f.o. signal on a calibrated receiver. Turn S_2 to the TUNE position while making these checks. With C_2 (or C_3) set at mid-capacitance, set C_1 to maximum capacitance and adjust the coil slug (in each case) until a signal is heard at 7000 (or 3500) kc. Then turn C_1 to minimum capacitance and check the frequency at the high end of the band. If the frequency is too high, increase the capacitance of C_2 (or C_3), turn C_1 to maximum capacitance, readjust the coil slug for a signal at 7000 (or 3500) kc., and recheck the high-frequency end. If the first check shows the frequency at the high end to be too low, follow the same procedure, except *reduce* the capacitance of C_2 (or C_3).

Before peaking up the 5763 input and output circuits, the high-voltage line that runs from the modulation-transformer secondary should be temporarily disconnected. Start out the adjustment at 7 Mc., setting the v.f.o. to 7.2 Mc., and peaking up L_3 and L_5 for maximum final-amplifier grid current. Then switch to 80 meters, set the v.f.o. at 3.8 Mc., and adjust L_5 for maximum grid current. For the 14- and 21-Mc. bands, set the v.f.o. to 7.1 and 7.07 Mc., respectively, while adjusting L_5 for maximum drive to the final. On 28 Mc., set the v.f.o. to 7.2 Mc., and adjust L_4 and L_5 for maximum grid current. It should be possible to obtain 4 ma. of grid current on all bands (with R_1 set for maximum drive), although 2 to 3 ma. should provide adequate excitation.

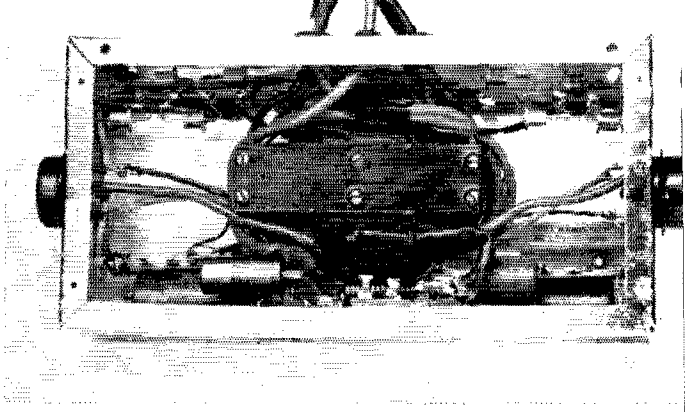
Before reconnecting the high-voltage line, the final amplifier should be neutralized. Turn the band switch to the 10-meter band, and switch the meter to read grid current. Now turn C_6 through its complete range while carefully watching for any flick in grid current. Adjust the neutralizing capacitor C_5 a bit at a time until the flick disappears. The high-voltage line may now be connected permanently.

In tuning up the final amplifier, a dummy load of some sort is needed. If nothing else is available, a 25-watt lamp will serve. (You may not be able to load the amplifier to maximum allowable input on all bands, but the lamp will provide sufficient loading to protect the 2E26 while checking the tuning.) Keep the amplifier tuned to resonance by adjustment of C_6 for minimum cathode current for any setting of C_7. By adjustment of C_7, always followed by an adjustment of C_6 for minimum cathode current, the loading on the final amplifier can be varied. The loading should be limited to the point where the cathode current is about 60 ma. after a final adjustment of C_6. Allowing for screen current, this represents a plate input of about 28 watts.

With phone operation, the audio gain control may be advanced to the point where the modulator cathode current just begins to show a slight upward kick on voice peaks.



The converter is built in a chassis measuring 5 by 9 by 2 inches. In the compartment to the left are the oscillator tuning capacitor, C_9, driven by a vernier mechanism, and the i.f. tube and output transformer T_3. In the compartment to the right are the antenna trimmer C_7, the r.f. amplifier tube, the 12AD6 converter tube, the 1600-kc. trap and the i.f. input transformer T_2. The center area is divided up into compartments which house the r.f. coils at the top mixer coils at the center, and oscillator coils at the bottom.



The power supply is enclosed in a 4 × 8 × 2-inch chassis. The rectifiers are mounted on terminal strips in two groups of four each in the upper corners. The transistors are mounted at opposite ends of the chassis. This chassis and the converter chassis are bolted to the bottom of the transmitter cabinet in the final package.

Table I

Converter Coil Specifications

	L_{13}	*Turns*	*Wire*	C_8	R_4	*Approx. L*
3.5 Mc.		50	36[2]	100 pf.	22K	14.5 μh.
7 Mc.		30	36[2]	75 pf.	33K	5 μh.
14 Mc.		16	20[2]	40 pf.	22K	2 μh.
21 Mc.		12	20[2]	50 pf.	47K	0.75 μh.
28 Mc.		8	20[2]	None	None	1 μh.
	L_{14}	*Turns*	*Wire*	C_{10}[4]	*Link*[5]	*Tap*[6]
3.5 Mc.		60[1]	20[2]	120 pf.	14	—
7 Mc.		35	20[2]	132 pf.	8	—
14 Mc.		10	20[2]	270 pf.	—	2.75
21 Mc.		6.5	20[3]	260 pf.	—	2
28 Mc.		5.5	20[3]	100 pf.	—	1.5

All coils are wound on $\frac{5}{16}$ × 1¼-inch iron-slug forms. See text. Forms ⅜ inch in diameter may be substituted, although a slight reduction in turns may be necessary in some instances.

[1] 1½ layers.
[2] Close-wound, enameled.
[3] Close-wound, plastic hookup wire.
[4] Silver mica; may require parallel combination to obtain correct value.
[5] Close-wound at ground end. Must be wound in same direction as L_{14}.
[6] Turns from ground end.

In mobile operation, the unit is used with a center-loaded whip tuned to resonance for each band, and fed with a 19-foot length of RG-8/U. If the unit is used in fixed-station operation with a random-wire antenna, an antenna tuner should be used. This will require the external connection of some additional output capacitance in the pi-network circuit.

Converter Adjustment

Before applying power to the converter, the iron-slug coils should be checked with a g.d.o., and adjusted so that each circuit resonates at approximately correct frequency. Adjust L_9 and L_{10} for the centers of the 80- and 40-meter bands, respectively, with C_7 set at about mid-capacitance. Also adjust the L_{13} coils for the centers of each band. With C_9 set at about half maximum capacitance, adjust the L_{14} coils for resonance at approximately 1600 kc. higher than the centers of each band except 10 meters. On the latter band, the oscillator is tuned 1600 kc. to the low-frequency side.

Now connect the converter to the car receiver, tune the receiver to approximately 1600 kc., and apply power to the converter. Using the g.d.o. as a signal generator, couple it to the input of the converter, and tune it to the middle of the 80-meter band. Tune in the signal with the oscillator tuning control, and adjust all circuits for maximum output from the car receiver. Then touch up the tuning of the car receiver for maximum response. Now set the g.d.o. for one end of the band and then the other, and make any adjustment in L_{14} necessary to cover the band. Then check the input circuit to make sure that C_7 covers the band, readjusting L_9 if necessary. Repeat the procedure for each of the other bands. As a final adjustment, peak the antenna trimmer on the car receiver for maximum noise or signal. If you find that your i.f. is tuned to the frequency of a strong local b.c. station, try to cut it out by adjustment of the antenna trap. If this is not successful, you may have to shift your i.f. slightly which, in turn, may require touching up of all converter circuits. QST

"BLACK BOX" FILTERS

Technical Editor, *QST:*

It has been reported to me that one of the New England surplus dealers who advertises regularly in another amateur magazine has answered queries regarding the availability of the FT-2409 filter used in "The Black Box," page 41, *QST* for February 1964, by replying that this filter is the same as the Navy FL-8, which he offers for $3.00 each.

Readers are warned that the FL-8 in no way resembles the FT-2409 as to shape factor, circuitry or components, and is of no value in this application.

To the best of my knowledge all presently-available stocks of the FT-2409 unit are exhausted, — *G. L. Countryman, W4JA1, 75 East Bay St. Charleston, S. C. 29401.*

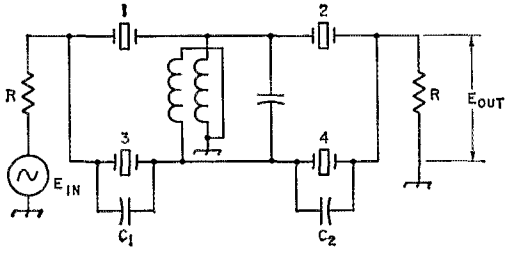


Fig. 1 — The hybrid crystal filter.

FILTER DESIGN Ă LA COMPUTER

Technical Editor, *QST:*

One of the most difficult problems to be solved when building s.s.b. equipment is the filter. The usual technique is to take a number of FT-243 crystals, select matched pairs, and hope for the best. Strange to say, one usually manages to produce a passable filter. However, more often than not, queer unexplainable little humps and dips appear where they are not wanted, and one either lives with them or resorts to the time-honored method of cut-and-try. This is not to be despised, but moving crystals around is a hazardous occupation and one's pile of spare crystals tends to diminish in size.

Having been through all this, I decided that it might be easier to cut-and-try on a computer. The transfer function (output volts ÷ input volts) was calculated for a hybrid filter, and, having access to a small electronic computer made the game easy. The filter is shown in Fig. 1, and in the calculations the bifilar-wound tuned circuit was assumed to have a very high dynamic impedance (i.e., low C and high Q) and perfect coupling between the two halves.

The crystals were typical FT-243 types, with a built-in shunt capacitance of 10 pf. and a pole-zero spacing of 1 kc. at 5 Mc.

Fig. 2 shows the effect of the terminating resistor. The crystal frequencies are shown by the four arrows. It is of interest to note that there is an optimum value for the terminating resistance — in this case, about 2000 ohms. Values substantially above or below this produce ripple in the passband. It obviously pays to adjust the termination for minimum ripple.

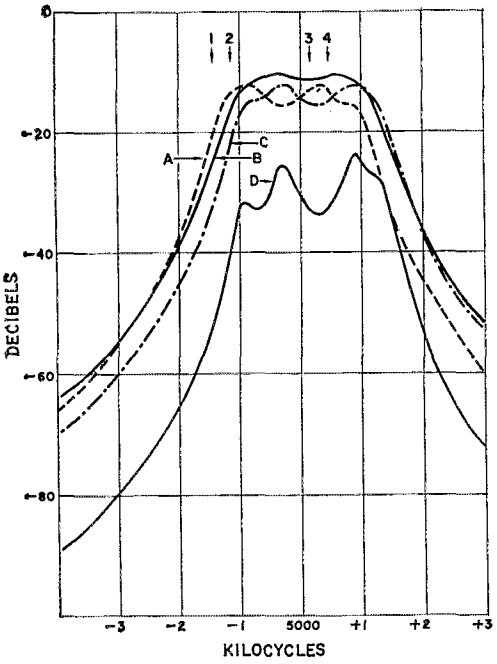


Fig. 2 — Crystal Q = 20,000. $C_1 = C_2 = 0$. Curve *A*, R = 500 ohms; Curve *B*, R = 2000 ohms; Curve *C*, R = 5000 ohms; Curve *D*, R = 50,000 ohms.

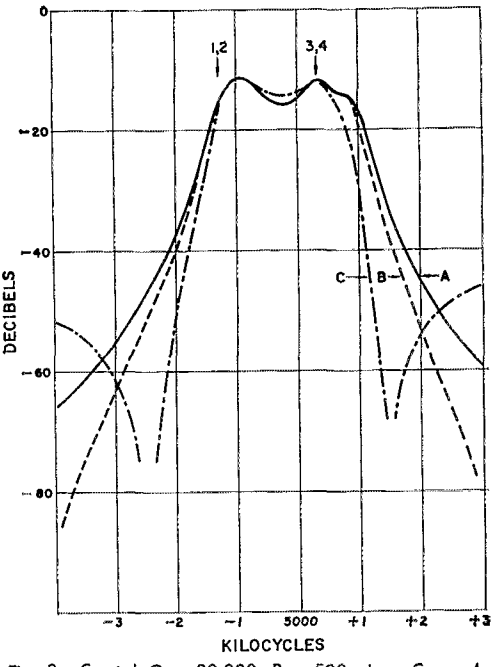


Fig. 3—Crystal Q = 20,000. R = 500 ohms. Curve *A*, $C_1 = C_2 = 0$, Curve *B*, $C_1 = C_2 = 2.0$ pf.; Curve *C*, $C_1 = 2.0$ pf.; $C_2 = 5.0$ pf.

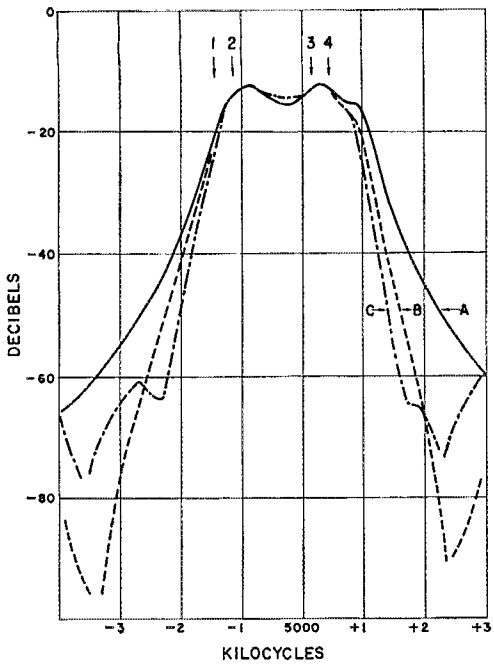


Fig. 4—Crystal Q = 20,000. R = 500 ohms. Curve A, $C_1 = C_2 = 0$; Curve B, $C_1 = C_2 = 1.0$ pf., Curve C, $C_1 = C_2 = 5.0$ pf.

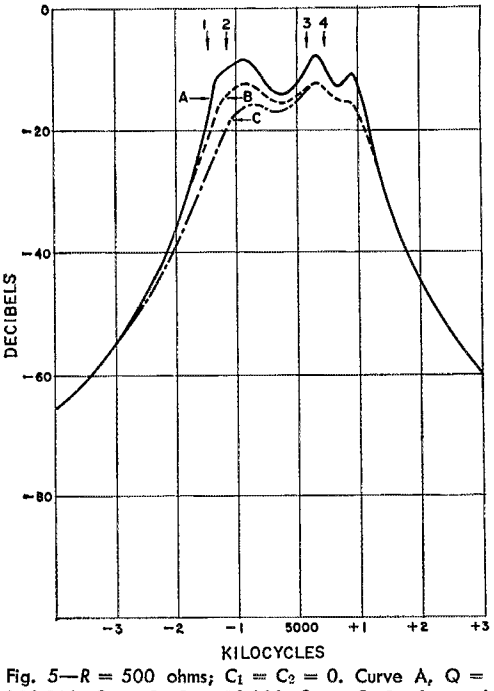


Fig. 5—R = 500 ohms; $C_1 = C_2 = 0$. Curve A, Q = 100,000; Curve B, Q = 20,000. Curve C, Q of crystal 1 = 5000, Q of other crystals = 20,000.

Figs. 3 and 4 show the effect of shunting the high-frequency crystals with extra capacitance. The skirt selectivity improves as the capacitance is increased, but if one goes too far the side lobes become objectionable. It is interesting to see that adding capacitance doesn't greatly affect the shape of the passband.

Fig. 5 shows the effect of varying crystal Q. In particular, curve C shows what happens if one of the crystals is less active (lower Q) than the rest. It simply depresses the corresponding side of the passband.

From all this information, a theoretical filter was designed with optimum termination and optimum crystal shunting capacitance. The result is shown in Fig. 6.

Taking an accurately-matched set of crystals and terminating the filter with 500 ohms would have produced curve A, Fig. 3. Staggering the crystal frequencies a little, adjusting the termination to 2000 ohms, and shunting the high-frequency crystals with 3 pf., produced Fig. 6, which is a marked improvement and looks more like a bought one.

For anyone who is interested in further experimenting, I can supply the program, which is written in Fortran 2. It takes about four minutes for an IBM 1620 to compute each curve. Fig. 6 is not claimed to be the best possible combination of parameters, but it is a reasonably good one. — *David S. Robertson, VK1ATR/5RN, 128 Schlick St., Yarralumla, Canberra, Australia.*

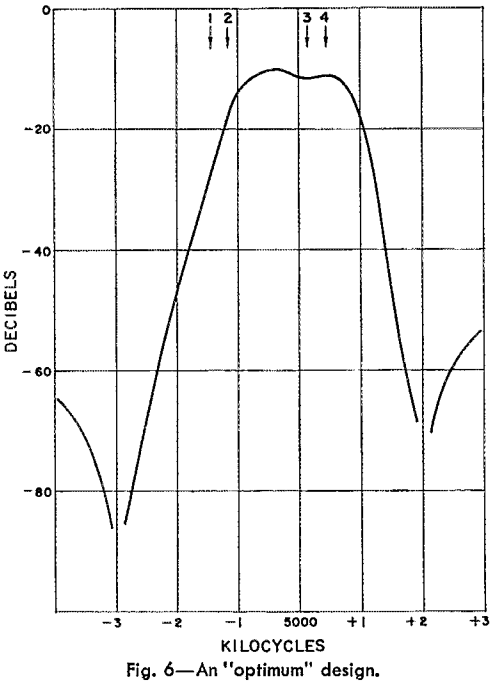


Fig. 6—An "optimum" design.

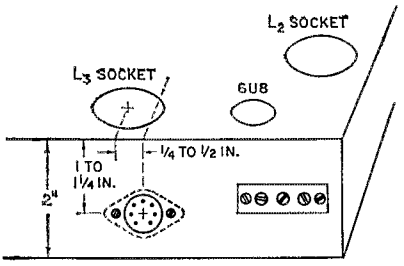
THE HBR-11/12

Technical Editor, *QST*:

In the HBR-11/12 article which appeared in the April 1964 issue of *QST*, the following errors occurred: On page 36, in the modified a.g.c. circuit diagrammed in Fig. 2, it is the upper section of S_4 (the V_5-V_6-V_{8A} line) which should have appeared in dotted lines. On page 37, the fundamental-type 14-Mc. L_3 coil data should have included C_4, a silver-mica 100-pf. fixed padder.

In my word picture of the correct location of the 6BH6 electron-coupled first oscillator, I was quoting center-to-center figures. In other words, the center

of the 6BH6 tube socket should be located approximately 1 inch below and ¼ inch to the left of the center of the L_3 coil socket, as viewed from the front. Not that the location of the 6BH6 socket is critical to the extent some readers seemed to believe. For example, the center of this socket could be located 1¼ inches below and ½ inch to the left of the center of the L_3 coil socket, with no harm done. The accompanying front-end sketch should remove all doubt as to what it was I was driving at in the original text. Definitely, I recommend the superior performance of the 6BH6 electron-coupled first oscillator, as compared to the original triode first-oscillator arrangement.



Placement of 6BH6 socket in HBR-12, as viewed from rear of chassis.

My comments regarding the substitution of the large No. 898 Eddystone dial in the HBR-11/12 receiver apparently did not make it sufficiently clear that not only would the drawn-to-scale drilling templates for the June 1961 *QST* HBR-16 receiver be of great help in making this transposition, but in addition, the explanatory manuscript in this same issue would be equally helpful. Both the templates and the text of this particular article should be secured prior to attempting to install the large No. 898 Eddystone dial in the HBR-11/12 receiver. The drilling templates still are available, but back issues of June 1961 *QST* no longer are obtainable from the ARRL. It is to be understood that the No. 898 dial version of the receiver is mechanically much more difficult of fabrication than is the No. 598 Eddystone dial model, and for this reason I suggest that it not be attempted by the relatively inexperienced.

In my comments regarding the importance of correct physical placement of all of the various fixed resistors and companion bypass capacitors used in the HBR-11/12 front end, I erred when I used only the cathode circuits of V_{1B} and V_{2B} as possible and probable examples of unsound wiring practice. Some readers apparently then understood that it was only the cathode circuits of the various front-end tubes I was referring to. Far from it. Instead, when I wrote "all front-end fixed resistors and companion bypass capacitors" I meant exactly that; not only the cathode circuits, but each and every additional circuit as well, be it grid, screen, plate, or what have you. Furthermore, when I stressed the importance of this type of sound practice in the front end, I thought it would be understood that similar wiring techniques would be in order in the remainder of the receiver.

I often have written that the L_1, L_2 and L_3 windings should not be cemented into permanent position until the builder was certain that all of the coils had been correctly adjusted for proper bandspread, perfect tracking, and optimum coupling. I still am of the same opinion. However, this does not necessarily mean that I believe it requires an experimental period of ninety days or more before such finalized adjustments can be made. Immediately any set of three coils is completed, the over-all correct adjustments should be made, and the windings cemented into position. Just so long as this is not done, just that long will the performance of the coils be erratic, and subject to frequency change due to mechanical as well as thermal causes.

What is the approximate cost of the HBR-11/12 receiver? With all new specified parts, complete with tubes, crystals, and the front-end coils for any one band, slightly more than one hundred dollars. Front-end coils for each desired additional band cost approximately six dollars per set of three coils. — *Ted Crosby, W6TC, 38901 Crosby Drive, Sun City, Calif.*

RADIATION ANGLE

Technical Editor, *QST*:

"How DX Kings Rate Antennas," by Don Ross, W2JMZ, in the January, 1964 issue of *QST* was a fine and informative article, and I was especially interested to note the emphasis placed by the majority of DX-men on the height of their arrays.

Other hams having 3-element rotaries swinging above their real estate may be interested in finding the lowest angle of maximum radiation — the lowest maxima of their vertical antenna radiation pattern — from their beams. A reasonable guesstimate can be made by plugging the station's operating wavelength, in meters, and antenna height, in feet, into the formula

$$\text{Radiation Angle} = \frac{49\lambda \text{ (meters)}}{h \text{ (feet)}}$$

For example, a beam 30 feet above the ground on 10 meters would exhibit the lowest maximum in its vertical pattern, and also its maximum gain, at an angle of 16 degrees. Switching this around, we can also find out that if this 10-meter beam is required to have its lowest maximum-gain elevation angle at 10 degrees, the array would have to be 49 feet high.

This formula will be valid within 10 per cent for angles up to about 50 degrees. Bear in mind that the presence of nearby houses, garages, trees, and similar objects will distort the idealized antenna pattern to varying degrees, depending on each individual case, and for this reason we have previously called this a guesstimate. — *Jack Wichels, WA4MPS (ex-W6YZP, KL7ADQ, K5GWJ).*

(The formula is based on the usual assumption that the ground is highly conducting and flat. The effective ground plane is often considered to lie a few feet below the surface, but this may vary a good deal with local conditions. — *Editor.*)

TEN-METER BAND NOT DEAD

Technical Editor, *QST*:

The letter in your "Technical Correspondence" section (*QST*, Sept., 1963, page 75) regarding ten meters hit the nail on the head.

Here, in KR6-land, the majority of hams consider the band to be dead, also. I haven't found it to be so. Since February this year, I have worked 15 countries — ZE, ZS, VK, DU, VS6, VS1, JA, HL/HM, UA, KG6, 9M2, 9Q5, 4S7, CR9 and 6L1 (Somali). I'll grant that the band is erratic and unpredictable, but that only adds to the excitement. During the spring months, when transequatorial propagation was the thing, many contacts were to be had with VKs, ZS, ZEs, etc. During the summer months,

(*Continued on page 160*)

I.A.R.U. News

AUSTRALIA

Effective March 31, six-meter radio operators in Australia are using 52-54 Mc. rather than 50-52 Mc. 50-54 Mc. is, by virtue of a footnote to the allocations table, normally allocated to the broadcasting, mobile, and fixed radio services and there was fear that amateurs in Australia would be deprived of a six-meter band. The Wireless Institute of Australia is to be congratulated on maintaining this important experimental frequency for their amateurs.

SIERRA LEONE

Government authorities in Sierra Leone have recently authorized their radio amateurs to increase their mean power output from 75 watts to 150 watts on 3500–3800, 7000–7100, 14,000–14,350, 21,000–21,450, and 28,000–29,700 kc. The frequency authorizations are the maximum permitted in ITU Region I below 30 Mc.

GENEVA

The Second Anniversary hamvention of the International Amateur Radio Club will be held in Geneva on the 5th and 6th of September during the Third International United Nations Conference on the Peaceful Uses of Atomic Energy. The theme of the convention will be "Future of Amateur Radio — HAM-TECH-AID." Inquiries should be directed to Mr. John Gayer, HB9AEQ, c/o International Amateur Radio Club, Place des Nations, Geneva, Switzerland.

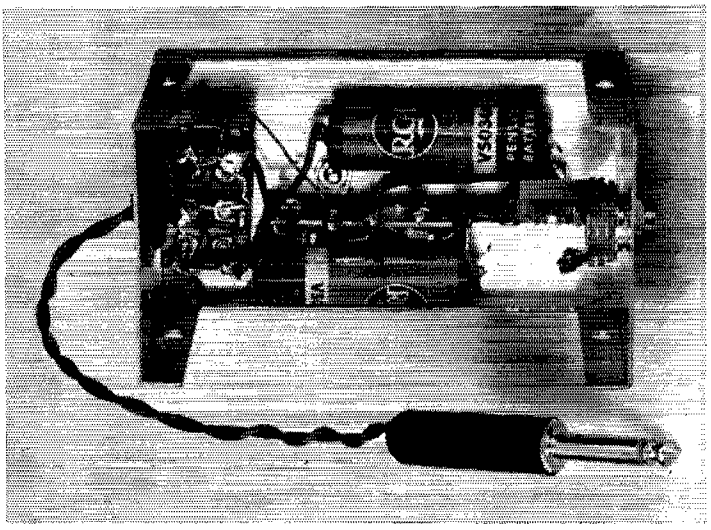
The IARC is also getting together their second annual magazine *4U1ITU Calling*, for distribution to ITU visitors, conference delegates, and other organizations. Contributions on any subject of amateur or scientific interest, preferably with photographs, diagrams and illustrations are welcome. Contributions may be sent to Mr. Werner Wolter, DL1YJ, Public Relations Officer, International Amateur Radio Club, Place des Nations, Geneva, Switzerland.

THE EUROPEAN BAND PLAN

The European frequency usage plan is a voluntary plan supported by all the IARU societies in ITU Region I (Europe, Africa, and the USSR). The bands available and the types of emission used are:

Frequency Band, Mc.	*Types of Emission*
3.5 – 3.6	c.w. only
3.6 – 3.8	phone only
7.0 – 7.05	c.w. only
7.05– 7.1	c.w. and phone
14.0 –14.1	c.w. only
14.1 –14.11	RTTY and c.w
14.11–14.35	c.w. and phone
21.0 –21.15	c.w. only
21.15–21.45	c.w. and phone
28.0 –28.2	c.w. only
28.2 –29.7	c.w. and phone

(Left) At the Mexico City Congress, HK3XB (second from left) addresses the delegates while W6ZH, XE1CCP, a representative of Mexican government telecommunications, and XE1RD listen. XE1CCP was later chosen Chairman of the new Inter-American Union of Radio Amateurs. (Right) Hard at work here is the Finance Committee, one of several chosen to draft regulations for later adoption by the plenary meetings. *L.* to r., XE1CV (proxy representation for Brazil), TI2SS, LU3DCA and VE3CJ.



This shows the arrangement of the components in the Minibox. A terminal strip is used to hold most of the components.

Ever Use an Audio Limiter?

A Simple Device for Improving Your Receiver's Performance

BY LEWIS G. McCOY,* W1ICP

SOONER or later, one of the things the Novice discovers is that there are countless gadgets that can be added to his station to improve operating convenience. Which of these you add to *your* station will, of course, depend on your needs, but one item that you will find to be a valuable aid in reception is an audio limiter. This article describes a simple audio limiter which can be built in an hour or so and only costs a few dollars for the parts.

What It Will Do for You

Basically, an audio limiter is just what the name implies. It will limit the amplitude of the audio output that can come from your receiver. Take, for example, the problem of monitoring your own sending. Most amateurs monitor themselves by listening to the transmitter signal with the receiver. This usually necessitates turning down the r.f. gain control so the transmitter signal doesn't blast your ears loose. With an audio limiter connected to your receiver you don't have to touch any of the receiver controls. The limiter automatically cuts the amplitude of your signal to a comfortable level.

As you listen across the c.w. bands you'll find that some signals are so strong that you have to "ride" the r.f. gain control to bring the signals down to a reasonable listening level. When the limiter is used, all signals are prevented from exceeding a fixed level, eliminating the necessity of riding the gain control.

When your receiver is used on a.m. phone, you have automatic gain control (a.g.c.) so there is no need for limiting. However, many receivers have no automatic gain control when used to copy s.s.b. signals, and the limiter is a great help in keeping signals at a comfortable listening level without continually adjusting the receiver controls.

Another point in favor of using the audio limiter is that it will help in reducing the other fellow's key clicks. According to FCC rules, hams aren't supposed to have key clicks, but unfortunately some do — and cause unnecessary QRM. The limiter will serve to reduce this type of interference. Also in this category is the popping type of noise from spark plugs and electrical switches, which the limiter will attenuate.

* Technical Assistant, *QST*.

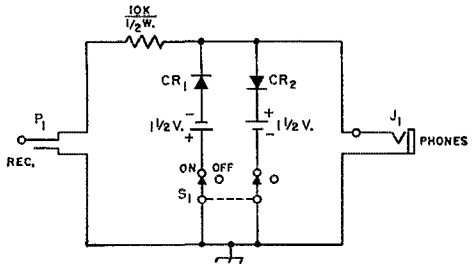


Fig. 1—Circuit diagram of the audio limiter.
CR_1, CR_2—1N34A germanium diodes.
J_1—Headphone jack.
P_1—Headphone plug.
S_1—Double-pole, double-throw toggle.

How It Works

Fig. 1 is the circuit of the unit. It should be pointed out that *no* modifications are required to the receiver. P_1 is plugged into the headphone jack of the receiver and your headphones plugged into J_1. The unit consists of two diodes, CR_1, CR_2, two 1½-volt penlite cells, and a 10,000-ohm resistor. The diodes are back-biased by the 1½ volts from the penlite cells. When the unit is connected to a receiver and S_1 is switched to the position that connects the diodes and batteries into the circuit, the limiter is ready for use. When a signal from the receiver exceeds the bias voltage on the diodes, the diodes conduct, acting as a short circuit for all that part of the signal that exceeds the biasing voltage. When signals from the receiver are below the biasing level the limiter takes no action and the signals pass through unhindered. One diode clips the positive signal peaks and the other, the negative. The limiter shown here is designed for high-impedance-type headphones, 2000 ohms or more.

The diodes used in the unit shown in Fig. 1 are the germanium type. As an experiment, we tried two silicon rectifiers as shown in Fig. 2. Silicon diodes have a "built-in" ½-volt limit so a pair of them connected as shown pass a one-volt peak-to-peak signal before limiting takes place. The advantage, of course, is that no batteries are required in this circuit. The disadvantage is that one-volt limiting may cut the volume too much for some ears. However, we liked the system, and at the cost of surplus silicon diodes (which is only pennies) it is well worth trying.

Putting It Together

Construction of the unit is quite simple, with only a few precautions to be observed. When wiring the diodes, be sure to hold the lead from the diode to the solder point with a pair of long-nose pliers, or else hang a clip on the head at this point. Excessive heat reaching the diode from the soldering iron will destroy the diode, making it unusable. The idea is to conduct the heat away from the body of the unit.

Some types of penlite cells have a "pressure" connection on the bottom of the cell, or the negative side. This is usually a metal plate of the same diameter as the cell body. In order to obtain an electrical connection to the base of the battery, this plate should be cut away with a pocketknife.

The unit shown here was built in a 2¼ × 2¼ × 4-inch Minibox, although any suitable container could be used. Layout is not critical and, aside from the precautions mentioned, wiring is straightforward. A double-pole, double-throw switch, S_1, is used to turn the unit on and off. Whenever the unit isn't in use be sure to turn it off to preserve battery life. The drain is only a couple of microamperes, but this is still enough to shorten the battery life.

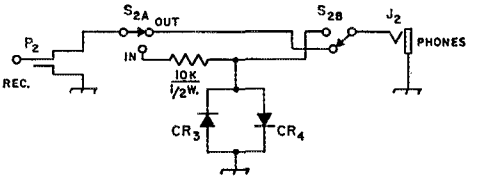


Fig. 2—Circuit diagram of audio limiter using silicon diodes.
CR_3, CR_4—Silicon diodes, any voltage and current rating.
J_2—Headphone jack.
P_2—Headphone plug.
S_{2A}, S_{2B}—Double-pole, double-throw toggle.

Using the Limiter

When you have the unit wired, simply plug P_1 into the headphone jack on your receiver and the phones in J_1. Leave the limiter switched off and set up your receiver controls as you normally would. Tune across the band and then switch in the limiter and go across the band again. You should be able immediately to notice the difference, in that loud signals don't tend to bang your ears off. If you find a station with bad clicks (and you probably will!) try switching the limiter on and off, noting the difference. You'll quickly see what we mean about cutting down the interference. Also, if you tune your receiver to the 10- or 15-meter bands you can probably find some ignition-type noise; try the limiter to see how it attenuates this type of interference.

You'll have to determine the best settings for your audio and r.f. gain controls. There is no gain control on the limiter, and usually the best setting of the receiver controls is one where moderately strong signals are clipped but the weaker ones and the background noise or "hiss" is not affected. You'll probably find that the best setting is to run your audio gain control nearly wide open and adjust the clipping level by means of the r.f. gain control. QST

One of the handiest devices a ham can have in his station is an audio limiter. The unit described in this article is simple to make, costs only a few dollars, and you'll wonder how you ever got along without one.

Hamfest Calendar

Alberta — The annual provincial picnic will be held Aug. 2. Check your local group for time and place.

British Columbia — The O.K. Valley International annual hamfest will be held July 25 and 26 at Conconully State Park, 18 miles west of Omak. No further info available.

British Columbia — The NW Chapter QCWA old timers week end will be held July 11-12 at the Villa Motor Inn in Burnaby. Hot and cold buffet dinner Saturday, dancing to a Latin Combo, a precision swimming show, and the bar will be open. Sunday a QCWA meeting and banquet. Everyone welcome. Contact Alan Venning, VE7BHH.

British Columbia — The Pacific Northwest DX Convention is slated for August 1-2 at the Bayshore Inn, Vancouver. Speakers, family rates, convenient to downtown, loads of good food, and for gourmets the VE7VC "Shanghai Express" to Chinatown. VE7QN has details.

Idaho — The annual WIMU (Wyoming-Idaho-Montana-Utah) hamfest will be at Mack's Inn, Idaho, August 7-9. Good time for all, just thirty minutes from Yellowstone Park. Preregistration $2.50. Contact W7RZY.

Illinois — The Piatt Co. ARC holds their picnic at noon July 19 at the 4-H grounds in Allerton Park west of Monticello, Ill. Contact WA9CCA.

Illinois — About 3000 people will attend when the Six Meter Club of Chicago holds the annual picnic and mobile meet August 2 at the picnic grove on Route 45, a mile north of Route 30, Frankfort, Ill. K9ZWU is picnic chairman and can supply details.

Illinois — The 7th annual Breakfast Club hamfest will be held July 18-19 at Terry Park, near Palmyra, hosted by the Quad-Co. Radio Club. Talk-in on 3873; games, contests, golf, fishing, dancing, movies, contests, swap shop and camping facilities. Preregistration (until July 8) is $1.50; $2 at the gate. Write "Hamfest," Quad-Co. ARC, Inc., Box 323, Chatham, Ill.

Illinois — The Hamfester Radio Club of Chicago annual picnic and hamfest will attract about 4000 guests to the Santa Fe Park, 91st and Wolf Road, Yellow Springs, August 9. Complete information and maps are available from K9LOK, John Chass, 5434 S. Bishop St., Chicago.

Illinois — The Radops ARC will hold its annual hamfest on Sunday, July 26, at Kendall Park near Wood River, Ill., just off Ill. Rt. 143. Games, swap shop, refreshments. Mobiles talked in on 3873 kc., 29.64 Mc., 6 and 2 meters. For additional info, write Radops, 901 West Main St., Collinsville, Ill.

Indiana — The Wabash Valley ARA presents the annual v.h.f. picnic July 26, all day, at Turkey Run State Park, about 40 miles north of Terre Haute, on U.S. 41 and Ind. 47. One dollar registration at the gate only. Full day's events scheduled. Contact W9HLH.

Indiana — The Indiana Radio Club Council, Inc., holds its annual hamfest and family picnic at Brown County State Park near Nashville, Ind., July 12. Inquiries to Hoosier Hills Ham Club, P.O. Box 375, Bedford.

Kentucky — The annual Mo-Ark-Ky of the Paducah ARC will be held July 12 at Noble Park Community House in Paducah. No registration fee. An all-day affair. Further information from W4KCH.

Maryland — The MDD Net picnic will be July 12 at Patapsaco State Park, near Baltimore, in the Hollowfield area, Sites 58-59-60.

Maryland — The annual picnic of the Md. Emergency Phone Net will be July 12 at the Marylander Club, Aberdeen. Refreshments and food will be available at the club. Contact W3LDD, R.D. 2, Box 193, Havre de Grace.

Michigan — The Upper Peninsula Annual Hamfest will be held in Sault Ste. Marie, sponsored by Twin Sault Radio Club and Kincheloe RC, on Aug. 1 and 2. Mobile contests and hunts are scheduled for Sat. afternoon. A $2 ham and turkey dinner will be held at the K.C. Hall at 1700 EST, Sat., followed by a free social dance at 2030. SSB and U.P. Net meetings will take place Sunday. Entertainment for the whole family — boat trips, train rides, tours — is planned, and there will be free coffee and donuts all day Sunday. Registration is $1.00 per person. Send advance registrations and reservations to Twin Sault Radio Club, Box 279, Rt. 2, Sault Ste. Marie, c/o C. M. Smith, K8ZSM.

Minnesota — Coming picnics are slated for the Rochester ARC July 19, the Mankato ARC July 26, the Minneapolis ARC Aug. 2, and the St. Cloud Club Aug. 9.

Missouri — The ZeroBeaters of Washington, Mo., will hold their hamfest August 2 at Washington City Park. KØIOG and other club members have information.

Montana — The Capitol City Radio Club (Helena) is sponsoring this year's international Glacier-Waterton Peace Park hamfest July 18-19, at Apgar, Glacier Park. Hams from five states and western Canada will attend, along with visitors from all over both countries. For more information and pre-registration contact William Warnke, K7RXO, P.O. Box 511, Helena.

Nebraska — The annual picnic and steak fry of the Central Nebraska RC will be held July 26 at Victoria Springs State Park, Anselmo. Registration is 50 cents a person, a family maximum of $2.50, on or before July 12. WAØGXL on 3960 for talk-in. Contact WØDLM for information registration.

New Jersey — The annual hamfest of the Gloucester County ARC will be held at Crystal Birch Lake, Chapel Heights, N. J., on Sunday, July 26. Tickets are $2 per family or $1.50 single. For further info contact Gil Hillman, WA2ZJY, 25 South Glassboro Ave., Woodbury Heights, N. J.

New York — The SWNYVHFA Field Day and Picnic is to be held July 18-19 at the Great Valley Fire Tower near Great Valley, N. Y. Follow the "V.H.F." signs.

North Carolina — The Coastal Carolina Emergency Net will hold its annual Get-Together at Manteo, July 10, 11, and 12. The Reginald Fessenden Award and the Alpheus Drinkwater Award will be presented, and speakers include ARRL Roanoke Division Director P. L. Anderson, W4MWH; section officials of AREC; W4BNU and W4MFK. Reduced rates will be available to all who wish to attend the pageant "Lost Colony" at Manteo. For more information, contact R. C. O'Bryan, W4YMI, Box 3, Pollocksville, N. C.

Pennsylvania — The 27th annual hamfest of the South Hills Brass Pounders & Modulators of Pittsburgh will be held at Spreading Oak Lodge, South Park (8 miles south of Pittsburgh on Rte. 88) on Sunday August 2. Registration is $2 at the door, $1.50 in advance. Contact Dave Imhoff, W3HND, 2283 Spokane Ave., Pittsburgh, Pa. 15210.

Pennsylvania — The Susquehanna Valley Hamfest will take place on Aug. 9, at Rolling Green Park, Hummels Wharf. The program begins at 12 noon, rain or shine, and includes special speakers, transmitter hunt, QSL contest, mobile rig contest, swap shop, and equipment displays. Advance registration $2.00. Write Susquehanna Valley ARC, c/o K3JSX, 157 Chestnut St., Sunbury, Pa. for tickets and details.

Tennessee — The Crossville hamfest, sponsored by Oak Ridge RC, will be held July 18 and 19. No other details available.

Tennessee — The Mid-South ARA and the Mid-South VHF Club will jointly host the Memphis hamfest July 21, featuring a hootenanny Saturday the 20th. Details from W4OQG.

Vermont — Hams from Canada, New York and New England annually liven the International Field Day. This year it's at the Cliffside Country Club, Burlington, Vt., July 26. Vermont SCM K1MPN will speak. Contact W1SCJ for more information.

Washington — Another international affair is the Okanogan Valley hamfest. This year it's in the U.S., at Conconully State Park, Wash., July 25-26. Registration a dollar. Contact K7RZH.

Wisconsin — The Wisconsin Nets Assn. (WNA) picnic will be held July 12 at East Park in Hartford, Wis. Registration starts ten A.M. Registration a dollar a head, or two dollars for the entire family. Bring your lunch, but refreshments served. Further details from W9NGT.

ARRL President Eugene C. Woodruff, W8CMP, unveils the Maxim Memorial Plaque during the dedication of the new W1AW on September 2, 1938.

Maturity

QST has earlier described the formative years of amateur radio, and the dark days of World War 1; the exciting years of discovery and achievement in the early twenties, followed by the coming of international law; the threat of extinction through crowding, headed off by a tremendous program of technical development in the late twenties; and the boom years of the early thirties, in which the amateur population more than doubled in four years' time.

Now comes the period 1934 to 1939, much more difficult for a writer than previous eras. It cannot be dismissed as an unimportant segment, for in this time the interpretations of Federal regulation and the administrative practices of the League were hewn out of the raw material available into a shape still recognizable today in amateur affairs. Yet the achievements would be measured in inches where they had been in feet, or even in yards. It is a time of myriad small changes, of gradual maturity rather than sudden change.

International Regulations

In the field of international regulation U.S. amateurs had to discover that, while they were not alone and friendless, neither were they free to do whatever they wished. Moreover, they found that, in return for the strong support and interest of their own government, they had to accept — and at conferences even fight for — decisions of the government not entirely to their liking.

Almost as soon as the Madrid Telecommunications Convention was ratified by the Senate in 1934, amateurs began thinking about and preparing for the Cairo Conference, the next at which the governments would discuss radio allocations. Amateurs of the day were particularly anxious to have the 80- and 40-meter bands expanded, for these were a sea of QRM. In November 1934, the League's secretary told a club official that expansion of 7 Mc. would certainly be a goal of the League as it prepared for Cairo. In May, 1935, though the Cairo Conference was a long time off, having by then been scheduled for early 1938, the League Board of Directors set up a special Cairo Committee of three directors headed by Atlantic Division Director Woodruff, a highly respected college professor and later ARRL president. The committee was given an appropriation of $2000, quite an amount for a Board committee in those years.

In November, 1935, Dr. Irwin Stewart, then vice chairman of FCC and still active in U.S. telecommunications circles, warned amateurs to keep their feet on the ground in planning for Cairo. His remarks still are germane; we reprint them elsewhere in these pages.

In the spring of 1936, U.S. — and ARRL — preparations for Cairo got underway in earnest. At its annual meeting, the Board adopted the recommendations of its Cairo Committee, including one that the League would seek 3.5–4.5 Mc. and 7.0–7.5 Mc., expansions of 500 and 200 kc. respectively. A special speaker at the meeting was Gerald Gross, chief, international division of FCC (who today is Secretary-General

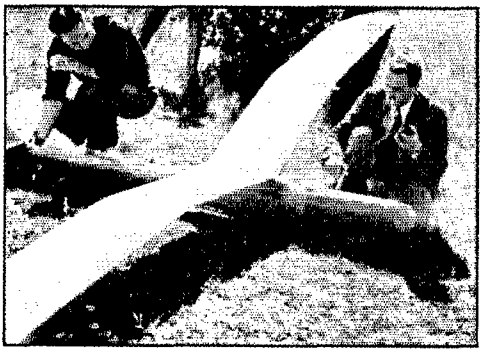
of ITU and who holds the calls W3GG and HB9IA).

The FCC held public hearings in June. ARRL chose to appear on the final day, and Messrs. Segal and Warner had prepared a masterly presentation showing how they policed themselves, how crowded they were, especially at 40 and 80, why they needed additional space, and even studies showing where the increased allocations could come from, if only an engineering basis were to be used by the nations at Cairo. In tribute to our forebears, we can say it was easily the best performance of the hearing, and compliments from the industry poured into the Hq. and appeared in the trade press.

But sympathy and understanding do not automatically solve all problems. The Cairo Preparatory Committee, made up of users of radio in government and industry, which met the following month, felt itself obliged to turn the League down on its request for additional frequencies. Warner and Segal took an appeal to the FCC and then to the State Department, but the word in both places was the same: No. The U.S. went on record then in favor of the status quo, firmly committed to support our allocations in toto, but equally committed to refrain from asking for more space.

In November and December 1937, a regional conference was held at Habana. The North and South American countries at the conference agreed to support the U.S. Cairo proposals, and to hold out for exclusive rather than shared bands. (The conference also adopted an agreement that, where internal legislation permitted, the republics of the Americas would permit unimportant third-party traffic. The joker lay in the words "where internal legislation permitted"; the U.S. has continued to enter into bilateral agreements wherever these are possible.)

Finally the Cairo conference itself started February 1, 1938. Before it was over, the ARRL/IARU representatives knew they had been at a conference! There were a great many proposals hostile to amateur radio, but the U.S. and Canadian delegations, with the help of the other American republics, held the line as far as allocations in this hemisphere were concerned. Amateurs in Europe lost chunks of 80, most of 5, and with the rest of the world outside this hemisphere, henceforth had to endure propaganda broadcasting in 7200–7300 kc.



Ross Hull, right, and Roland Bourne, W1ANA, now curator of the League Museum, did pioneer work on radio control of models. The 16-foot glider pictured here is familiar to hundreds of visitors to 38 LaSalle Road, where it hung in the main lobby. The man on the left is not Bourne, however, but By Goodman, W1DX, Editor of the *Radio Amateur's Handbook.*

National Regulations

Not long before it was destined to join History, the Federal Radio Commission rearranged the amateur regulations along lines still recognizable. The Class A, B and C licenses were created, at ARRL request, with the Class A taking over the function of the special phone license and carrying with it phone privileges in the 80- and 20-meter bands not available to the old First Class or the new Class B and C. The Class B was the basic license under the new rules, carrying c.w. privileges in all bands and phone on 160, 10 and 5 meters. The Class C was to have the same exam as the Class B, and carry the same privileges, but it could be taken by mail with a volunteer code examiner and volunteer witness, only by those living more than 125 miles from one of the 32 examining points. The FRC regretfully stopped issuing Amateur Extra First Class licenses at this point, solely as an economy measure in that Depression year.

Tests weren't long then — only ten questions. But they were essay-type, and were chosen from a list of several hundred. Memorization didn't help much, but luck probably did, in getting questions on which the applicant was fully prepared. Incidentally, it did no good to ask a buddy what questions he had — there were 16 versions of the Class A test and 256 of the Class B/C! Failures on the exams stayed right around 30%.

In June Congress adopted the famous Communications Act of 1934 which scrapped the Federal Radio Commission, created a new Federal Communications Commission, and charged it with overseeing the field of electrical communications, wire as well as radio. Amateurs were not much affected, though, because most of the people we'd been dealing with were transferred intact to the new FCC along with all our regulations.

Enforcement of the amateur rules had been almost non-existent during the early thirties, but it got increasingly better during the decade. Monitoring stations were furnished with "all-band" receivers in 1933, and commenced to spend two hours a day monitoring the amateur bands. Later, oscilloscopes were obtained, and FCC used them in part to check amateur modulation. The regulations in force today, which provide that amateurs must have means of insuring operation within the bands and of modulation not exceeding the capability of the transmitter and in no case in excess of 100%, were adopted during the mid-thirties. Retransmission of broadcast

signals was prohibited, and later the transmission of music for "test purposes" was stopped after the League showed it had been greatly abused. In its place went the rule we have today, permitting the use of a single audio tone for testing. Filtered power supplies were required up through ten meters, and then in 1938 through 5 meters. Amateur TV was pulled out of the 1.8 and 56 Mc. bands, but authorized in new bands made available at 112 and 224 Mc., and in the wide open territory above 300 Mc.

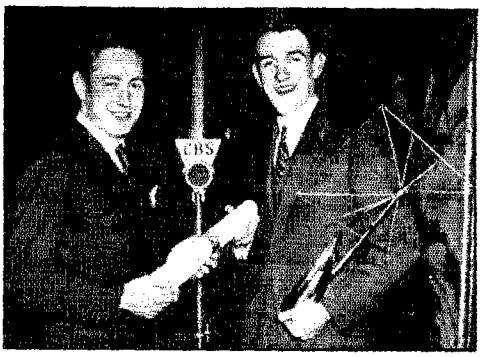
At League request, the code speed was raised from 10 to 13 w.p.m. in 1936. A Board request for expansion of the Class A phone band from 3.9–4.0 to 3.850–4.0 Mc. was forwarded to FCC but was later withdrawn when amateur c.w. operators sent in petitions containing 5100 signatures against the move, and FCC thereupon ordered a hearing. The ten-meter phone band was first 28.0–28.5 Mc. This was extended 500 kc. in 1933, and in 1937 switched and expanded to the more-familiar 28.5–30.0 Mc. allocation.

In 1933 special licenses for portable stations had been discontinued and the "notification" system we now have was started. Initially, amateurs were required to indicate portable operation by following their call with BT and the number of the call area in which operation took place. After repeated League protests about the confusion which arose, particularly when messages were being handled by a portable, the prescribed prosign was changed to the slant bar. Mobile operation was first permitted only aboard private aircraft, and then only on v.h.f. Then just before it went out of business, the FRC changed the rules to allow "portable mobile" operation on frequencies above 56 Mc. by all amateurs without special notice or license. The definition of portable mobile used then is part of the definition for ordinary mobile today, and covered the usual installation in a car quite nicely. In 1938 the rules were further liberalized to permit maritime mobile operation outside the continental limits of the United States, except when within foreign waters, on 10 meters and the v.h.f.s only.

Canadian rules have not been treated separately since development closely paralleled that in the United States, except that the principle of having Canadian phone bands in addition to those of the U.S. had already been established. The licenses were then, as now, issued for the period April 1–March 31, and any new rules would be announced when the new licenses were made, remaining in force until the next year.

League Affairs

On February 17, 1936, Hiram Percy Maxim, the Old Chief, The Old Man, co-founder of the League and its president from the start 22 years earlier, passed on of a throat infection at the age of 66. The extent of the loss can only be imagined by those of us who have come along since. Suffice it to say here that amateur keys and mikes the world over lay silent when Hiram Percy Maxim, W1AW, was laid to rest.



CBS President William S. Paley presents the first Paley Trophy to Walter Stiles, W8DPY, for his public service work during the 1937 Ohio River Floods.

At its May meeting in 1936, Dr. Eugene C. Woodruff, W8CMP, head of the Departments of Electric Railways and Radio at Pennsylvania State College and most senior of the 1936 Board of Directors, was elected president of the League on the first ballot. George W. Bailey, W1KH, was then elected as vice president (Dr. Woodruff served two terms as president, in his quiet but able fashion. He joined the ranks of Silent Keys in 1944. Mr. Bailey, now W2KH, followed W8CMP into the president's chair in 1940, and occupied it decisively until 1952. He is still active as a consultant for the IEEE, a merger of the IRE and AIEE, and on the air.)

In 1936 shortly before the Board meeting a serious flood struck New England. Much of Hartford was severely damaged by the waters of the Connecticut River, and the headquarters station W1MK at Brainard Field near the river was practically destroyed, no trace of its antenna structures being found after the waters receded. Combining its needs and its sentiments, therefore, the Board decided that a new station be built on a suitable site to be found, in memory of Hiram Percy Maxim. In December 1936, the FCC, in the first action of its kind (although it has since become standard procedure), assigned the call W1AW to ARRL in memorium, and it was used for headquarters transmissions even before the new station could be built. (During the 1936 flood, the lesser-known League Hq. club station, W1INF, handled a great quantity of flood relief traffic. This station still exists in the ARRL laboratory, but its equipment is seldom the same for two successive operating periods; thus its phonetic nickname, "It's Never Finished.")

A fine piece of farm land was located in thinly-settled Newington, Conn. measuring 7½ acres, for a three-room building with garage, and plenty of space for a rhombic antenna. On September 2, 1938, the Maxim Memorial station was dedicated, and commenced its services as W1AW which have continued ever since (except for the war years) at the same location. Now in 1964 a fully-

Text of remarks by Dr. Irwin Stewart, Vice Chairman, FCC, to a meeting of the Washington Radio Club, November 2, 1935:

I came here tonight to say one thing, and when I have said it I am through. It is this: in your preparations for the Cairo Conference, keep your feet on the ground.

It is no news to you that frequency allocations must be determined by international agreement. It is no news to you that some countries endeavor to suppress amateurs; that many countries merely endure amateurs; and that only a few countries actively encourage amateurs.

You can be proud of the fact that of approximately 60,000 amateurs in the world some 45,000 of them are in the United States. You must recognize, however, that these figures furnish the source of your greatest weakness in an international conference. Aside from the United States and certain parts of the British Empire, only one country has as many as 1000 amateurs. Bands that to you mean terrific congestion, to some countries represent waste space. Far from wanting to set aside more space for amateurs, many countries may feel that too much space is now set aside for amateurs. After all, if space is needed for some service deemed nationally more important, what is more logical than for a delegation to insist that it be made at the expense of that service which is deemed nationally of less importance?

The moral? Simply this: at Cairo no important delegation will go farther for amateurs than the American Delegation, and many will be reluctant to go as far.

I do not know who will compose the American Delegation nor what its position will be. I am sure, however, that a conscientious effort will be made by the delegation to establish that position which is best conducive to the development and use of radio and, therefore, to the best interests of the United States. Actively assist in the formulation of that position and, once it has been formulated, whether or not it contains everything you desire, support it loyally.

If you try to go farther than the American position you may lose part of what you have. If you work with the American delegation, there is a fair chance that the American position may be adopted internationally.

grown up area of single residences surrounds the acreage, and in place of the rhombic sits the gleaming new headquarters.

Speaking of headquarters, the League had moved to West Hartford from Park Street in 1931, occupying the top floor of 38 LaSalle Road. By May 1937 things were much too crowded, and the Board therefore authorized the taking of a five-year lease on the whole building. By September, the office had been spread out accordingly, with a great sigh of relief by Warner and his crew!

League Organization

From the viewpoint of League organizational

Sidelights, 1934–1939

There were complaints in 1934 that *QST* was too technical. . . . Ham radio was part of the program in many CCC camps. . . . Secretary Warner wondered out loud whether there should be a special license, with no code requirement, for serious experimental types interested in exploring the v.h.f.s. . . . An FRC engineer thought amateurs could get better results if they avoided local contacts on the long-distance bands such as 7 and 14 Mc. . . . The Board urged FRC to look into the problem of auto ignition noise. . . . Four monthly versions of *QST* were established, with regional advertising and station activities being printed separately for the East, West, North and South editions. . . . The Lamb Noise Silencer (*QST*, February, 1936) got a tremendous play from the daily press and weekly magazines outside the radio field. . . . The 1936 Board agreed to publish Clinton B. DeSoto's history of amateur radio, *Two Hundred Meters and Down*. (Anniversary Section Editor's Note — Thank Heavens!) . . . The Board permitted alternate directors to attend the 1936 Board meeting at their own expense. . . . Many complaints about the Class C license: it's notorious that no one ever fails the code test! . . . Secretary Warner complained mildly that members are not too interested in the serious affairs of amateur radio; only 60 copies of the Cairo hearings document, 39 copies of the Board's investigating committee report and 15 copies of the annual reports of the officers were ordered by members. . . . Mr. Maxim's son and daughter with League cooperation created the Hiram Percy Maxim Memorial Award to be awarded annually to the amateur age 20 or under adjudged to have accomplished the most in amateur radio. The award carried a $100 prize and a miniature Wouff Hong. The first went to a youngster named Victor Clark, then W6KFC (1964 note to contest men and DXers: recognize him?). . . . The Paley Trophy for outstanding service to the public through amateur radio was also established in 1936, by the Columbia Broadcasting System. A blue-ribbon panel of judges awarded it first to Walter Stiles, W8DPY for work in the 1937 Ohio River Valley floods. . . . Ross Hull, famous v.h.f. pioneer from Australia who had been on *QST*'s staff for ten years and had become its Editor in December, 1937, was accidentally electrocuted at his home workbench on September 13, 1938. . . . The *Handbook* and the *License Manual* were printed by the Braille Service, New York Chapter, American Red Cross through the cooperation of ARRL and the Library of Congress, copies to be available through the regional libraries for the blind affiliated with the Library. . . . The International Morse Code period which had been .. .. .. was changed to . _ . _ . _ ; the comma took over _ _ .. _ _, heretofore the symbol for!

life, 1934–1939 starts with a note of discord. A misunderstanding on international third-party traffic regulations, and consequent disagreement on League policy thereto on the part of Clair Foster, W6HM, and others, was blown up, with the help of two commercially-published magazines *R/9* and *Radio*, into a violent disagreement by members of this group with virtually everything the League did. Particularly, the campaign sought to discredit Secretary Warner. While *QST* never answered in kind, a policy still regarded as a wise one, President Maxim did feel the necessity of sending out a letter to clubs and SCMs early in 1934, shooting down the worst of the distortions. The two magazines merged, keeping the name *Radio*, and continued a policy of snapping at the League's heels. The time of widespread criticism and unrest was short, however, and the League continued to merit and to have the confidence of active amateurs.

Up until 1934, anyone interested in amateur radio could be a member of the League with full privileges, including the right to vote and to hold office. That year, the Board changed its policies, amending its by-laws so that henceforth members had to be licensed amateurs in order to vote. Life members and those who have not had a lapse in League membership since 1934 still have the right to vote, however, even if they do not hold ham tickets.

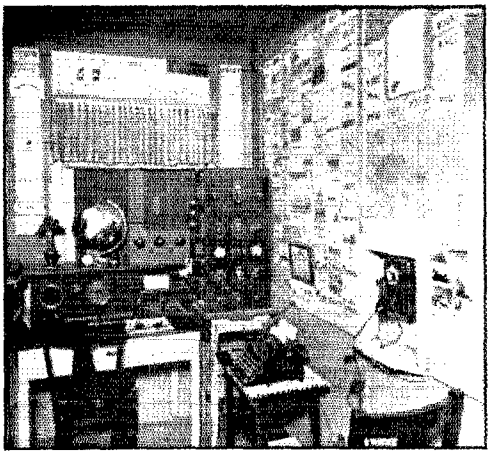
The League's officers and directors had to meet tighter rules, too. There had always been a prohibition against directors earning their living by selling things to amateurs. In the thirties, however, this policy was broadened and spelled out in the By-Laws with examples of who could and who could not stand for election. In 1937 the holding of an amateur license for two years and League membership for a year became a requirement for SCM candidates, while for directors it was four and four. Affiliation of clubs was made more meaningful, too. The Board decided that clubs should have 60% of their membership also members of the League, and control should be in the hands of licensed amateurs. This policy, proving a little stringent, was later modified to the 51% League membership, 51% licensed amateur rule we have today.

A proposal that the League adopt a scheme of local chapters, state federations and an actual national convention, each group sending delegates to the next higher one, kept recurring during the 30s, but always was overwhelmingly defeated. Steps were taken, however, to broaden the members' contacts with the organization. Regular travel and administrative accounts were established for the directors, and SCMs were reimbursed for specified travel. Assistant directors were appointed, and then were placed on the mailing list for most of the information previously sent only to directors. Then the League's Constitution was amended to provide for the election of alternate directors who would have power to represent the division at Board meetings if the director was unable to be present. Some (including Secretary Warner) thought that slates of candidates should be put up, with a two-man team running inseparably, as in the U.S. election for president and vice president. But this was not the majority view, and since the first alternate director election in 1934, the voters have picked the two men separately. The Board ordered that the Executive Committee minutes be published; since the Board meetings of those years always had actions ratifying the work of the executive, it was only logical that these actions be published with the Board minutes.

The League had thus survived another radio conference, a change in regulatory bodies, a change in its own top officers, a minor insurgence within its ranks, and a depression, emerging stronger and more mature than ever before.

The Late Thirties

FROM the Hq. station 1MK at Brainard Field Mr. Maxim sent the annual Navy Day Receiving Competition message by his own hand each October 27th, this exercise being the predecessor to Armed Forces Day. Three ARRL Phone-C.W. Transcons in January 1931 brought operations for that year to a high pitch of excitement. The results took some 12 *QST* pages. A Crossband Get-Acquainted Party on 3.5 and 7 Mc. was the means for promoting fraternalism and versatility in November. Two 10-hour Transcons in December topped off the operations in 1931. With 500-watt rigs on two bands, 1MK was making a name for itself in the service of the fraternity; all hams made it a point to get *that* QSL. A key station in a 19-day midwinter amateur collaboration with the Army Air Corps "arctic patrol" in 1930, the Hq. station made a name for itself anew. In the presidential election year 1932 ARRL bought available election-return service for all League members. The 8 hrs.



W6KFC (now W4KFC) was the Arizona SS Certificate winner in 1936, and second high nationally. His transmitters ended up with the ubiquitous (in them days) 210s. His receiver was an ACR-136.

8 mins. continuous tape transmission at 22 w.p.m. had a big following and brought reports from all over the world.

The first Field Day was announced by the League in 1933 as an "international" FD and enthusiastically acclaimed by the fifty who reported. Following annual FDs embraced the 20- and 60-watt level and emergency power supply multipliers, also confirmed the emergency test pattern and many options for participation. The A-1 Operator Club to encourage a high caliber of operating in our amateur bands got its start in 1933. ORS and Trunk Line Stations utilized a General Traffic Hour (6.30–8.00 P.M. local time) using directional CQs or CQ TFC to supplement other scheduled provisions. With the growth of phone the Official Phone Station appointment was announced in late 1933.

Five meters was in its hey-day as we reported last month. Ten-meter tests also were popular . . . the band being referred to as 'hot' and 'boiling.' ARRL repeated its 10-meter tests of 1934 the following year to fire up even more interest and occupancy of this band. In September 1934 a one-year 28-Mc. DX operating contest was announced, RSGB and ARRL working hand in hand in this one. A 10th anniversary of Transocean work was celebrated. There was a series of 3.5 Mc. transocean tests, somewhat on the pattern of ARRL's earlier International Goodwill Test. Besides quiet periods for logging calls, this time there were designated periods to try QSOs. A 20th Anniversary Relay was announced during 1934, with an elaborate organization of Connecticut stations mustered to help 1MK get the incoming traffic.

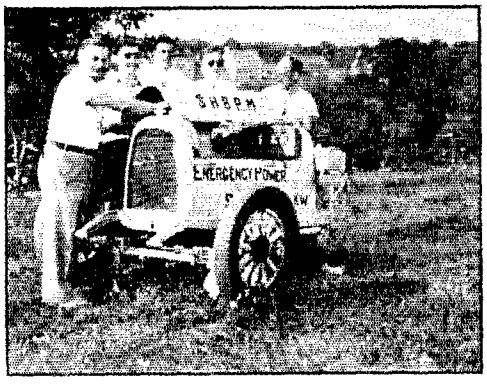
In late 1934 2½- meter experimentation was advanced when the first 100-mile contact could be reported between the Boston and Hartford areas. In early 1935 a frequency-use registration was made with a 10 percent response which indicated that as of 1935 two amateurs out of every three were opposed to opening any part of the 7-Mc. band to phone. As of that year 95% of the interest of amateurs was entirely in the four lowest-frequency amateur bands.

One of the big events of that year was the undertaking of a pre-Cairo operational occupancy survey of 4-4.5 Mc. and 6-8 Mc., this to assist our amateur service conference delegation with practical data on the operating side.

There were many firsts in these boom years. The Sweepstakes quickly assumed a first-place interest in amateur operating. In its first five years participation steadily mounted to *ten times* the initial interest! This was a decade in which message handling, with better organized means supported by ARRL stepped upward from a steady pace of 400,000 annual handlings per year to 1.5 to 2 million message handlings. In 1931 the ARRL Trunk Line system had been reorganized. By the mid-thirties 14 TLs were functioning covering east-west and north-south and interlocking at numerous points. All-ORS, crystal control, each TL station had an alternate and five-day-per-week skeds.

This period of League doings was replete with activities. A series of Canada-U.S.A. contact contests was started in 1934 to renew and foster the bonds of friendship through the years. The Copying Bee was a unique activity. Tricky text and code combinations were transmitted (50 words). For several years this was an annual December exercise to "copy what you hear." Sometimes the winners could make but 95% of the copy accurately even at 20 w.p.m.! Fun and challenge! The first ARRL QSO Party was held in January 1938. In a 20th Anniversary Party April 7–8, 1934, President Maxim received even more messages from members in every ARRL Section then on the occasion of his 60th birthday relay in 1929. An elaborate organization of Connecticut amateurs supplemented W1MK's efforts in getting the incoming traffic!

The League was requested in 1935 to assist the Bureau of Standards in checking fading drop-outs of signals in wide parts of the spectrum, this observed at 54-day intervals.



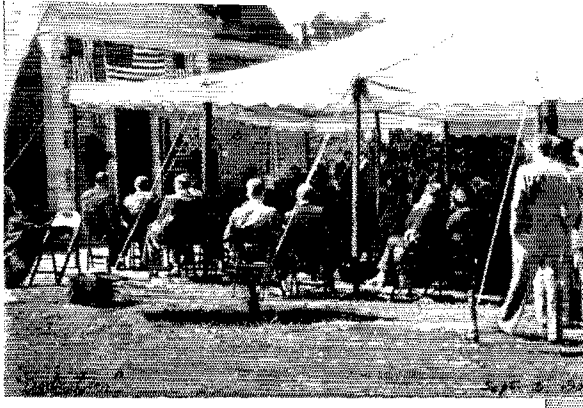
This was typical of Field Day power sources in 1938. This one was used by the South Hills Brass Pounders and Modulators (Pittsburgh, Pa.) and delivered a total of 4 kw.

This was VE2BV operating VE2KH in the 1938 Field Day. A 6L6 ran 12 watts input from a 6-volt Genemotor, while the receiver was a t.r.f.

The true operational weight of interest in Field Day began to make itself evident with the third FD in 1935. Participation was that year 53% on 80 meters, 32% on 40 meters, 12% on 5 meters but only 2% on 20 meters and 1% on 160 . . . just to convey the ever changing picture of band use for the benefit of today's readers. VK contest-results were reported annually. A combined VK-ZL international DX test was announced in the fall of 1935. The annual U.S.A.-Canadian QSO Contact Contest, sponsored by a Canadian group continued to gain in popularity. There were 1.75-Mc. DX tests and an REF Cup Contest. The year recorded continuing expedition interest. There was the Morrisey W1ØXDA, the Bol-Inca expedition CP1GB, an Andes-Amazon expedition and by now amateurs were following other amateurs around the world with the early globe-circling flights.

These were years of increasing objectivity in amateur radio. The Worked All States Award announced in January 1936 *QST* was issued to 230 amateurs the first year. The Communications Department announced DXCC in September 1937. The 100-country goal became the leading and standard token of DX operating accomplishment in the worldwide sphere. The Emergency Corps was established and grew in its capabilities from 1935 to step up our organizational means to give public service in disaster communications. FCC advanced its examination requirements to 13 w.p.m. in 1936. Also that year ARRL revised its message form and simplified group count to a text-only count with an "extra delivery credit" thrown in, all assisting amateur radio to reach higher performance levels. W2BSR proposed a new RST signal reporting system. This represented an advance in completeness of reports between amateurs. The logic and brevity of the new system made it an instant success, although arguments as to the feasibility of a 5-point or a 9-point scale for audibility would go on for some years.

A William S. Paley Award was established and announced in late 1936 for the individual amateur contribution most useful to the American people. W8DPY, W9RSO, W9MWC and W1BDS were successively declared winners of this CBS Trophy, emergency-operating achievement in the public service field and the challenge of widespread



The dedication ceremonies at W1AW on September 2, 1938.

disasters, hurricanes and floods bringing such work to the front.

A Maxim Memorial Relay, February 17, 1937 on the first anniversary of the passing of our founder again required organization of Connecticut stations to receive incoming traffic. The relay activity was carried on progressively all one evening following the transmission of President Woodruff's message through OBS and OPS.

August 1937 was marked by the holding of a successful Low Power Contest (25 watt limit).

The Maxim Memorial Station bearing our founder's call W1AW was completed in 1938 and a Dedication Relay held in September of that year.

By the end of 1938 the new WAS certificates numbered about 500, the rejuvenated Rag Chewers Club had 2000 members (it runs 6000 a year currently!) and there were 1000 operators in the A-1 Operator Group. A band occupancy survey in the mid-thirties covering 1¼ to 160 meters indicated a 68% predominance of c.w. telegraph users and a 32% over-all interest in voice work. A question put to the gang about 40-meter phone (not then permitted) brought a 68% negative response . . . all characteristic of this operating era. Emergency Corps registrations hit the 3000 and the 5000 mark. Two- and six-meter work came to the fore in 1939 when ARRL held two U.H.F. Relays. Successful message work on v.h.f. became a fact; these relays were the predecessor of our present three v.h.f. contests a year.

Emergency

ELEVEN emergencies were reported in the 1935 volume of *QST*. These included a lost plane in the Adirondacks in December of '34, and a northwestern storm in October. In January of '35 there were two storms, one in British Columbia and one in the Md.,-Del.-Va. area, and a flood in the lower Mississippi Valley. In March came a heavy snow-and-sleet storm in the Duluth, Minn., area. In late May and early June the midwest experienced severe floods. In July a disastrous flood occurred in New York state; also in July, amateurs took part in a search for a lost yacht; and in September a Florida hurricane gave amateurs another opportunity to perform in the public service.

This was all well and good, and much favorable publicity for amateur radio resulted in the increased tempo of emergency communication. At headquarters, however, it was soon realized that a need for organization existed. Thus, in the September issue of *QST*, in the small type of the Communications Department, the formation of the ARRL Emergency Corps was announced. "Join now!" adjured the announcement. "Every

This is the type of flood washout that took communications with it at Ithaca, N. Y., in 1935.

red-blooded ham should want to do his part! We need you!" Amateurs having emergency-type equipment were urged to send their "application" (a postcard listing their gear) to headquarters which, if OK, would result in issuance of a membership card.

The November issue gives the first membership list, including such familiar calls as W1CJD, W3BWT, W3QV, W6AM, W8OFO, W6YX, W4NC and VE3GG. Note that the requirement for joining was the possession of equipment capable of operating in an emergency, not, as now, merely a willingness to do so.

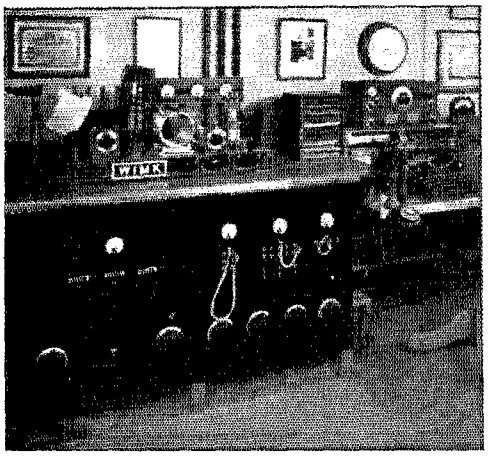
The year 1936 saw one of the greatest floods in history, striking right at the heartland of highest population and coming literally into the front door of ARRL headquarters as W1MK was completely inundated and destroyed. Two headquarters staffers, one an associate editor by the name of Ross Hull, the other an assistant secretary by the name of Clinton B. Desoto, were assigned the job of writing the story, and spent some time traveling around the northeast interviewing amateurs and taking pictures. The May '36 issue of *QST* carried the 15-page story, a masterpiece of prose in W1CBD's inimitable style. The 1936 flood created such heroes as W8DYY in Johnstown, detailed the controversial but dauntless work of W8BWH of Punxsutawney, and produced the first winner of the William F. Paley CBS Award, W8DPY of Coudersport, Pa.

Meanwhile, the AEC grew, with additional membership lists appearing in the January, March and September issues of *QST*. By September, a second "division" of AEC had been created, called the "Supporting Division," the latter being those amateurs wishing to take part who did not possess emergency equipment. Total membership was now almost 300.

But it took another disastrous flood to bring about realization of the necessity for a closer-knit organization. In January of 1937 the Ohio River watershed flooded and sent billions of gallons of excess water cascading over normal river banks throughout West Virginia and Ohio, and southward along the Ohio and Mississippi. Once again W1CBD toured the flooded area, then took his agile pen in hand and composed a 16-page account of the activity, this time gathered from stacks of reports sent in by amateur participants. Equaling, if not exceeding, the 1936 flood in the northeast, the 1937 Ohio River Valley flood brought new concepts to the fore in emergency communications organization. Emergency preparedness was gradually becoming an obsession. The editorial of March 1937 *QST* was dedicated to the subject, with a special article on "Flood Relief Communications" by W9ZN immediately following it.

Comments, articles, suggestions followed in the wake of the flood. Gradually, the fervor died down, but the Communications Department was studying the subject with its field organization, and so indicated in October. The January 1938 issue carried, under *Operating News*, the first specifications for emergency coordinator appointments by the SCMs. Before enough of them had been appointed and gotten organized to do an effective job, another big disaster struck New England.

This was the hurricane of 1938, which came



Here is what the flood of '36 did to W1MK's transmitter! This spelled the end of an era for the ARRL headquarters station at its Brainard Field, Hartford, location. Activity was transferred to 38 La Salle Road, first as W1INF, then W1AW until the new Maxim Memorial Station was erected in Newington in 1938.

roaring across Long Island Sound and into Connecticut and Rhode Island without warning. Again, W1CBD tackled the job of writing up what the amateurs did. "Dazed by three staggering blows in rapid succession: hurricane, tidal wave and flood," said the lead, "overconfident and undertrained, ham radio generally reeled in its tracks for . . . 24 hours before pulling itself together." When they did, however, the hams did a job that wasn't soon forgotten. Among the principals were W1EBO of Norwich, Conn., and W1BDS of Westerly, R. I., who was later given the Paley Award for his heroic activity in getting the first word to the "outside" of the devastation wrought by wind and waves in his town.

QST continued to cajole amateurs with emergency preparedness dicta during 1938. In January, Communications Manager W1BDI outlined emergency operating policies, dropping inactive AEC members and setting forth some recommendations to FCC. In April, some of the lessons learned in current emergencies were discussed. "*Have a plan!*" was the theme. In November lessons learned in the New England hurricane were discussed, and the appointment of more emergency coordinators in all communities, regardless of size, was called for. Once again, the aftermath of a severe emergency brought much discussion of the general subject.

In 1939 the biggest emergency topic was the growing war clouds in Europe. However, during this year FCC came out with regulations for operation in emergencies containing real teeth, and ARRL completed an agreement with Western Union in which the telegraph company would actively assist in recruiting for the AEC. Early in 1940, the first feature article on the workings of

Wilson Burgess, W1BDS (center), operated an emergency-power station which was the only contact with Westerly, R. I., for several days following the 1938 New England hurricane. Other operators are W1KRF (l.) and W1KRQ.

ARRL emergency coordinators, written by W3ZD, appeared, and the battle for interested leadership appointees in the AEC continued. Subsequently, the increased preparedness resulting from the efforts of those already appointed showed to good effect in tornadoes and hurricanes in the south in February and August respectively.

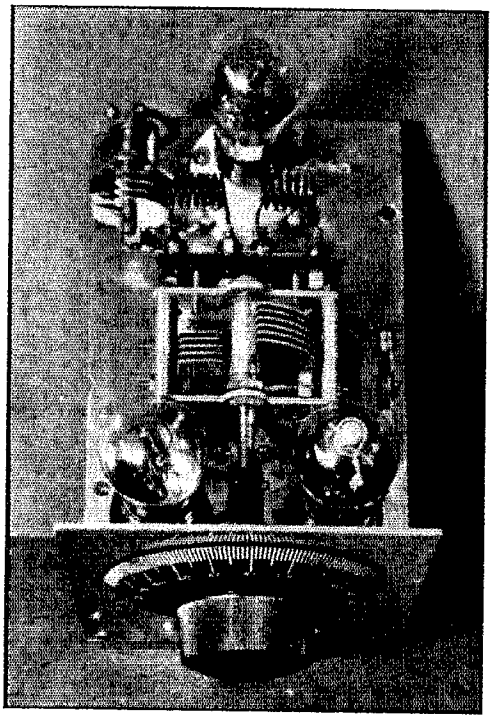
In 1941, with the war raging in Europe and a growing tenseness in the U.S., emergency organizers began looking toward defense preparations in case this country were dragged in. Amateurs also assisted in major emergencies in the Mexican earthquake (April) and the Texas hurricane (Sept.), as well as the usual scattering of other incidents, some minor and some major.

Although amateur radio was shut down when war finally engulfed us in December of 1941, emergency work by amateurs did not entirely cease, as we shall see later.

Technical Progress

THE first few years of the 1930s were exciting years from a technical standpoint, but to appreciate them thoroughly one should have at least a rough idea of what ham radio was like at the time. At the start of 1930, most of the hamming of the 17,000 U.S. licensed amateurs was c.w. in the 80- and 40-meter bands, with some activity in the 20-meter band. 'Phone was permitted on 160 meters (where BCI was an ever-present problem), on the *low* 50 kc. of the 80-meter band, all of the 5-meter (56-Mc.) band (with no activity), and on 14.1 to 14.3 Mc. by special permission (a very few takers). A typical c.w. transmitter would be a single-tube self-controlled oscillator working into a "Zepp" antenna (dipole end-fed with open-wire line) or possibly a "Windom" (single-wire off-center feed). The favorite tubes were '10s (25 watts input) and '03As (the so-called "50 watter," running about 100 watts). The 'phone would be the same transmitter "loop-modulated" or, if the operator was affluent and technically savvy, Heising-modulated. Although the correct technique for obtaining 100-per cent modulation with Heising modulation had been described in *QST*, it was seldom used or understood. The incidental f.m. of modulated oscillators was often considerable. The elite transmitter of the day was crystal-controlled, using a triode ('10) crystal-oscillator stage to drive a multiplier or a neutralized triode final amplifier. Plate power was obtained from supplies using thermionic or chemical rectifiers, an occasional motor-generator set, or mercury-vapor rectifiers.

The standard receiver was battery-powered, using plug-in coils, a regenerative triode detector, and one or more stages of audio amplification. More elaborate receivers included an *untuned* screen-grid r.f. stage and possibly a peaked-audio amplifier, after a popular Ross Hull design. The advanced amateur might have a superheterodyne for 'phone reception; if it was used on c.w. it would have an oscillating second detector. Practically all transmitters and receivers were homemade, although you might have your eye on one of the Pilot "Super Wasp" (regenerative) receivers that was newly available in an a.c. model. Homemade receivers generally used aluminum



The famous superregenerative receiver that made 5-meter 'phone practical. The caption accompanying this picture read, "56-Mc. receiver, the chief features of which are extremely high sensitivity, simplicity of tuning control, and an ability to operate reliably in a moving automobile."

panels, to reduce any hand-capacitance tuning effects, but the base of the receiver was likely to be a piece of ¾- or one-inch pine or redwood. Transmitters built on wood bases were the rule; the occasional panel would also be wood.

Operating was more leisurely and less hectic than today. One might call "CQ" on 7100 kc. and find a reply anywhere in the band. (Once you had found the band with your self-controlled oscillator you weren't tempted to move for every call.) This meant that calls after CQs could easily last for a minute or two, depending upon one's estimate of how long it would take the CQer to tune the band. Signal reports, based on QSA1-5 (readability) and R1-9 (strength) scales, tended to be more realistic than they are today. Lacking a tone scale, signals were described according to modulation as "ac," "rac" ("rectified a.c."), "dc" and "pdc" ("pure d.c."). Although, bug keys and side-swipers were available and used, code speeds were, in general, slower than they are now, although many operators were capable of as high speeds as they are today.

Transmitter Developments

It is interesting to speculate on just how much was known of the proper operation of vacuum tubes at the start of 1930. Practically all of the multistage transmitters described in *QST* that year showed a grid return running to a "−C" terminal, with no suggestion of grid-leak bias. The single exception was a description of the short-wave (to 10 meters) transmitter at NKF (Naval Research Laboratory), which showed a combination of grid-leak and fixed bias. Transmitting tube ratings made no mention of operating grid currents or dissipations, and no schematics showed provision for metering grid currents. The important metering was the plate current and occasionally the filament voltage. It seems probable that there were a few warm grids in those days! However, by late 1931 grid-leak bias began to appear and be mentioned, but without metering the grid current.

Exciting news for 'phone men came with Loy Barton's classic article on Class-B modulators in the November 1931 issue. Prior to that time the usual approach to phone (other than loop modulation) was to use Class-A modulators in the Heising circuit. This meant the very inefficient generation of audio power; e.g., *ten* 845 tubes (same envelope size as the '03-A "50 watter") in

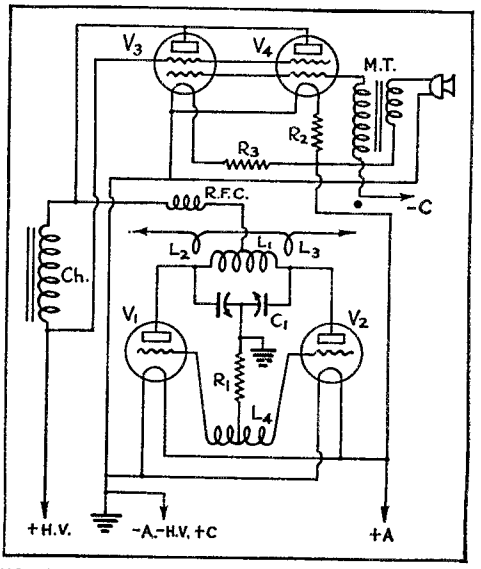


FIG. 1.— THE COMPLETE CIRCUIT OF THE 56-MC. TRANSMITTER

C_1 — Type 406B 25-plate Cardwell receiving condenser with stator split and plates removed to give 5 stator and 4 rotor plates in each section.
R_1 — 50,000-ohm Electrad wire-wound resistor.
R_2, R_3 — 2-ohm fixed filament resistors for Type '47 modulators; 12-ohm resistors for Type '33 modulators.
L_1 — 5 turns 1 inch inside diameter of ⅛-inch diameter copper tubing or wire.
L_2, L_3 — One turn each ¾-inch diameter of similar conductor.
L_4 — 7 turns spaced ⅛ inch of 22 d.s.c. wire on ½-inch bakelite tube. Adjustment of turns and spacing may be necessary.
R.F.C. — 35 turns of 30 gauge d.s.c. wire on former 5/16-inch diameter. Turns spaced approximately twice diameter of wire.
M.T. — Microphone transformer made from old audio transformer with primary removed. New primary of 300 turns of 30-gauge d.s.c. wire. A split primary of 600 turns would serve for double-button type microphone.
CH. — Type 244 Silver-Marshall choke. Any similar choke rated at 150 ma., 20 to 30 henrys, would be suitable.
V_1 to V_4 — See text.

parallel and running 750 ma. at 1000 volts would deliver 200 watts of audio. Consequently the usual approach to high-powered 'phone was a low-level modulated stage followed by a linear amplifier (with its attendant inefficiency in a.m. service). The use of the high-efficiency Class-B modulators made high-level modulation practical. A *pair* of "50-watters" would deliver 200 watts of audio! With the transformer coupling between modulator and r.f. amplifier, 100-per cent modulation involved no dropping resistors as it did with the shunt-fed Heising system. How-to-build-them articles on transformer construction followed quickly, as did special zero-bias tubes designed for the Class-B audio application. Although designed for b.c. receiver audio, these new type '46 tubes were pressed into modulator service and also into r.f. work.

But the 'phone men didn't get all of the breaks, even if Class-B modulators were a giant step forward in making high-powered 'phone feasible. When receiving-type audio pentodes (the '47) were introduced early in 1932, they were quickly used as crystal-oscillator tubes because you could get more output from the stage before the crystal shattered than you ever could with the old '10 triode circuit.

Power supplies came in for long-overdue consideration when a classical series of three articles by Dr. F. S. Dellenbaugh and Robert Quimby

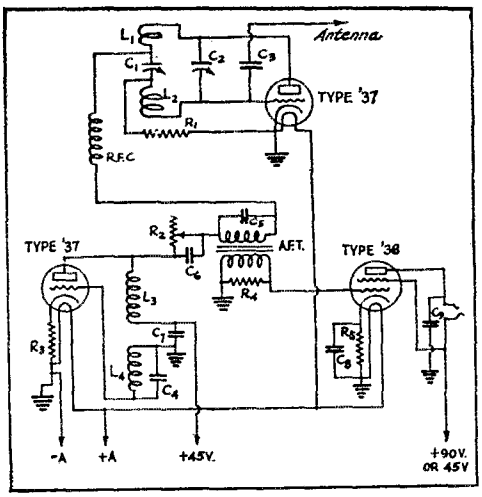
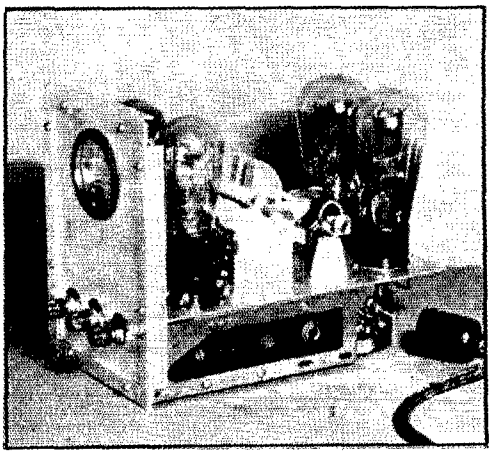


FIG. 2 — THE COMPLETE CIRCUIT OF THE super-regenerative receiver. The tubes are indicated in the same relative position as they are mounted in the set.
C_1 — 105 μμfd. Cardwell Type 404B variable condenser.
C_2 — 15 μμfd. Cardwell "Balancet" midget condenser.
C_3 — Antenna coupling condenser — see text.
C_4 — .0025 μfd. fixed condenser..
C_5 — .004 μfd. fixed condenser.
C_6, C_8 — 1 μfd. fixed condenser.
C_7 — .1 μfd. fixed condenser.
C_9 — .001 μfd. fixed condenser.
R_1 — 2 megohm gridleak
R_2 — 50,000 ohm Frost No. 2890 variable resistor.
R_3, R_5 — 2,000 ohm carbon type fixed resistors.
R_4 — 150,000 ohm carbon type resistor (or gridleak type).
L_1, L_2 — Each seven turns of 16 gauge wire 3/8 in. inside diameter with turns spaced the diameter of wire.
L_3, L_4 — see text.
"Grounds" indicated on the diagram represent connections to the metal chassis of the set.



The companion 56-Mc. transmitter used '71-A audio triodes in a push-pull oscillator circuit; the modulator was a pair of '47 audio pentodes in parallel.

described the virtues and design of the input "swinging" choke, at a time when the popular power-supply filter configuration was aptly called "brute-force." But the eye-popper of them all was the inspiring "Thirty-Three Watts per Dollar!" by Charles Perrine, W6CUH (September 1932), where he told how to operate two 852s, and even *one* 852, at a kilowatt input. (These tubes were rated by the manufacturer to be run in Class C at 2000 volts and 100 ma.) Perrine accomplished his feat with a combination of low-*C* tank circuits, high drive and bias, 4500 plate volts and — we suspect — short dashes.

Although the term wasn't used, interstage impedance matching (for optimum loading and maximum drive) was given some attention in 1933 through the appearance of interstage "link coupling" between tuned circuits. And in June of the same year Technical Editor Jim Lamb described his "Tri-tet" circuit that provided good second-harmonic output from a single-tube crystal oscillator. (Before this, crystal oscillators had always delivered fundamental output.)

The regulations forced a technical change in late 1933 when it became mandatory to use an "adequately-filtered power supply" on transmitters operating below 14.4 Mc. Prior to that time c.w. transmitters could use unfiltered power supplies on the output amplifier stage if the previous stages were powered by good d.c. The elite of the day used various methods for obtaining distinctive modulation on their c.w. signals, ranging from the use of 500- or 1000-cycle alternators to unfiltered 3-phase systems. When the regulations were announced, shouts and screams and accusations were heard all over the place, ranging from "Regimentation!" to "Now I won't be able to handle traffic as well!"

It should be noted in passing that VOX systems were described on several occasions during 1932, in an effort to discourage the tedious monologue of 'phone transmissions, but they apparently had no appeal. Late in 1932 relay racks

and aluminum bases and shelves were being advertised, but they seem to have had little influence on construction practice. Metal housings were extensively used only in portable gear and in "monitors" (the shielded single-tube receiver with which the conscientious operator monitored his transmitter and spotted its frequency).

Receiving

Except for the gradual spread of a.c.-operated receivers (in contrast to battery-operated), little happened to receiving in 1930 and the first half of 1931. Screen-grid tubes had been reported as good detector tubes (more gain) and were slowly replacing the triodes. In September 1931, the SW-3i receiver of the National Company was described in *QST*, extolling the virtues of the *tuned* (and ganged with the detector) r.f. stage. It rapidly became a widespread favorite of the hams who could afford it and the separate power supply and the additional pairs of plug-in coils for each band.

The truly significant receiving development of the period came with an article by Jim Lamb in the June 1932, issue. Up to this time it was an accepted fact of life that one tuned through a c.w. signal twice, and that there was nothing that could be done about it. The Lamb article pointed out that this made the bands appear to be twice as crowded as they actually were. It suggested a cure through the use of i.f. selectivity and an offset b.f.o. Strictly a "technical" article with no how-to-do-it content, it caused little stir among the hams. Not so the later August and September constructional articles! Here was described a crystal filter with incredible selectivity, which through proper adjustment could cause the "other side" of zero beat to disappear. (The idea didn't get across to everyone immediately. As late as '38 and '39, when any decent commercial receiver included a crystal filter, proper use of the filter and b.f.o. was always a good topic for a radio-club talk. Since this new principle required the use of a superheterodyne for receiving, single-signal c.w. reception was the beginning of the end for the beloved regenerative receiver.

Five Meters

Sporadic attempts to "do something" with five meters were based on the use of low-frequency techniques (c.w., regenerative receivers) and were seldom a success. All this was changed almost overnight when Ross Hull described a *super*-regenerative receiver using regular receiving tubes (July 1931) and followed the next month with a simple self-controlled push-pull oscillator and parallel modulator using receiver power tubes. Field tests had shown that high power was not essential (the excellent a.g.c. characteristic of the superregenerative receiver may have influenced this conclusion) but, most intriguing of all, it was quite possible to work "duplex" on the 4-Mc.-wide band. The possibility of eliminating the "monologue" combined with the promise of simple and inexpensive 'phone was irresistible. The mating of superregenerative receiver and modulated oscillator was a natural, since the deficiencies of each complemented the other, and the audio quality was generally as good as the (carbon) microphone. Portable and mobile 5-meter operation was reported, and proper antennas (instead of random wires) were given some consideration. The original Hull superregen receiver had a separate quench oscillator tube and circuit, but it wasn't too long (1933) before the self-quenched superregen was devised and described. Transceivers (same tubes used for transmitting and receiving) became popular and were the standard for portable and mobile, as well as for much home use.

Five-meter 'phone had everything: low cost, simplicity, fun.

The Prolific Thirties

THE years between April 1933 and January 1940 saw the start of many manufacturers who have enjoyed the ups and weathered the downs of the amateur radio business to the present time and whose products we know so well.

The first Hallicrafters ad, in January 1935, introduced the Super Skyrider and established the "Sky" name as one of the best known in amateur radio. The first large-scale display of ads telling *QST* readers at which stores to buy a product was in the Hallicrafters Super Skyrider campaign in September 1935, and the first group of advertisements in *QST* by suppliers of components for a receiver appeared in 1938 when the Skyrider Diversity was first advertised. The SX-23 was introduced in March 1939. The first in a series of ads on new transmitters was in August of 1938. It was on the HT-1.

Barker & Williamson's air-wound coils appeared in February of 1937, to be followed in August by band-switching turrets.

November was the favorite month for initial tube advertisements, although Sylvania (then Hygrade Sylvania) had come in with the 830 two months before, in September 1933. Raytheon's first ad in November of 1933 was on the RK-18. Eitel-McCullough's in November of 1934 showed the 150T and Amperex followed in November of 1935 with the HF-200. Some of amateur radio's most popular tubes were the T and TH series brought out by Eimac in the thirties — the 35T and the 100TH being examples.

In addition to a complete line of transformers, United Transformer offered a booklet with technical data useful to amateurs. This UTC ad, the company's first in *QST*, was in February of 1936.

James Millen announced his new company in June 1939. The first ads by Electro-Voice, Instructograph, Lampkin, J. W. Miller, Petersen, Communication Products, also ran in the years between April 1933 and January 1940.

Distributors starting in this period who are

our friends today: Radio Shack, February 1934; Delaware Radio (now Willard Wilson), March 1934; Henry Radio, May 1934; Newark, November 1934; Harvey, November 1936; Wholesale Radio (now World), April 1939.

Several manufacturers already established as leaders introduced new products in the thirties. Hammarlund brought out two receivers that enjoyed wide acceptance and are used today: the Super Pro in March 1936 and the HQ-120, later the HQ-120-X, in December 1938.

National's famous HRO was first advertised in October 1934. It was followed by the NC-101X in December of 1936 and by the NC-80X, 81X, NC-44, NHU, and several transmitter kits during the next three years.

RCA design engineers were busy, as evidenced by a selection of more than forty tubes: receiving, transmitting and cathode ray.

The 1930s also saw the start of many manufacturers who were well known to us for years, but who have left the pages of *QST*. A few sold out to other companies, some went out of the amateur business and others went out of business completely. What old timer can forget the transmitters built by Harvey Radio Labs, Marine Radio or Temco? The Meissner Signals Shifters? RME? Bliley? Heintz and Kaufman? Taylor Tubes? The RCA crystals, mikes and TV parts, as well as amateur receivers and transmitters?

There were many other manufacturers who are, perhaps, not as well remembered, but who were important to amateur radio over a long period. Antennas, for example: the first rotary beam advertised in *QST*, the Mims Signal Squirter, February 1937. Receivers: how about E. M. Sargent? Remember the transmitter kits put out by Stancor and Thordarson? Readrite meters? The Mackey? Let's see how many of these companies you Old Timers do remember. Young Squirts with only twenty-five years of hamming can skip most of the list.

Receivers: Canadian Marconi, Howard, RCA, RME, A. H. Ross, Sargent, Tobe-Deutschmann.

Transmitters and Exciters: Abbott, All Star, Browning Labs, General Transformer, Harvey, Ottawa, Marine, Meissner, Radio Transceiver Lab, RCA, Stancor, Temco, Thordarson, Utah.

Mikes: Bruno Labs, Comet, Lifetime, Radio Receptor, RCA, Rathert, Tibbetts, Wright-De Coster.

Keys, code teachers, etc.: Audiotone Oscillator, American Code Reader, Fleron, McElroy, Signal, Visasig.

Crystals: Bellefonte, Bliley, Brazilian Importing, Gentry, Hi Power, Monitor Piezo.

Tubes: H & K, Hytron, Ken Rad, National Union, Sheldon, Taylor, Triad, Western Electric.

Transformers: Aalloy, General, Hilet Engineering, Jefferson, Kenyon, Transformer Corp of America.

Components: Electrad, Centralab, IRC, Yaxley; Aladdin, Barrett, Coto Coil, DX, Sickles; Bud, Eby, Insuline; Barr Labs; Western Radio; Acrovox, Condenser Products, Solar; Atkins & Brown.

Antennas, feed lines, rotors, towers: Ace, Amplovox, Bassett, Brach, General Rotary Beam, Mims, Verti-Flex; Bassett, Gray EO-1, Lynch, Transducer; Amplex, Mims, Skyrotor; Wincharger.

Accessories: Modulation meters by Doolittle & Falknor; frequency meters and standards by Guthman and Comm Measurements Lab; Tatellite by Sundt Engineering; vibrator power supply by Electronic Labs; clocks by Gordon Specialty and Chelsea; the Brush Transfilter; Trimm headsets; the Selectosphere; Par Metal cabinets; auxiliary power plants by Kato, Onan and Pioneer.

Test Instruments: Clough-Brengle, Precision, Radio City Products, Solar, Supreme, Triumph, United Sound.

Relays: Gordon, Guardian, Leach, Staco, Ward Leonard.

The many stores included Blan, Consolidated, Gross, Leeds, Terminal in the east; Cameradio, Radio Lab (remember how the air was filled with numbers in December 1935?) and Wilcox in the middle west; Shuler in the south; Offenbach, Radio Supply in the west.

Cathode-ray television reception received attention in *QST*'s advertising pages during 1938. Du Mont's April ad on the Phasmajector and the Television Sales and Service October ad on a kit were directed to experimenters; Meissner ran an ad in March of 1939 on a TV receiver ki. However, in May of 1939 RCA/NBC announced that "Television Broadcasting Begins on April 30th in the New York Area" and stated with prophetic accuracy that the date "marks the birth of a new industry." Three receivers for home use were advertised.

In 1939 the president of Zenith signed a pair of interesting advertisements. In the February issue of *QST* E. F. McDonald Jr. said, "I have always contended that the credit for most of the major developments we have in radio have been due to the American amateur" and in both ads he asked hams for suggestions on how to build a better loop antenna.

One of the most unusual ads was in August 1936 on W9XIO, Robie the Iron Man robot, who "walks, talks, smokes, and winks his eyes." Burgess doesn't tell us later whether lung cancer got Robie. Perhaps he just rusted away.

But it may be that the best ad of all ran in *QST* for December of 1938:

Advertising rate card #10 was in effect at the end of 1939. A full-page ad cost $240. The circulation of *QST* was a little over 42,000. QST

the SUPER-SKYRIDER offers these advanced features . .

WHEN the hallicrafters' SKYRIDER

the hallicrafters, inc.

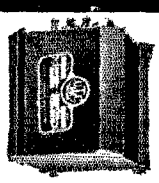
UNITED TRANSFORMER CORP.

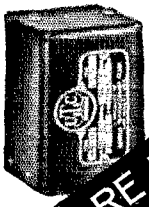
76 SPRING STREET - NEW YORK, N. Y.

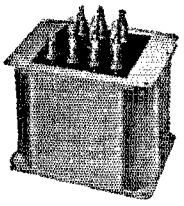
EXPORT DIVISION — 15 LAIGHT STREET, NEW YORK, N. Y.

A Transformer for Every Purp... ...very Purse

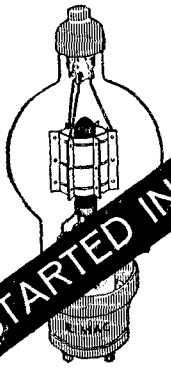
STARTED IN THE 1930's AND ARE IN QST TODAY.







EIMAC 150-T



MAX R.F. COATINGS

Communication Products, Inc.

245 CUSTER AVE., JERSEY CITY, N.J.

Characteristics:

EIMAC-150-T Triode

Fil. Voltage 5 V.; Fil. Current 10 A.; Rated Plate. Dissipation 150 W.; Amp. Factor 13; Max. Plate Current 200 MA.			
Plate Voltage.....	1000	2000	3000
Plate Resistance.....	2750	1900	1250
Mutual Conductance .	5800	7300	1200
Normal Power Output (75% eff.).....	150W.	300W.	450W.

PRICE $24.50. Sold Only by Reputable Dealers.

for the MICROMETER FREQMETER

A FOUNDATION UNIT — CONSISTING OF:

- Precision Micrometer
- Band Spread Condenser
- Special Isolantite Coil Form
- Temperature Compensator
- Adjustable Pad Condenser
- Complete Circuit Details

Price Complete, Assembled, $14.50 net

G. F. LAMPKIN LABORATORIES

146 W. McMillan St. Cincinnati, Ohio

New Miller Preselector

Here is a simple, inexpensive and really practical Preselector It will give you more distance and sensitivity with lower noise and absolutely no images. The coils cover the full range from 12 to 200 meters. Additional features include built-in power supply, two stages of tuned R.F., efficient output circuit, and single wire or doublet antenna

"Build it Yourself" in Kit Form, No 302 Coil Kit $4.80

Or if you prefer to buy your equipment "tailor made" here is a real opportunity Complete with tubes and metal cabinet $24.00

At Your Dealer or Write

J. W. MILLER CO.

5917 SOUTH MAIN STREET, LOS ANGELES, CAL

FRENCH TYPE HAND-SET

Particularly designed for 56 mc. and portable work. Incorporates a 2000 ohm earphone with a high quality microphone. High output with excellent fidelity. Light weight and durable. Separate cables from microphone and earphone allow any circuit combination.

Type 214 (single-button) net, $6.00. Type 215 (double button) net, $9.00

If your jobber can not supply you, order direct!

THE ELECTRO-VOICE MFG. COMPANY, INC.

324 East Colfax Avenue, South Bend, Indiana

Crystal Transmitters

Radically new design suitable for Class B modulation or high output C.W. on 14, 7 and 3.5 M.C.

Consists of crystal-oscillator, buffer amplifier, and Class C output amplifier mounted on polished aluminum and hard rubber chassis with plug-in coils and plug-in crystal holder for quick change of frequency. Complete Kits, less tubes, crystal and power supply:

210 Output....$37.25 203A Output....$47.50

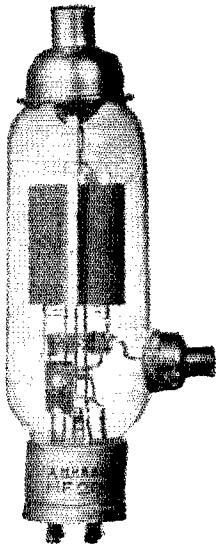
852 Output.....$47.25

The smoothest, neatest little rig you ever saw — and what a Kick she has!

Immediate Delivery *Write for data sheets*

ARTHUR A. COLLINS

Cedar Rapids, Iowa Radio Laboratories, Inc., W9CXX



Hints and Kinks For the Experimenter

MODIFIED CQ SENDER

W9JCV's "Simple Automatic CQ Sender," *QST*, October, 1963, works fine with most full-size a.c. tape recorders that have a watt or two audio output. However, the inexpensive imported transistor tape recorders simply do not have enough "oomph" to drive the keying relay directly. The circuit in Fig. 1 shows an amplifier that can be used between a low-output tape recorder and the keying relay.

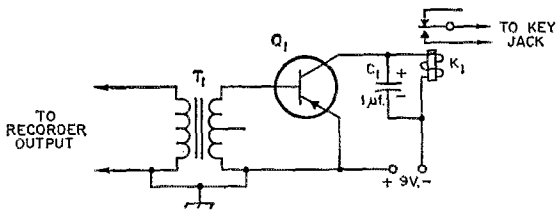


Fig. 1—This transistor amplifier will boost the output from a transistor tape recorder.

The transistor is any general-purpose audio type; T_1 is a transistor output transformer with the low-impedance side connected to the tape-recorder output. Relay K_1 is a 300-ohm unit I happened to have in the junk box. As in W9JCV's circuit, capacitor C_1 should be reduced in value to 0.05 μf. when using speeds above 20 w.p.m.

— *Bob Herman, WN5JEX*

FREQUENCY METER FOR PORTABLE GENERATORS

THE circuit in Fig. 2 is a power-line frequency meter which can be used to adjust and monitor Field Day and emergency-power a.c. generators. The hookup is somewhat similar to the Knight-Kit transistorized tachometer, but instead of using pulses from the distributor "points," the unit operates from pulses generated by rectifying line current.

The transistor is a general-purpose n-p-n type, although a p-n-p transistor can be used if the polarities of the battery, meters, and diodes are reversed. The Zener diode CR_1 is a 7.5-volt unit. Other diodes in the circuit are inexpensive germanium types.

I built my line-frequency monitor in a small metal box. For reasons of safety, the circuit should be electrically isolated from the meter case. Calibration is accomplished by using current from the a.c. mains where the 60 cycles is usually right on the button. First, set R_1 for zero resistance and turn the unit on. Plug P_1 into the 117-volt outlet and set R_1 for a reading of 0.6 on the 0–1-ma. meter. The meter is now calibrated to read 0 to 100 c.p.s. with reasonable accuracy over the upper two thirds of the scale. This unit seems to be quite insensitive to the shape of the waveform and to voltage fluctuations between 80 and 150 volts. — *W. J. Savage, Jr., K3PEP*

RECEIVER OVERLOAD PROTECTION

DAMAGE to my Collins receiver from r.f. overload prompted me to install two silicon diodes connected back-to-back from the antenna post to ground. The diodes must be silicon, since silicon diodes do not conduct until the voltage across them reaches about 0.5 volts. With two diodes connected as shown in Fig. 3, the voltage to the receiver input is limited to about 1 volt peak-to-peak.

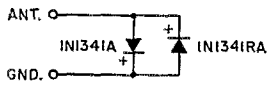


Fig. 3—Back-to-back silicon diodes will give receiver overload protection.

I used the 1N1341A diode which is rated at 7 amp., although almost any silicon diode can be used. The 0.5-volt figure holds for all silicon rectifiers regardless of p.i.v. or current rating.

Mount the diodes on a grounded metal shield inside the receiver chassis, as close to the antenna terminal as possible. In order to mount both diodes to the same shield, use one 1N1341RA diode, a reversed polarity type. No change in my receiver's performance can be noticed since installation of the diodes. — *A. W. Moody, W7SI*

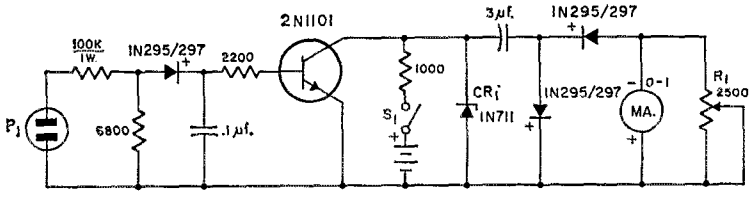


Fig. 2—A transistor tachometer circuit can be used as a power-line frequency monitor.

DX-100 HIGH-VOLTAGE RECTIFIER ARCING

THE CERAMIC SOCKETS provided in DX-100 transmitters for the 5R4 rectifiers, if mounted with hardware provided, have caused many owners headaches. After some use, arcing appears to take place from the tube base to the metal parts of the socket. Actually, however, arcing is between the chassis and these metal parts, and efforts at sticking electrical tape and other material between the tube base and socket won't give much relief. A simple remedy is to remove the supporting hardware from each socket and replace this with longer screws. Put in ½- or ⅜-inch insulators or washers on the screw shafts between the chassis and the top of each socket. Be sure the nut in each case doesn't come too close to the pin connections under the socket. If this is done with any care at all, it isn't even necessary to touch socket wiring.

— *Gary Foskett, W1ECH*

MIKE HOOK

AFTER assembling a Heath Sixer, I realized that there were no provisions for holding the microphone when it was not in use. My solution to the problem was to attach a small hook to the back of the mike so that it could be hung on one of the ventilation holes in the side of the cabinet.

The hook is an adhesive picture hanger, commercially sold as a Jiffy Picture Hanger, and available at most five-and-dime stores for less than "six for a quarter." The hanger may be used as purchased; I had little trouble getting the hanger to stick to the back of the microphone, although a little Elmer's glue will insure a good connection.

— *Benjamin W. Day, Jr., K3HSF/1*

REPAIRING SPEAKER CONES

YOU can repair a torn or damaged speaker cone easily with some fingernail polish and a piece of tissue paper. Saturate a strip of the tissue with fingernail polish and place it over the hole. When the polish has dried, the tissue becomes hard and makes a fine repair to the damaged area of the speaker cone.

— *Bruce Zieminski, W1GNOV*

RANGER KEYING MONITOR

THE keying monitor shown in Fig. 4 differs from others used with the Ranger in that it uses no relays and connects directly to the key itself. The monitor uses the simple and reliable neon-bulb oscillator circuit shown. With the key open, the voltage difference between battery B_1 and the −56 volts keying voltage in the Ranger appears across the NE-2 neon lamp. Capacitor C_2 isolates the keying circuit from the outboard equipment. When the key is closed, the monitor receives the full 90 volts from BT_1, the NE-2 fires, and the Ranger is simultaneously keyed in the normal fashion.

Various schemes[1] can be used to couple the

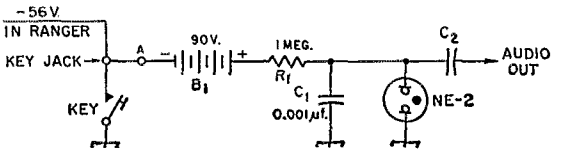


Fig. 4—WØCHM's Ranger keying monitor.

monitor output to headphones, speaker, or the station receiver. I use the circuit shown in Fig. 5, where R_2 and C_3 filter the high frequencies from the rich neon-oscillator waveform, and R_4 isolates the monitor volume control, R_3, from the receiver volume control. I also open point "A" in Fig. 4 with a pair of normally open contacts on the an-

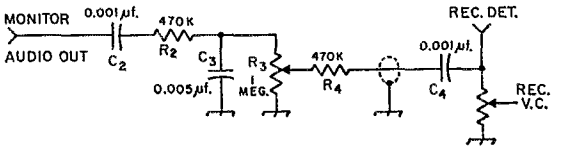


Fig. 5—This shows how the monitor can be fed into the station receiver.

tenna relay, so that the monitor is inoperative when the Ranger v.f.o. is zeroed. The values of R_1, C_1, and C_2 may be varied to obtain best operation for the particular NE-2 used.

— *M. Gerald Arthur, WØCHM*

[1] Paddon, "The 'Monitone,'" *QST*, September, 1948; Tanner, "A Neon-Tube Keying Monitor," *QST*, "Hints & Kinks," November, 1955; McCoy, "A $1.69 Keying Monitor," *QST*, September, 1957.

MORE AUDIO FOR THE KNIGHT C-100

MANY people in our area have purchased hand-held CB transceivers for use on the amateur bands.[2] Those who have the Knight C-100 units have complained about the lack of modulation. I have found a simple correction for the difficulty.

Locate the 0.1-μf. disk capacitor (C_8) located near the transmitting crystal. Remove this capacitor and replace it with a 1.0-*μf. nonpolarized* one. I used three 0.33-μf. disk ceramic capacitors in parallel. It is necessary to use a nonpolarized capacitor since the polarity across C_8 changes between receive and transmit. If several disks are paralleled, be careful that no short circuits occur in the limited space around the capacitors.

This modification will change the tuning of the crystal somewhat, so it will be necessary to retune the r.f. stages. Use the tune-up procedure outlined in the instruction manual.

— *Francis J. Merceret, Jr., K3MIDL*

[2] "Converting the Knight C-100 CB Transceiver to 50 Mc.", *QST*, March 1964.

COMPACT COIL FORMS

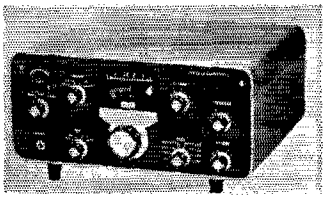
INEXPENSIVE double-slug TV-type i.f. coil forms may be halved to provide single-slug forms for compact construction.

— *Bela V. Foldesy, W6HCI*

• Recent Equipment —

The Heathkit SB-300

Communications Receiver



QUITE OFTEN, in reviewing a piece of manufactured equipment, a comparison is made between the unit being reviewed and the manufacturer's preceding model. In this instance, however, such an attempt would be futile, for few parallel lines, if any, can be drawn between Heath's latest offering — the SB-300 — and its predecessor, the RX-1 Mohawk. Both are ham-bands-only communications receivers covering 80 through 10 meters, but that just about takes care of any similarity. The 300 is half the size of the Mohawk, weighs only one third as much, has several fewer tubes, and only about half the number of panel controls. There are many other differences, including a somewhat lower price which is a novelty these days, to say the least.

Following a trend that has become evident within the last few years, Heath has gone to a crystal-controlled front end, and has also crystal-controlled the b.f.o. This narrows the problem of achieving good frequency stability down to the confines of a single variable oscillator in a tunable i.f. covering the same limited frequency range for all bands.

The block diagram of the SB-300 appears in Fig. 1. V_1, V_2 and V_3 represent the essentials of a band-switching crystal-controlled converter which transforms signals in the amateur bands to a broad first i.f. centered on 8645 kc. Both the r.f. amplifier, V_1, and the mixer, V_2, have tunable input circuits. The tuning capacitors of these circuits are ganged to a panel control requiring little more attention than the customary antenna trimmer. The band switch selects the proper coils and conversion-oscillator crystals for the band in use.

S_1 is an internal switch connected to three jacks at the rear of the chassis. This switch permits feeding to the r.f. amplifier a choice of three antennas, or of three external converters covering frequencies outside the range of the receiver, or any combination thereof. Not shown are two additional sections of this switch which feed plate and filament voltage to an auxiliary outlet for external converter use. A.g.c. voltage is also available at one terminal of this outlet. Thus, two external converters may be permanently plugged into the receptacles provided, and switched into operation as desired, leaving one position of the switch for returning to the antenna for normal reception.

The output circuit of the first mixer is in the form of a bandpass filter which accepts the band of frequencies from 8395 to 8895 kc. while sharply attenuating signals outside this range. This limits the receiver input range to a 500-kc. segment for any position of the band switch, which is adequate to cover all bands except 10 meters. The latter band is divided into four segments.

Signals from the band-pass filter are fed to a second converter consisting of the mixer, V_4, and

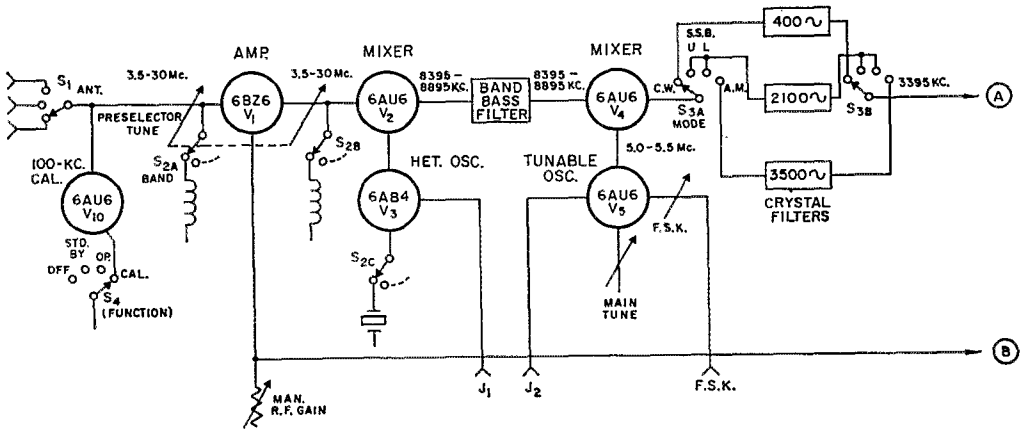


Fig. 1—Block diagram of the Heathkit SB-300. J_1, J_2 and J_3 are jacks for transceiver operation with a compatible transmitter.

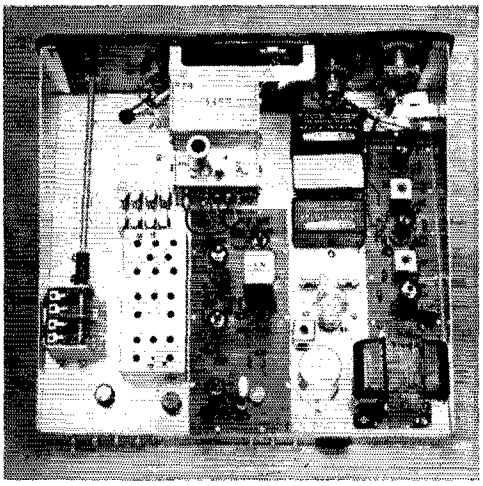
the tunable oscillator, V_5, the latter covering the range of 5 to 5.5 Mc. This tunable oscillator is the heart of the receiver and is the only circuit governed by the calibrated tuning dial. To make sure that the original excellent factory job will perform as predicted no matter how many thumbs you may have, the oscillator is furnished as a preassembled unit in a sealed box, immune to tampering (unless you are willing to void the guarantee).

The signal from the second converter is fed to a two-stage 3395-kc. second-i.f. amplifier, V_6 and V_7, whose selectivity is determined largely by a crystal filter at the input of the amplifier. Three filters, differing in selectivity, are available and, when all three are installed, the mode switch selects the filter appropriate for the mode in use. Only the filter for s.s.b. reception is furnished with the kit. This one is rated at 2.1 kc. wide at 6 db. down, 5 kc. wide at 60 db. down. The other two filters are available as accessories. One has a rating of 3.5 kc. wide at −6 db., 10 kc. wide at −60 db. for a.m. use; the other is 400 cycles wide at 6 db, 2.5 kc. at 60 db. down for c.w. With the single filter supplied, the receiver is not operable with the mode switch in the a.m. or c.w. positions. However, both a.m. (exalted carrier) and c.w. can be received at the bandwidth of the s.s.b. filter with the mode switch in the s.s.b. positions.

The i.f. amplifier feeds a crystal diode detector, a product detector (V_{8A}) and a crystal-diode circuit for the a.g.c. signal. The mode switch feeds the output of the diode detector to the audio amplifier in the a.m. position; the product detector feeds the audio channel when the mode switch is in s.s.b. or c.w. positions. A 6AS11 (dual triode and pentode in a single Compactron envelope) performs the functions of product detector (V_{8A}), b.f.o. (V_{8B}), and b.f.o. amplifier (V_{8C}). The b.f.o. is crystal controlled, as mentioned earlier, and the mode switch selects the proper crystal for upper or lower sideband, or disables the v.f.o. for a.m. reception.

The a.g.c. system has short and long release characteristics as selected by an a.g.c. switch which cuts off a.g.c. in its third position. A.g.c. is applied to the two i.f. stages and the r.f. stage, as is the manual r.f. gain control.

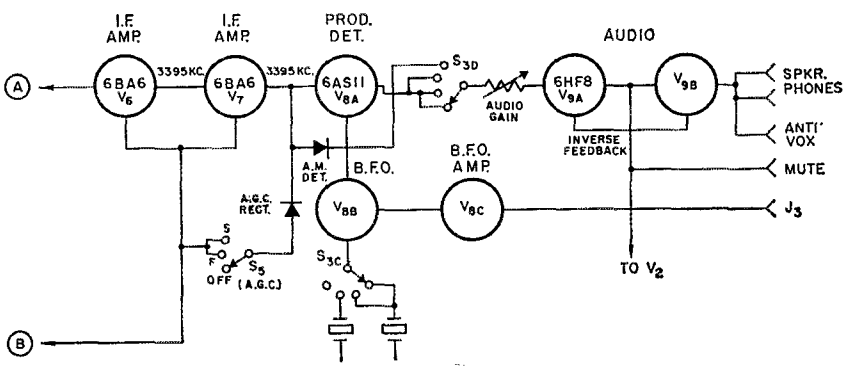
In the audio section, the triode section of a

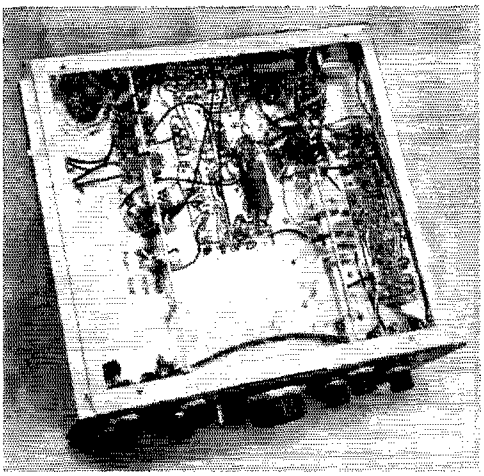


Chassis-top view of the Heathkit SB-300 receiver. The crystal-controlled first-conversion section is to the left. The r.f., mixer and h.f.-oscillator coils are inclosed in a box perforated to permit adjustment of the coil slugs. The r.f./mixer tuning capacitor is to the left of the coil box and the oscillator crystals above. The printed-circuit board to the right of the coil enclosure contains, from bottom to top, the crystal-calibrator, r.f.-amplifier, first-mixer, h.f.-oscillator and second-mixer tubes, and the band-pass filter in the output of the first mixer. The preassembled variable oscillator, with dial bracket attached, is above. The printed-circuit i.f. strip is to the right, above the power transformer and filter capacitor. In the area to the left of this strip are the three i.f. crystal filters, and the product-detector/b.f.o. tube, coil and crystals. The power fuse and antenna/external-converter switch are in the lower left-hand corner.

6HF8 (V_{9A}) drives the pentode section (V_{9B}) with inverse feedback. Output is rated at 1 watt. The audio gain control is in the input circuit of the first stage. The output transformer has windings for both speaker and headphones. The speaker is muted when headphones are plugged into the headphone jack on the panel.

A small power transformer, full-wave silicon rectifier and resistance-capacitance filter provide a maximum voltage of 150 for plates and screens. A half-wave silicon rectifier operating from the





Although the bottom side of the chassis is remarkably free of components, this is where you'll be spending most of your assembly time. Identifiable in this view are the mode switch to the right, the band switch to the left, and the audio output transformer in the upper right-hand corner.

same transformer provides up to 60 volts of negative bias for r.f.-gain-control and muting purposes.

Provision is made for transceiver operation with a compatible transmitter by feeding signals from the heterodyne oscillator of the first converter, the variable oscillator of the second converter, and an amplified signal from the b.f.o. to output jacks at the rear of the chassis. Provision is also made for frequency-shift keying of the variable-frequency oscillator in this application. Frequency is shifted by keying a biasing voltage to a diode switch built into the oscillator unit. Shift is adjustable by a screwdriver control. Jacks are also provided at the rear of the chassis for making muting and anti-VOX connections.

Assembly

There are 826 parts to this kit, and 644 soldered connections to be made, so the week end will have to be a rather long one. The writer spent some 50-odd hours on the job, which is probably about par. But, after assembly is finished, the receiver can be completely aligned in 15 minutes or less using the crystal calibrator (V_{10}) and S meter. The instruction book lives up to Heath's usual excellence. Chassis punchings are accurate and the major components fall into place quite readily. The r.f. and i.f. sections are printed-circuit subassemblies with component locations well identified. You'll have a lot of fun assembling these boards and doing the little actual wiring required. A prefabricated harness makes the cabling of control and power wiring unnecessary. But we'll be surprised if even a Parson Brown will be able to suppress a few strong words before he finishes the wiring under the rear left corner of the chassis and completes the connections to the headphone jack. In these areas it would seem that there might be room for improvement in the prescribed sequence, if not in the somewhat wider dispersal of components. However, we feel sure that any expletives at this point will be taken back later after a short or two have been run down and the receiver is functioning. One of these hidden shorts (directly across the power supply —and you can't do much worse than that) burned out two 2-watt filter resistors in the supply without blowing the 2-amp. fuse supplied with the kit. Since these resistors are in the over-populated area mentioned and therefore hard to replace, it might be a good idea to substitute a lighter fuse, at least until you are sure the wiring is clear. Over a considerable period of time, a 1-amp. fuse has proved to be adequate, although it should be of the "slow-blow" type to take care of the initial charging current through the low-resistance diodes to the filter capacitors when the receiver is turned on.

Performance

Although no precise measurements were made, from a practical operational viewpoint an excellent job appears to have been done on the preassembled variable oscillator (which Heath calls the LMO, or linear master oscillator). Frequency drift appears to be exceedingly low. During the first minute or two after a cold start, the frequency wandered off about 200 cycles and then returned to zero beat where it stayed. Applying heat to the oscillator compartment until it felt warm to the touch did not drive the signal off zero beat with the calibrator. Ordinary changes in line voltage have no noticeable effect on frequency, even though there are no voltage regulators in the receiver. An abrupt drop in line voltage to 70 volts caused a momentary deflection of a few hundred cycles, but the beat note returned rapidly so close to the original that it was impossible to detect a difference by ear. The receiver continued to function at this low voltage, although at somewhat reduced gain. The stability under reasonable mechanical shock or vibration is also good, barring a microphonic tube in the oscillator. (There are three other 6AU6s that you can swap in such an event, although you may have to reset the dial zero.)

The oscillator circuit is a form of Colpitts with only a moderate amount of C, but with the circuit loosely coupled to the tube through a 10-pf. capacitor. The output from the oscillator plate circuit is stepped down to low impedance through

Heathkit SB-300 Communications Receiver

Height: 6⅝ inches.
Width: 14⅞ inches.
Depth: 13⅜ inches.
Weight: 17 pounds.
Power Requirements: 115 v.a.c., 50 watts.
Price Class: $265.

a transformer. Details of temperature-compensating measures, if any, are not furnished.

Heath has turned out a simple but well-working dial for the SB-300. The mechanism is of the internal pinch-ring type which can't be damaged by continuing to turn against the end stops. It takes 6 turns of the control knob to rotate the calibrated dial through 360 degrees which covers 100 kc. (30 turns for the complete 500-kc. range). The resulting bandspread makes s.s.b. or c.w. tuning quite easy. There is no observable backlash. An auxiliary slide-rule-type scale operated by a follower against a plastic spiral cam on the back of the calibrated dial tells you which 100 kc. you are tuning in. The calibrated dial has marks every kilocycle, and these lines are spaced about ⅛ inch. The scale is linear, and so is the oscillator tuning. Once the fiduciary hairline is set for a band by the small knob on the dial escutcheon, the 100-kc. calibrator signal shows up smack on zero at every revolution of the calibrated dial. Several spot checks at intermediate points showed that the oscillator tuning is very close to being truly linear.

Overload characteristics appear to be reasonably good, as judged by the performance close to the signals from three or four one-kw. beam stations within a radius of two miles or less, with the r.f. gain control at maximum. There is no tendency to pull the oscillator frequency even when the receiver input is well overloaded by the signal from the station's own transmitter.

The manufacturer's performance figures are as follows.

Sensitivity: Less than 1 μv. for 15-db. signal plus noise-to-noise ratio for s.s.b.

Image rejection: Better than 50 db.

Internal spurious: Below equivalent antenna input of 1 μv.

Drift: 100 cycles per hour after 20 minutes under normal ambient conditions.

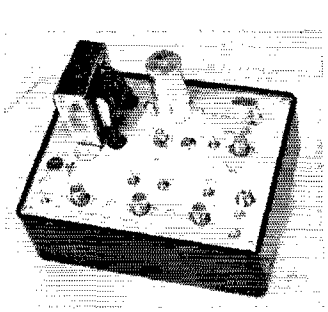
Line voltage: Less than 100 cycles for a change of plus or minus 10 per cent.

Dial visual accuracy: 200 cycles on all bands.

Dial accuracy: 400 cycles on all bands after setting against 100-kc. calibrator.

Backlash: No more than 50 cycles.

Use of the receiver under actual operating conditions has led to no suspicion that these claims are excessive. — *D. H. M.*

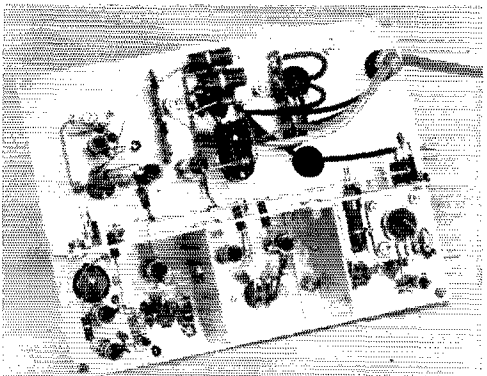


Parks Two-Meter Converter, Model 144-1

At first glance the Parks 144-Mc. converter appears to be merely another Nuvistor job. This is not bad, as the Nuvistor has established itself as a favorite tube type for v.h.f. converter use. More careful examination of the Parks converter shows that it has several features of more than ordinary interest, in addition to its all-Nuvistor lineup.

Four 6CW4s are used in the conventional cascode circuit, with crystal-controlled injection, but the designer (whose call, appropriately enough, is W7UHF) included several neat tricks that help to achieve desirable objectives, including uniform response across the band, disarming simplicity of circuit and mechanical layout, and good rejection of out-of-band signals.

At the lower right of the bottom view is the first r.f. stage, the neutralized-triode portion of the cascode amplifier — nothing unusual here. The plate coil of the first stage, L_3, is in the center compartment, shielded from the input, presumably to aid in neutralization. As shown in the partial circuit diagram, Fig. 1, the plate circuit is link-coupled to the cathode of the second, or grounded-grid, stage of the cascode. Our guess is that this gives a better match between stages, and somewhat more selectivity than is usual in this portion of the cascode circuit. It also permits the grid to be grounded directly, eliminating the



Bottom view of the Parks Converter. R.f. amplifier and mixer stages, left to right, are below the horizontal shield. At the upper left is the oscillator circuitry. Unit has built-in power supply, upper center.

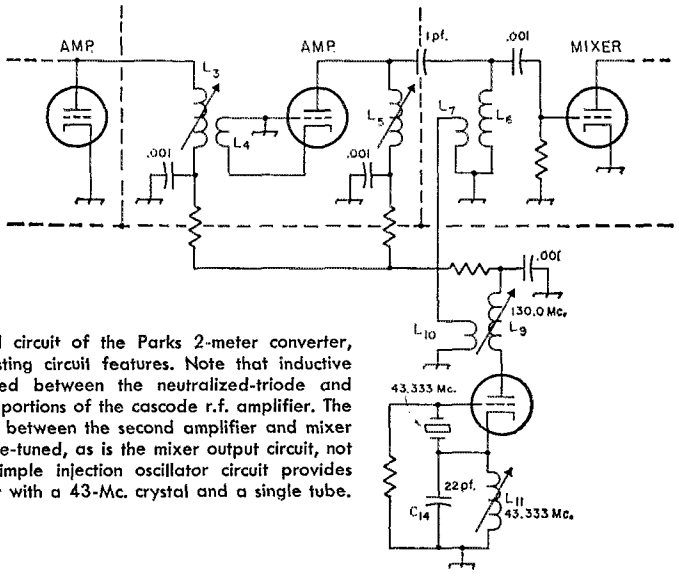


Fig. 1—Partial circuit of the Parks 2-meter converter, showing interesting circuit features. Note that inductive coupling is used between the neutralized-triode and grounded-grid portions of the cascode r.f. amplifier. The coupling circuit between the second amplifier and mixer stages is double-tuned, as is the mixer output circuit, not shown here. Simple injection oscillator circuit provides 130-Mc. output with a 43-Mc. crystal and a single tube.

sometimes-tricky bypassing of this point needed in the series-cascode circuit.

Coupling between the second r.f. plate and mixer grid is by means of a double-tuned circuit, L_5L_6, which should aid in obtaining a bandpass response. The mixer output circuit is also double-tuned, for the same reason, and there is resistive matching of the i.f. output, for efficient coupling to the communications receiver input circuit.

The crystal oscillator arrangement is unusual, in that a single Nuvistor is used to give 130-Mc. injection with a 43.333-Mc. crystal. The circuit is a triode oscillator for use with overtone crystals. The tuned circuit in the cathode lead, $L_{11}C_{14}$, resonates at or near the overtone frequency of the crystal, in this case 43.333 Mc. The plate circuit, L_9, is tuned to the desired harmonic of the oscillation frequency, in this instance the third, 130 Mc. Output at this frequency is loosely link-coupled to the mixer grid circuit, L_6, visible in the upper left portion of the picture, on the upper side of the lateral shield plate.

The built-in power supply uses a small transformer, diode rectifiers, and an *RC* filter. These components and the switch and pilot light occupy the upper center portion of the converter as seen in the picture.

Parks Converter, Model 144–1

Height: 5 inches, approx.
Width: $5\frac{9}{32}$ inches.
Depth: $6\frac{13}{16}$ inches.
Power requirement: 115 volts a.c.
Price Class: $50.
Manufacturer: Parks Electronics Laboratory, Beaverton, Oregon.

Neat appearance is achieved through the use of a satin-finished anodized aluminum panel, and sharp printed lettering. The case is black molded plastic with its inner surface sprayed with conductive paint to provide shielding.

No electronic device can "have everything." Where a choice had to be made between low noise figure and the ultimate in freedom from overload, the designer went for the former. The result is a noise figure about as low as you'll find in v.h.f. equipment of moderate cost. The maker claims 3 db., and we're not inclined to argue with him. He freely admits that it is possible to build in somewhat better resistance to overloading by in-band signals by some sacrifice in weak-signal performance, but offers to accept return for refund of any converter that turns out to be unsatisfactory in circumstances where overloading is an extreme problem.

Also supplied by the same maker: crystal-controlled converters for 50 and 220 Mc.; preamplifiers for 144 and 220 Mc. All are sold with built-in power supply. Converters are supplied for any of the popular i.f. tuning ranges.

— *E. P. T.*

Strays

The Tri-State VHF Net of Bergen and Passaic Counties, N. J., has accepted the challenge of making ham operators out of some of the patients at the Multiple Sclerosis Service Organization Home in Chester, N.J. The net needs help in the way of equipment, code records, etc. Please contact Thomas R. Burney, WB2COY, 89 Fairview Ave., Bergenfield, N. J., for further information.

—•••—

Stolen from W9ODD (Radio Amateurs of Marquette Univ., 1515 West Wisconsin Ave., Milwaukee, Wis.): on April 18 an HQ-170, serial No. 2093; on May 18 a Viking Ranger, serial No. 60271. Hams and dealers are urged to keep their eyes open for this gear and advise the club if spotted.

Happenings of the Month

Reciprocal Operating Bill Becomes Law
Examination Schedule, July-December
Third Party, Canada/Peru
Board Meeting Minutes

PRESIDENT SIGNS GOLDWATER BILL

On May 28, 1964, President Johnson signed Senate Bill 920, amending the Communications Act of 1934 so as to permit reciprocal operating agreements between the United States and other countries.

The job is not completely over yet. The State Department will now have to enter into agreements with individual countries willing to allow U.S. citizens to operate when their own citizens are permitted to operate here.

Passage of the bill came exactly three years after W6MLZ and other ARRL officials had discussed the problem with Senator Barry Goldwater at the Southwestern Division Convention in Phoenix, Arizona. The Senator, 6BPI in the "good old days", has pushed the bill all the way, and in the process. renewed his own personal interest in hamming, having acquired K3UIG and K7UGA since introducing the bill.

A pertinent portion of the new text appears below.

Section 303 . . . (a) . . . (2) Notwithstanding section 301 of this Act and paragraph (1) of this subsection, the Commission may issue authorizations, under such conditions and terms as it may prescribe, to permit an alien licensed by his government as an amateur radio operator to operate his amateur radio station licensed by his government in the United States, its possessions and the Commonwealth of Puerto Rico provided there is in effect a bilateral agreement between the United States and the alien's government for such operation on a reciprocal basis by United States amateur radio operators: Provided, That when an application for an authorization is received by the Commission, it shall notify the appropriate agencies of the Government of such fact, and such agencies shall forthwith furnish to the Commission such information in their possession as bears upon the compatibility of the request with the national security: And provided further, That the requested authorization may then be granted unless the Commission shall determine that information received from such agencies necessitates denial of the request. Other provisions of this Act and of the Administrative Procedure Act shall not be applicable to any request or application for or modification, suspension, or cancellation of any such authorization.

THIRD PARTY CANADA/PERU

The governments of Canada and Peru have agreed to permit the handling of messages or other communications on behalf of third parties between amateur stations of the two countries, effective May 8. The amateur stations must not be paid direct or indirect compensation and messages must be of a technical or personal nature such that recourse to public telecommunications services would not be justified.

Canada has previously signed similar agreements with the United States, Venezuela, Costa Rica, Honduras, Mexico, Chile, El Salvador and Bolivia.

The United States has third party agreements with Bolivia, Canada, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Haiti, Honduras, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru and Venezuela.

LICENSE REVOKED

Another amateur license has been revoked because the amateur did not answer his mail from the Federal Communications Commission. An Order to Show Cause was issued January 29, 1964 to James Clarence Nix, W5VKV of Bossier City, Louisiana for failure to answer its letters of July 5 and October 3, 1963. No answer having been received, the Review Board certified the case to the FCC on March 19, and the FCC issued an Order of Revocation effective on May 11, 1964.

MIXED CODE FOR PRACTICE

In a quiet liberalization of a long-standing interpretation, the FCC currently permits the transmission of combinations of letters and numerals having no particular meaning or intent for code practice. The groups should be interspersed with frequent announcements explaining that they are intended for code practice only and do not convey any meaning beyond that which each letter or numeral signifies by itself. In other words, mixed number-letter groups sent for code practice are no longer considered as "codes and ciphers" within the meaning of section 97.117 (old 12.105).

COMPUTER PROBLEMS AT FCC

During the shake-down period of the new FCC computer and its use on amateur applications there may be some errors made in issuing amateur radio licenses. Licensees have a responsibility to check the name, address, call sign and class of license, and to notify the Federal Communications Commission, Washington, D. C., 20554 of any errors, at the same time returning the defective license.

In particular, amateurs should take note that

if a license is issued bearing higher privileges than the holder is supposed to have, the licensee may not use the additional privileges, but should return the faulty "ticket" at once.

It would appear that an amateur who has to return a license to FCC may enter that fact in his logbook and then continue to operate as though the license had been correctly issued until he hears further from the Commission.

EXAMINATION SCHEDULE

For the convenience of those planning to take an FCC examination for General or Extra Class license, we present below a tentative schedule of dates and places for the latter half of 1964. All examinations begin promptly at 9 A.M. except as noted. IMPORTANT: New rules require that an applicant submit his application Form 610 (August 1963 revision) *in advance*, particularly when he wishes to appear at one of the field points. The application, accompanied by a check or money order for $4.00, should be sent to the Engineer-in-Charge of the district in which the applicant resides. Where the schedule below indicates a choice of dates or places, the applicant may indicate his preference. The District Engineer will then notify the applicant when and where to appear. (Applicants for Novice, Technician or Conditional Class licenses should follow the new procedures outlined on page 79 of December, 1963 *QST*.)

Albuquerque, New Mexico: October 10, 1:00 P.M.
Amarillo, Texas: September 11, 8:00–12 A.M.
Anchorage, Alaska, Room 55, U.S. Post Office Building: By appointment.
Atlanta, Georgia, 2010 Atlanta Merchandise Mart, 240 Peachtree Street NE: Tuesday and Friday, 8:30 A.M.
Baltimore, Maryland, 415 U.S. Customhouse, Gay and Water Streets: Monday and Friday, 8:30–10:00 A.M., and by appointment.
Beaumont, Texas, 301 Post Office Building, 300 Willow Street: By appointment.
Birmingham, Alabama: September 2 and December 2, 1:00 P.M.
Boise, Idaho: Sometime in October.
Boston, Massachusetts, 1600 Customhouse: Wednesday, Thursday and Friday, 8:30–10:00 A.M.
Buffalo, New York, 328 Post Office Building: First and Third Friday.
Charleston, West Virginia: Sometime in September and December.
Chicago, Illinois, 826 U.S. Courthouse: Friday.
Cincinnati, Ohio: Sometime in August and November.
Cleveland, Ohio: Sometime in September and December.
Columbus, Ohio: Sometime in July and October.
Corpus Christi, Texas: September 3 and December 3.
Dallas, Texas, Room 707, 1314 Wood Street: Tuesday.
Davenport, Iowa: Sometime in July and October.
Denver, Colorado, 521 New Customhouse: First and second Thursday, 8:00 A.M.
Des Moines, Iowa: Sometime in September and December.
Detroit, Michigan, 1029 Federal Building: Wednesday and Friday.
Fairbanks, Alaska: Sometime in November.
Fort Wayne, Indiana: Sometime in August and November.
Fresno, California: Sometime in September and December.
Grand Rapids, Michigan: Sometime in July and October.
Great Falls, Montana: Sometime in September.
Hartford, Connecticut: September 16.
Hilo, Hawaii: October 6.
Honolulu, Hawaii, 502 Federal Building, 335 South King Street: Tuesday, Wednesday and Thursday, 8:00–9:30 A.M. and by appointment.
Houston, Texas, Room 5636, New Federal Office Building: Tuesday, 8:00–10:00 A.M.
Indianapolis, Indiana: Sometime in August and November.
Jackson, Mississippi: December 2, 1:00 P.M.
Jacksonville, Florida: October 14 and 15.
Jamestown, North Dakota: October 14, 11:00 A.M.
Kansas City, Missouri, 3100 Federal Office Building, 911 Walnut Street: Thursday and Friday, 8:30–11:00 A.M.
Knoxville, Tennessee: September 16 and December 16, 1:00 P.M.
Lihue, Kauai, Hawaii: November 3.
Little Rock, Arkansas: August 5 and November 4, 1:00 P.M.
Los Angeles, California, Room 50, 849 South Broadway: Wednesday, 9:00 A.M. and 1:00 P.M.
Louisville, Kentucky: Sometime in August and November.
Memphis, Tennessee: July 9 and October 8, 8:30 A.M.
Miami, Florida, Room 919, 51 S.W. First Avenue: Thursday.
Milwaukee, Wisconsin: Sometime in July and October.
Mobile, Alabama, 439 U.S. Court and Customhouse: Wednesday by appointment.
Nashville, Tennessee: August 5 and November 4, 1:00 P.M.
New Orleans, Louisiana, 608 Federal Office Building, 600 South Street: Monday, 8:30 A.M.
New York, New York, 748 Federal Building, 641 Washington Street: Tuesday through Friday, exam must be started by noon.
Norfolk, Virginia, 405 Federal Building: Friday, 9:00 A.M. to 4:30 P.M.
Oklahoma City, Oklahoma: July 17 and October 16.
Omaha, Nebraska: Sometime in July and October.
Philadelphia, Pennsylvania, 1005 New U.S. Customhouse: Monday, Tuesday and Wednesday, 9:00–10:00 A.M.
Phoenix, Arizona: Sometime in July and October.
Pittsburgh, Pennsylvania: Sometime in August and November.
Portland, Maine: October 13.
Portland, Oregon, 441 New U.S. Courthouse, 620 S.W. Main Street: Friday, 8:45 A.M.

The ARRL Board of Directors held its formal annual meeting on May 1, 1964, following two days of informal meetings, inspection of the League headquarters, observation of its activities and the like. *First row, from the left:* General Counsel Booth, Vice President Handy, General Manager Huntoon, First Vice President Groves, President Hoover, Vice President Reid, Northwestern Director Roberts, Treasurer Houghton. *Second row:* New England Director Chaffee, Hudson Director Kahn, Delta Director Spencer, Pacific Director Engwicht, West Gulf Director Best, Dakota Director Compton, Southwestern Director Meyers, Midwest Director Denniston. *Third row:* Southeastern Director Moss, Roanoke Director Anderson, Canadian Director Eaton, Atlantic Director Crossley, Central Director Haller, Rocky Mountain Director Smith and Great Lakes Director Cartwright.

Roanoke, Virginia: October 3.
St. Louis, Missouri: Sometime in August and November.
St. Paul, Minnesota, 208 Federal Courts Building, Sixth and Market Streets: Friday, 8:45 A.M.
Salt Lake City, Utah: September 11 and December 11, 1:00 P.M.
San Antonio, Texas: August 6 and 7, and November 5 and 6.
San Diego, California, Fox Theatre Building, 1245 Seventh Avenue: Wednesday by appointment.
San Francisco, Calif., 323A Customhouse, 555 Battery Street: Friday.
San Juan, Puerto Rico, 322–323 Federal Building: Friday.
San Pedro, California, 356 West Fifth Street: Wednesday, 8:00 A.M.
Savannah, Georgia, 238 Post Office Building: By appointment.
Schenectady, New York: September 9 and 10, and December 2 and 3; 9:00 A.M., and 1:00 P.M.
Seattle, Washington, 806 Federal Office Building, First and Marion Street: Friday.
Sioux Falls, South Dakota: September 1 and December 1, 1:00 P.M.
Spokane, Washington: Sometime in October.
Syracuse, New York: Sometime in July and October.
Tampa, Florida, Room 201, 221 North Howard Avenue, By appointment.
Tucson, Arizona: Sometime in October.
Tulsa, Oklahoma: July 15 and October 14.
Wailuku, Maui, Hawaii: October 20.
Washington, D.C., Room 10110, 1101 Pennsylvania Avenue N.W.: Tuesday and Friday, 9:30 A.M., and 1:00 P.M.
Wichita, Kansas: Sometime in September.
Williamsport, Pennsylvania: Sometime in September and December.
Wilmington, North Carolina: December 5.
Winston-Salem, N. C.: August 15 and November 7.

Minutes of 1964 Annual Meeting of the Board of Directors The American Radio Relay League, Inc.

May 1, 1964

1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in annual session at the Shoreham Hotel, Hartford, Connecticut, on May 1, 1964. The meeting was called to order at 9:52 A.M., with President Herbert Hoover, Jr., in the Chair and the following directors present:

P. Lanier Anderson, Jr., Roanoke Division
Roemer O. Best, West Gulf Division
Dana E. Cartwright, Great Lakes Division
Milton E. Chaffee, New England Division
Charles G. Compton, Dakota Division
Gilbert L. Crossley, Atlantic Division
Robert W. Denniston, Midwest Division
Noel B. Eaton, Canadian Division
Harry M. Engwicht, Pacific Division
Philip E. Haller, Central Division
Morton B. Kahn, Hudson Division
Raymond E. Meyers, Southwestern Division
Thomas M. Moss, Southeastern Division
R. Rex Roberts, Northwestern Division
Carl L. Smith, Rocky Mountain Division
Philip P. Spencer, Delta Division

Also in attendance, as members of the Board without vote, were Wayland M. Groves, First Vice-President; Alex Reid, Vice-President; F. E. Handy, Vice-President; John Huntoon, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were Canadian Division Vice-Director Colin C. Dumbrille, Hudson Division Vice-Director Harry J. Dannals, New England Division Vice-Director Bigelow Green, Southeastern Division Vice-Director Charles J. Bolvin, and Southwestern Division Vice-Director Virgil Talbott. There were also present Treasurer David H. Houghton, General Counsel Robert M. Booth, Jr., Associate Counsel for Canada Arthur K. Meen, Assistant General Manager Richard L. Baldwin, Technical Director George Grammer, and Assistant Secretary Perry F. Williams.

2) On motion of Mr. Eaton, unanimously VOTED that the minutes of the 1963 annual meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

3) On motion of Mr. Chaffee, unanimously VOTED that the annual reports of the officers to the Board of Directors are accepted and the same placed on file.

4) Mr. Chaffee, as Chairman, presented the report of the Finance Committee; Mr. Anderson, as Chairman, stated that the Planning Committee had no assignments and therefore no report; Mr. Meyers, as Chairman, presented the report of the Membership and Publications Committee; Mr. Smith, as Chairman, presented the report of the Public Relations Committee; Mr. Groves, as Chairman, presented the report of the Merit and Awards Committee; Mr. Kahn, as Chairman, presented the report of the Housing Committee.

5) On motion of Mr. Denniston, unanimously VOTED that the annual reports of the directors to the Board of Directors are accepted and the same placed on file.

6) At this point, supplementary oral reports were rendered by the officers of the League, and the General Counsel discussed at length various legislative and regulatory matters affecting amateur radio and the League, with particular reference to assistance provided by his office to local attorneys of amateurs in difficulty with municipal or county zoning or other regulations. During the course of these discussions, the Board was in recess from 10:58 A.M. to 11:15 A.M.

7) On motion of Mr. Best, unanimously VOTED that the Board commends the General Counsel for his extensive efforts in assisting League members and their local attorneys involved in regulatory difficulties, and for his continuing regular representation of the League in its Washington affairs.

8) Moved, by Mr. Smith, that the Board of Directors reaffirm the resolution, adopted at its annual meeting of May 3, 1963, concerning extension of the existing incentive licensing structure in the United States and approve the action of the League's officers and Executive Committee in submitting to the Federal Communications Commission a petition for rulemaking to implement the foregoing resolution, to which the Commission has assigned File No. RM-499. Unanimous consent was granted to show Messrs. Best and Roberts as jointly seconding the motion. The yeas and nays being ordered upon request, the question was decided in the affirmative: Whole number of votes cast, 15; necessary for adoption, 8; yeas, 14; nays, 1; all the directors voted in the affirmative except Mr. Spen-

OFFICERS' REPORTS AVAILABLE TO MEMBERS

Each year the officers of the League make comprehensive written reports to the directors. The Board has made these reports available to interested members, in a volume which also includes reports of the directors. The cost price is 75 cents per copy, postpaid. A copy of the financial statement only is available without charge. Address the General Manager at Newington, Conn.

cer, who voted opposed, and Mr. Eaton, who abstained as requested in By-Law 11. So the motion was adopted.

9) The Board was in recess for luncheon from 12:25 P.M. to 1:52 P.M.

10) On motion of Mr. Roberts, unanimously VOTED that the General Manager shall be an ex-officio member of all committees appointed by the President.

11) On motion of Mr. Engwicht, unanimously VOTED that the Finance Committee is instructed to study a procedure for receiving financial gifts after the Building Fund drive is completed.

12) On motion of Mr. Engwicht, after discussion, unanimously VOTED that the Board recommends the Editor of *QST* give increased coverage of activities of the International Amateur Radio Union.

13) On motion of Mr. Engwicht, after discussion, unanimously VOTED that the Editor of *QST* carefully appraise material from overseas radio amateur and electronics magazines, with a view to reprinting certain articles in *QST* when appropriate.

14) Moved, by Mr. Engwicht, that the General Manager be instructed to create a policy of payment to *QST* authors; but there was no second, so the motion was lost.

15) On motion of Mr. Anderson, after extended discussion, unanimously VOTED that the Communications Manager study the practicability of reimbursing all National Traffic System officials, above the section level, for travel in line with existing practices covering SCMs, SECs, and QSL Managers.

16) On motion of Mr. Moss, unanimously VOTED that the Board extends its appreciation to the Field Engineering Bureau and the Amateur & Citizens Division of the Federal Communications Commission, and to the Telecommunications Division of the Department of Transport of Canada, for their continuing assistance and cooperation in administering affairs of the amateur body during the past year.

17) Moved, by Mr. Meyers, that the Communications Department discontinue the use of multipliers for sections worked in all future v.h.f. contests. After discussion, on motion of Mr. Smith, unanimously VOTED that the matter is laid on the table.

18) Moved, by Mr. Meyers, that, based on a petition received from League members residing in Orange, Riverside, and San Bernadino Counties, a new section in the Southwestern Division be established in the area involved, and that the Communications Department be instructed to call for nominations for the office of Section Communications Manager in this new section. After discussion, on motion of Mr. Crossley, VOTED to amend the motion to request the Communications Manager to make a study of this matter, in line with Rule 2 of the Rules and Regulations governing the Communications Department, and to include a study of section boundaries in the State of Florida. Whereupon the motion as amended was unanimously ADOPTED.

19) On motion of Mr. Meyers, unanimously VOTED that the Board of Directors expresses its sincere appreciation to the Honorable Barry Goldwater, K7UGA, for his efforts in behalf of amateurs throughout the world by vigorously supporting Senate Bill 920 in both the Senate and the House.

20) On motion of Mr. Best, unanimously VOTED that the Board expresses its sincere thanks and appreciation for the untiring work and devotion to the League and to amateur radio by the Vice-Directors, Assistant Directors, SCMs, SECs, QSL Managers and all members of the League; their contribution to amateur radio has done much to enhance amateur value in the field of public interest, convenience and necessity.

21) On motion of Mr. Best, unanimously VOTED that the Board expresses its deep appreciation to the several vice-directors present for their demonstration of interest in League affairs by their attendance at this meeting, since vice-directors incur the expense of attendance out of their own pocket and are to be commended for their interest in the American Radio Relay League and actions of the Board, their attendance and devotion going far beyond the call of duty.

22) On motion of Mr. Best, unanimously VOTED that the Board extends its special thanks to the many amateurs and clubs who have contributed to the Building Fund, and that the Board requests continued support of this project until the goal has been reached.

23) On motion of Mr. Best, unanimously VOTED that the Board of Directors expresses its appreciation and approval of the activities of the Rotarians of Amateur Radio, and the Society for the Promotion of Amateur Radio Communications Services, in their programs of making amateur radio station equipments available to our prospective fellow amateurs overseas.

24) On motion of Mr. Eaton, unanimously VOTED that, recognizing that a World's Fair is to be held in Montreal in 1967, the League authorizes the holding of an ARRL National Convention in Montreal from June 30 through July 2, 1967, under the joint sponsorship of a group of amateurs representing the Radio Amateurs du Quebec, Inc., and the Montreal Amateur Radio Club — the two major associations in Quebec.

25) On motion of Mr. Crossley, after discussion, unanimously VOTED that the Board requests the Communications Manager and staff to continue to review and study the League contest patterns and objectives with a view to progressive improvement, and possible additional limitations of timing, duration and other factors that might be specified in the applicable rules.

26) On motion of Mr. Meyers, unanimously VOTED to take from the table his motion concerning multipliers in v.h.f. contests. On motion of Mr. Crossley, unanimously VOTED to amend the motion to provide that this matter is referred to the Communications Manager for study. Whereupon the motion as amended was unanimously ADOPTED.

27) On motion of Mr. Compton, unanimously VOTED that the Board extends its special thanks to Lloyd Colvin, W6KG, for his sponsorship of a future annual monetary award, known as the Colvin Award, to a deserving radio amateur.

BOARD THANKS VOLUNTEER A.R.R.L. OFFICIALS

In reviewing the work of the League for the past year the ARRL Board of Directors again found that much of our progress is due to the volunteer efforts of elected and appointed officials in the administrative and field organization of our association. By unanimous action the Board has again expressed its sincere thanks to the Vice-Directors, assistant directors, SCMs, SECs and QSL Managers — an action which we know all amateurs will heartily endorse.

28) Moved, by Mr. Spencer, that the Articles of Association of the American Radio Relay League, Inc., be amended so that Article 7 shall read as follows: "During the intervals between meetings of the Board of Directors the affairs of the corporation shall be administered by an Executive Committee consisting of the President, the First Vice-President, and the General Manager. The Board of Directors, in its discretion, may also appoint from amongst its members not more than six additional members of the Executive Committee to serve for fixed terms between regular meetings of the Board of Directors. The Executive Committee shall meet no less often than bi-monthly. The Executive Committee may in its discretion submit for determination or decision by the members of the Board of Directors by mail vote any proposal pending before the Executive Committee. When such submission is made, it shall be made in precise terms embodying the text of a proposed resolution. Such resolution shall be deemed adopted upon the receipt of the affirmative mail votes of at least 60% of the members of the Board. Otherwise, it shall be deemed rejected. Such action shall be binding upon the Executive Committee." But there was no second, so the motion was lost.

29) Moved, by Mr. Spencer, that the President appoint a committee to study the Articles of Association and the By-Laws of the League and make their recommendations to the next annual meeting of the Board, with the assistance of the General Counsel. Mr. Best wished to be recorded as seconding the motion. After discussion, moved, by Mr. Crossley, to lay the matter on the table. After further discussion, the yeas and nays being ordered upon request, the question was decided in the affirmative: whole number of votes cast, 16; necessary for adoption, 9; yeas, 10; nays, 6. Those who voted in favor were Messrs. Cartwright, Chaffee, Compton, Crossley, Denniston, Eaton, Engwicht, Kahn, Roberts, Smith; those who voted opposed were Messrs. Anderson, Best, Haller, Meyers, Moss, Spencer. So the matter was laid on the table.

30) The Board was in recess from 3:40 P.M. to 3:54 P.M.

31) At this point, Mr. Kahn called attention of the directors to the plans for presentation, at the 1964 ARRL National Convention in New York City, of special plaques of commendation to ARRL divisions which have by that time achieved 100% of their quotas in the Building Fund drive.

32) On motion of Mr. Denniston, after discussion, VOTED that the Board of Directors approves the affiliation of the American Radio Relay League with the new Inter-American Union of Radio Amateu s — Region II Division of the International Amateur Radio Union — subject to approval of the constitution by the General Counsel, and heartily endorses the objectives of the new organization in international cooperation and coordination of amateur affairs of common interest. Mr. Eaton wished to be recorded as seconding the motion, and Mr. Spencer wished to be recorded as voting opposed.

33) On motion of Mr. Chaffee, the following resolution was unanimously ADOPTED:

WHEREAS, on August 22, 1963, George Hart completed 25 years of continuous service to the American Radio Relay League, be it

RESOLVED, that the Board of Directors, meeting in Hartford, Connecticut, May 1, 1964, in recognition of George Hart's untiring efforts on behalf of the League, does hereby express its deep appreciation of his loyality, fidelity, and intelligent devotion to the best interest of amateur radio.

34) On motion of Mr. Meyers, unanimously VOTED that the General Manager is hereby authorized to reimburse the division directors for actual expenses incurred by them during the year 1964, in the proper administration of ARRL affairs in their respective divisions, up to amounts as follows:

Canadian Division Director	$1500
Atlantic Division Director	2400
Central Division Director	2600
Dakota Division Director	800
Delta Division Director	2250
Great Lakes Division Director	2300
Hudson Division Director	1500
Midwest Division Director	900
New England Division Director	1000
Northwestern Division Director	1000
Pacific Division Director	2400
Roanoke Division Director	750
Rocky Mountain Division Director	1500
Southeastern Division Director	2300
Southwestern Division Director	2400
West Gulf Division Director	2000

35) On motion of Mr. Haller, unanimously VOTED that, to continue the Board's policy of reimbursing Section Communications Managers and QSL Managers of the League for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1964 a total amount not to exceed $12,500 under terms prescribed by the Communications Manager following the general pattern established by the Board.

36) On motion of Mr. Roberts, unanimously VOTED that, to continue the Board's policy of reimbursing Section Emergency Coordinators for certain travel in furthering ARRL organization activities, the General Manager is hereby authorized to pay during the year 1964 a total amount not to exceed $9,500 under terms prescribed by the Communications Manager following the general pattern established by the Board.

37) On motion of Mr. Best, unanimously VOTED that the General Manager is hereby authorized to pay, during the period between January 1, 1965, and the 1965 meeting of the Board, expenses against usual authorizations for the administrative and committee operations in no greater amounts than 1964 authorized amounts.

38) On motion of Mr. Chaffee, unanimously VOTED that the Board adopts the recommendations of the Finance Committee as concerns an expense reimbursement policy for directors of the American Radio Relay League, Inc.

39) On motion of Mr. Meyers, after discussion, unanimously VOTED that the Board adopts recommendations of the Membership and Publications Committee.

40) On motion of Mr. Smith, unanimously VOTED that the Board accepts the report of the Public Relations Committee.

41) On motion of Mr. Smith, unanimously VOTED that consideration be given to an ARRL field corps, composed of prominent radio amateurs and elected League officials and augmented by the Headquarters staff, for the purpose of maintaining liaison with member and non-member amateur groups to appear before civic organizations, service clubs and school science groups for the specific purpose of upgrading the public image of amateur radio and increasing the stature of the amateur service and the League in the public interest, convenience and necessity.

42) On motion of Mr. Smith, unanimously

VOTED that the public relations within the League be increased through review of the various ARRL award programs already established, and a summary of past recipients of each of the special awards, such as the ARRL Merit and Cover Plaque awards, be regularly featured in *QST* on an annual basis.

43) On motion of Mr. Groves, unanimously VOTED that the report of the Merit and awards Committee is accepted and the same placed on file, and that the work of the committee is continued.

44) On motion of Mr. Chaffee, unanimously VOTED that the Board now discharges its Housing Committee, and expresses special thanks to Chairman Kahn for outstanding achievements in planning and guiding construction of a new headquarters administration building for the League. (Applause).

45) On motion of Mr. Chaffee, after discussion, unanimously VOTED that the Finance Committee is directed to discuss with Arthur L. Budlong an adjustment of his retirement remuneration as the result of the revision of the League's retirement program which became effective in June of 1962, and that the Executive Committee is authorized to approve and adopt a settlement which, in the Executive Committee's opinion, is satisfactory.

(46) On motion of Mr. Meyers, unanimously VOTED that the Board commends and approves the action of the Executive Committee in planning and implementing a program of modernizing and refurbishing the Maxim Memorial Station, W1AW.

47) The Chair announced the opening of nominations for the appointment of additional members to the Executive Committee. Mr. Kahn nominated Mr. Denniston, Mr. Chaffee nominated Mr. Eaton; Mr. Smith nominated Mr. Compton; Mr. Anderson nominated Mr. Chaffee; Mr. Haller nominated Mr. Engwicht; Mr. Best nominated Mr. Meyers; Mr. Roberts nominated Mr. Cartwright. On motion of Kahn, unanimously VOTED that the nominations are closed. The Chair appointed Messrs. Dannals and Dumbrille as Tellers. The Tellers announced the result of the balloting as follows:

Mr. Denniston.....14	Mr. Engwicht.....4
Mr. Eaton.....11	Mr. Meyers.....6
Mr. Compton.....15	Mr. Cartwright.....3
Mr. Chaffee.....11	

Whereupon, the Tellers declared Robert W. Denniston, Noel B. Eaton, Charles G. Compton and Milton E. Chaffee elected as members of the Executive Committee.

48) The Chair announced the opening of nominations for the appointment of special members of the Executive Committee. Mr. Anderson nominated Mr. Houghton; Mr. Chaffee nominated Mr. Handy. On motion of Mr. Engwicht, unanimously VOTED that the nominations are closed and the Secretary is directed to cast one ballot electing Francis E. Handy and David H. Houghton as special members of the Executive Committee.

49) The Chair announced the opening of nominations for the election of President. On the suggestion of Mr. Chaffee, unanimous consent was GRANTED to elect League officers *en bloc*. On motion of Mr. Chaffee, unanimously VOTED that Herbert Hoover, Jr., is re-elected as President; Wayland M. Groves as First Vice President; Francis E. Handy and Alex Reid as Vice Presidents; John Huntoon as Secretary; and David H. Houghton as Treasurer, all for two-year terms.

50) On motion of Mr. Compton, unanimously VOTED, at 5:35 P.M., that the Board does now resolve itself into a Committee on the Whole to consider an adjustment in the salary of the General Manager. At the request of the Board, Headquarters personnel left the meeting. The Chair appointed Arthur K. Meen as Secretary of the Committee. The Committee rose and reported at 6:15 P.M., Headquarters personnel returned to the meeting, and Mr. Huntoon resumed recording. With unanimous consent, the Chair announced that the recommendation of the Committee was unanimously ADOPTED.

51) Moved, by Mr. Best, that in order to stimulate better participation from individual directors in the monthly selection of the *QST* Cover Plaque award winner, all directors who make selections for each of the 12 months between Board meetings be given some kind of special recognition by the Merit & Awards Committee; but, after discussion, with the consent of his second, Mr. Best withdrew the motion.

52) On motion of Mr. Eaton, the following resolution was unanimously ADOPTED:

WHEREAS, on February 8, 1964, John Huntoon completed 25 years of continuous service to the American Radio Relay League, be it

RESOLVED, that the Board of Directors, meeting in Hartford, Connecticut, on May 1, 1964, in recognition of his many years of untiring effort in behalf of the League, does hereby express whole-hearted thanks for his devotion and loyalty, and expresses complete confidence in his administration of League affairs. (Applause.)

53) At this point, Mr. Meyers presented certified copies of a resolution adopted by the California Legislature, introduced by the Honorable James L. Holmes, W6REK, and the Honorable Pearce Young, WB6BWY, congratulating members of the American Radio League on their performance in providing emergency communications during the Alaskan earthquake.

54) The Board was in recess for dinner from 6:30 P.M. to 9:03 P.M., with Messrs. Best and Green then absent because of the necessity of returning to their homes.

55) At this point, the Chair announced the following committee appointments for the coming year:

Finance Committee..	Mr. Chaffee, Chairman Mr. Anderson Mr. Roberts
Planning Committee.	Mr. Crossley, Chairman Mr. Engwicht Mr. Eaton (Mr. Denniston, alternate)
Membership & Publications Committee..	Mr. Meyers, Chairman Mr. Best Mr. Spencer
Public Relations Committee.....	Mr. Compton, Chairman Mr. Cartwright Mr. Haller
Merit & Awards Committee.....	Mr. Groves, Chairman Mr. Smith Mr. Moss

56) On motion of Mr. Compton, unanimously VOTED that the General Manager is hereby authorized to pay expenses for the operation of ARRL Committees during the year 1964, but not to exceed amounts as follows:

Planning Committee.....	$1000
Finance Committee.....	250
Membership & Publications Committee....	1000
Merits & Awards Committee.....	400
Public Relations Committee.....	500

57) On motion of Mr. Meyers, unanimously VOTED that the General Manager is hereby authorized to reimburse the West Gulf Division Director $38.37 as additional expense for the year 1963.

58) Moved, by Mr. Spencer, that no electioneering be carried on at League expense. After extended discussion, on motion of Mr. Denniston, unanimously VOTED to amend the motion by striking the text and substituting therefor the following: that Directors, Vice Directors and Section Communications Managers seeking re-election shall not use League postage in soliciting votes from members. Whereupon, the question being on the original motion as amended, the same was unanimously ADOPTED.

59) On motion of Mr. Eaton, unanimously VOTED that, pursuant to the provisions of By-Law 20, the 1965 annual meeting of the Board of Directors shall be held in the City of Quebec on Friday, May 14, 1965.

60) At this point, Mr. Reid addressed himself to the President, on behalf of the Board, expressing deepest appreciation for Mr. Hoover's dedication to League ideals; for taking many days of his personal time in efforts to promote and achieve objectives of the League and the amateur radio service; and for his skill and tact as presiding officer at Board meetings. Mr. Reid further expressed the hope that the League would be fortunate enough to have Mr. Hoover as president for many years to come. At Mr. Cartwright's suggestion, unanimous consent was GRANTED to note these remarks in the minutes.

61) On motion of Mr. Smith, after discussion, unanimously VOTED that the Board hereby creates and establishes a permament award for extraordinary contributions to the science of communications by a radio amateur, to be known as the Hiram Percy Maxim Memorial Award, and to be conferred only through action of the Board of Directors in exceptional instances.

62) On motion of Mr. Groves, unanimously VOTED that the Board of Directors of the American Radio Relay League, as a tribute of its highest esteem, is pleased to honor John L. Reinartz, K6BJ, with the first issuance of the Hiram Percy Maxim Memorial Award, in recognition of his outstanding achievements of pioneering the early development of amateur radio communications equipment and techniques, which contributed so heavily to the opening of practical short-wave communications.

63) On motion of Mr. Kahn, after extended discussion, unanimously VOTED that the Board of Directors establishes a special fund of one hundred thousand dollars ($100,000) from the League's reserves for the defense of amateur frequencies in the coming years; that the President of the League, with the advice and approval of the Executive Committee, is granted supervision of the expenditure of this fund; and he is fully authorized by the Board to speak for and on behalf of the Board in all aspects of protecting amateur operation on a world-wide basis.

64) At this point, Mr. Kahn announced he would not be a candidate for re-election this year because of a change of residence. At the suggestion of the Chair, a rising vote of thanks was extended to Mr. Kahn for his many years of devoted service as director. (Applause).

65) On motion of Mr. Crossley, after discussion, unanimously VOTED that the League, recognizing the importance placed by the Federal Communications Commission in its basis and purpose section of the amateur rules on our development of a voluntary non-commercial communications service, particularly with respect to providing emergency communications, directs that in any restatement of our 8-point program, we place public service and the development of provisions for disaster and emergency communications first in our point listing.

66) On motion of Mr. Crossley, unanimously VOTED that, in further recognition of the principle just adopted, the League will give increased emphasis to the invitational recruiting, training and extension of the Amateur Radio Public Service Corps, through bulletins, *QST* and the field organization, again giving editorial support such as may result in increasing the participation of all amateurs in netting and training, and result in increase of our operational capabilities for orderly and useful radio performance in disasters.

67) On motion of Mr. Compton, the following resolution was unanimously ADOPTED:

WHEREAS, on December 5, 1963, Joseph A. Moskey completed 25 years of continuous service to the American Radio Relay League, be it

RESOLVED, that the Board of Directors, meeting in Hartford, Connecticut, on May 1, 1964, in recognition of Joseph Moskey's untiring efforts on behalf of the League, does hereby express its deep appreciation of his loyalty, fidelity and intelligent devotion to the best interests of amateur radio.

68) Mr. Booth requested unanimous consent, which was GRANTED, to note in the minutes receipt of a resolution by the National Association of Broadcasters adopted at its convention in Chicago April 8, congratulating the League on its 50th anniversary.

69) On motion of Mr. Kahn, unanimously VOTED that the Board of Directors expresses its deepest gratitude to the widow of Thorne Donnelley, for numerous gifts from the estate of his amateur station, K7LJA, to the League, primarily for use in refurbishing the equipment at W1AW. Mr. Meyers requested to be recorded as seconding the motion.

70) Whereupon, on motion of Mr. Groves, the Board adjourned *sine die* at 11:25 P.M.

71) (Time in session, as a Board, 8 hours, 22 minutes; as a Committee of the Whole, 40 minutes; total authorizations, $152,788.37).

JOHN HUNTOON, *Secretary*

REPORT OF THE PUBLIC RELATIONS COMMITTEE

To: THE BOARD OF DIRECTORS
AMERICAN RADIO RELAY LEAGUE

Gentlemen:

The Public Relations Committee held one meeting during the past year. Invitations were extended to numerous individuals, clubs, and to the officials of the League to offer suggestions relative to the overall assignment of the committee. The recommendations contained herein are offered for consideration by the Board.

With reference to the Public Relations Committee report of 1963, this committee recommends the further implementation of the proposal that, in addition to the present training aids and program film library currently available, the increased circulation of an absentee lecture series composed of color slides and tape recording on subject material such as operating procedures, efficient use of equipment, current construction practice, etc. presented by individuals of the headquarters staff would be most beneficial for affiliated club programs thereby providing better public relations with the membership and further emphazing the principles of the incentive program.

(Continued on page 166)

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1NJM

A LETTER from K7JHA, RN7 Manager of the National Traffic System, who was in the middle of the communications snarl following the Alaskan disaster says, in part, that "the whole operation was a collection of individual efforts." The writeup, elsewhere in this issue, will more or less confirm this. Our ARPSC organization was used sparingly. Most of the emergency communicating was done by amateurs who got on the air, found someone with whom to communicate, then proceeded to do so.

As a result, we are getting some letters from some pretty "angry" amateurs, those who have been working hard to get ARPSC set up and functioning and who were bitterly disappointed that in Alaska, as always previously, the bulk of the public service jobs performed by amateurs were done spontaneously, sporadically, mostly by amateurs unfamiliar with organizations and procedures set up specifically for this purpose. "A rare opportunity," says K7JHA in his four-page letter, "which was open is now closed again until — when? Another earthquake?"

Thus, we in ARPSC continue to berate ourselves for not having done a better job when the opportunity was there. Actually, what happened was that the individual with lots of drive and power but not always lots of know-how stole the ball from us and ran with it. Where has Alaska been on RN7, for example? Month after month goes by with hardly ever an Alaska station reporting in. Is this RN7's fault? Is it headquarters' fault? No, it's Alaska's fault, something wrong in the field administration. When 314 KL7s show up to do a job in an emergency, it stands to reason that at least a half dozen ought to be available to participate regularly in NTS. When several stations from each fair-sized city are there when emergency needs them, it seems there ought to be *some* tendency for AREC organization in Anchorage, in Seward, Kodiak, Fairbanks, Juneau and Ketchikan, so that when they are needed they can perform efficiently.

There may not be another such emergency in Alaska for a hundred years. Next time there is a big earthquake, it might level San Francisco, or Los Angeles, or any one of a great number of points along the same "fault," *all* of them more populous than Alaska. How are we fixed, ARPSC-wise, there? Supposing this earthquake had occurred in the Bay Area of California, for example?

The need for emergency communications facilities by amateurs is not new, the urgency no greater now than it was before the earthquake. It is just that such occurrences "shake us up," to use a play on words, and after we get through taking bows to the public accolades, we take a good look at ourselves and start wondering if we really deserve them. At the conclusion of this, one dominating thought is inescapable: we *could* have done a *lot* better. Let's not prepare for another Alaskan earthquake. Let's prepare for *any* kind of an emergency *anywhere* by supporting our amateur organizations created for that purpose.

—•••—

Regarding precedences, still a controversial issue in the ARPSC, it is contemplated that in order to provide for personal inquiry traffic without disrupting our present setup and at the same time not downgrade anything, we simply break down the present "priority" designation into two parts, labeling them arbitrarily "P" and "P2." The "P2" designation will be especially for personal inquiry traffic and in an emergency situation will rate *below* other types of P traffic.

It may be some time before this distinction can be made official in our literature, but in the meantime we can have an understanding amongst ourselves. What do you think of the idea?

* National Emergency Coordinator.

Diary of the AREC

On Mar. 9, the normally peaceful Susquehanna river, due to a combination of melting snow and torrential rains, began to overflow its banks. This presented a real problem and threat to the unfortunate people living within reach of its mighty and dangerous path.

W3LXN, EC for Northumberland County, Pa., activated the ARPSC and set up a net control, K3FLT, at Borough hall. Information was gathered from communities farther upstream as to flooding conditions, and direct liaison between civil defense and the Red Cross was maintained. Stations participating in the net were: *W3s* JVP and LXN, *K3s* ARR BIG JJN LHN LTI NCV NKO OSO PYN RCM SJK TZY VRJ and VVE.

—•••—

At a recent N.Y.C.-L.I. Section ARPSC meeting we find (l. to r.): K2OVN SEC, WB2DUD EC, K2IDB SCM, W2EW VHF PAM, W2WFL RM.

QST for

On Mar. 28, WB2DMR and K3QJX relayed, from YV3AA, a message to a medical supply firm near New York requesting a special drug for a critically ill patient. Thanks to the quick action of these two stations the drug was shipped immediately, and the patient was reported to be recovering nicely. — *WB2FBF.*

— • • • —

On Apr. 12, a tornado struck several towns in Douglas County, Kans. When WØOBH received a call from the civil defense director, he immediately went to the airport to observe suspicious storm echoes on radar. KØPOU and WØNSB set up portable stations and kept watch for the funnel. The AREC in Leavenworth set up an emergency net with KØAYO as NCS, and provided liaison communications for the Red Cross. A long-haul net was set up on 20 meters with direct contact to W6QOE who relayed traffic and kept the net frequency clear. Other stations participating were: W4IVL/Ø, KH6BSD/Ø, *WØs* JUV REU VWV OAQ, *KØs* CHH TLQ BTG MFI HBV DHV HVD BAT OCS, *WNØs* HLZ HVM RDC, within the emergency area and K1SDT, WB2CGW, WA4MLB, W6OI, K7NEK, WØLFW WAØAMR, *KØs* BXF EVM RDC, KH6BGL and KZ5FP as members of the 20-meter net.

— • • • —

On Apr. 13, during a blinding dust storm west of Minco, Okla., W5VBG/mobile and W5VAX/mobile came upon a serious accident involving 16 automobiles in which 2 persons were killed and 16 injured. W5VBG/mobile was in contact with K5OXP in Bartlesville, Okla., at the time and he called the State Highway Patrol for ambulances and assistance. After K5OXP had advised W5VBG/mobile that the Highway Patrol had been notified, W5TNW advised that he had also contacted Norman, Okla. police about the accident. W5VBG/mobile remained at the scene of the accident maintaining contact with K5OXP and W5TNW until sufficient ambulances and Highway Patrol Units arrived. — *W5UYQ, Vice Director, ARRL*

— • • • —

On Apr. 23, a tornado struck Springhill, La. The local AREC was activated, and provided communication links for the local police and the weather bureau in Shreveport. The 7½-hour net was manned by *W5s* ADE KKI, *K5s* ELM QNK TAD WOD and WA5FRU. — *K5WOD, EC Springhill, La.*

— • • • —

On May 6, KØVBM and WØEFG headed a search for a 3-year-old boy who was feared drowned. After a four hour search of Stratton creek at Washta, Iowa, the boy's body was found and the search called off.

— • • • —

Thirteen Kauai, Hawaii, amateurs turned out for a tidal wave alert on Mar. 27. A net was set up on 75 meters with amateurs all over the state checking in. Since no emergency developed, the alert was cancelled at 0100. — *KH6ARL*

— • • • —

The possibility of a flood in Tuskegee and surrounding communities, Ala., brought 10 amateurs out in readiness for any possible emergency. Communication links were set up but emergency situations did not develop. — *K4HJX, EC Macon County, Ala.*

— • • • —

On Mar. 26–28, members of the Michigan 6-meter club of Detroit aided in "Operation Hospital." A total of 129 Easter greetings from the patients was relayed to their families throughout the U.S. — *K8LUY*

— • • • —

On Apr. 19, members of the AREC in Fairfax County, Va., were requested by the county medical society to set up two-way radio communications during the polio vaccination drive, to handle the hourly reports that were necessary to maintain supervision over the vaccine supply, and any medical problems that might arise during the eight hour period in which the vaccination stations were in operation. — *W4ZMT, EC Fairfax County, Va.*

— • • • —

Thirty-five SEC reports were received for March, representing 16,342, AREC members. This is 9 less reports than last year at the same time, and a drop of 1,275 members. Sections reporting: E. Mass., Colo., Minn., N. Dak., Wash., N.C., Ore., B.C., Nev., Ind., Ala., Alta., Ohio, Maine, Okla., Va., Ark., N.Y.C.-L.I., S. Dak., N.N.J., Tenn., Kans., Mich., Ont., W. Pa., Utah, R.I., E. Fla., Ariz., Mo., Iowa, Del., Los. A., Manitoba, S.C.V. On page 88, April 1964 *QST*, Utah should have been credited with 4 years of 100% SEC reporting.

Members of the Fairfax County, Va. AREC provided communications for the Sabin Oral Polio Vaccination drive held on Apr. 17. Pictured at the net control station are (standing l. to r.): Drs. Berger and Thorn, W4OP, W4GEB, W4BVU, W4NQE, (seated l. to r.) W4JKX, W4TVT and K4YCG. (Photo by Huffman).

National Traffic System

During last year's Simulated Emergency Test, one thing that NTS seemed to need was a set of frequencies on the 40-meter band as an alternate to the regular NTS net frequencies on 80 meters. Some section nets needed such frequencies, but practically *all* region and area nets needed them for daytime use, when the skip became short and stations without enough power were down in the mud. Let's give some consideration to this.

Such alternative frequencies would not normally be used, because NTS nets normally operate in the evening, when 80-meter frequencies are optimum for most of the distances to be covered. Some of the area nets, nevertheless, may be able to use them as QNY frequencies, for use by stations equipped to change over quickly from one band to another.

Headquarters has considered coordinating a frequency plan for NTS for quite a few years, but has never taken any concrete action on it, preferring to leave the selection of frequency in the hands of the net management. NTS rules set the operating procedure, the operating times and the routing procedures for traffic in NTS. Should they also set the operating frequencies? We don't think so, but it's a topic that could be argued. We *do* think that in these days of versatility on the part of traffic-handling stations it should be possible to make maximum use of QNY procedure not only by shifting frequency up or down a few kilocycles, but by actually changing bands to get the advantage of a different propagation path.

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 should be used for *emergency calling only*. 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.

Think of the possibilities! The NCS on EAN is in Virginia; his 1RN rep is in Maine and his 4RN rep in Florida. They have traffic for each other. He can hear them both and they can both hear him, but they can't hear each other; it's just too long a hop. So NCS QNYs them to 7115 kc. to clear their traffic, where they can copy each other with ease. If their rigs are both bandswitching (aren't most rigs, these days?) they can both be on frequency in less than 30 seconds and back to the net frequency in jig time after the traffic is cleared.

Or the trouble may be just the opposite: the 3RN rep is in Maryland and the 4RN rep in Virginia and they are skipping over each other. So NCS QNYs them to 1805 kc., where they can copy each other, and the traffic gets cleared without a 500-mile QNB.

Such procedure has actually been used on some NTS nets. We think it can be used more often and to better advantage on more of them. Versatility of equipment is required, as well as a new kind of net "savvy." We recommend that managers of NTS nets at region and area levels, and some section levels as well, select alternate frequencies on 40 meters to be used for daytime operation in emergency (or test emergency) situations, at other times utilizing such frequencies as QNY spots for their more versatile operators as possible. And along the same line, why not a drill on the alternate frequency every so often, say on a weekend morning or afternoon, just to keep it actively in the minds of the regular net participants?

Don't forget — whatever can be done effectively in normal times can be done twice as effectively in an emergency.

—•••—

April reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation %*
1RN	60	650	.353	10.8	79.0
2RN	60	747	.658	12.4	100.0
3RN	60	670	.339	11.2	96.1
4RN	57	718	.365	12.6	93.6
RN5	60	1270	.619	21.1	97.2
RN6	60	1193	.682	19.8	89.7
RN7	34	714	.427	21.8	92.8[1]
8RN	64	525	.324	8.2	87.5
9RN	30	598	.702	19.9	95.0[1]
TEN	60	574	.430	9.5	65.6
ECN	30	114	.197	3.8	81.1[1]
EAN	30	2039	1.200	67.9	100.0
CAN	30	1534	1.050	51.1	100.0
PAN	30	1636	1.013	54.3	100.0
Sections[2]	1141	6691			
TCC Eastern	120[3]	844			
TCC Central	91[3]	951			
TCC Pacific	103[3]	1390			
Summary	1806	22858	EAN	12.7	2RN/EAN CAN/PAN
Record	2075	27780	1.061	17.8	100.0

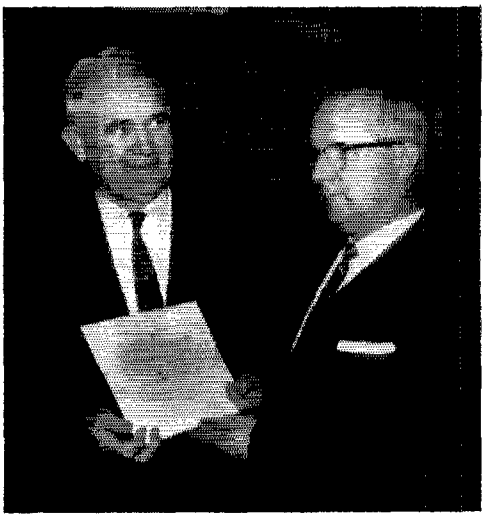
[1] Representation based on one session or less per day.

[2] Section nets reporting (45). WIN, WSBN (Wisc.); Ore. State; EPA, PTTN (Pa.); QFN (Fla.); W. Fla. phone net; Ohio SSB; QMN (Mich); AENB, AEND, AENH, AENJ, AENM, AENO, AENP (morn.), AENP (eve.), AENR, AENT, AENV (Ala.); Wash. Sect.; 16N, NJ 6&2, NJ phone, NJNN, NJN (N.J.); MDD, MDDS (Md.-D.C.-Del.); OZK (Ark.); VTN (Vt.); NCSN, NCN, THEN (N.C.); Buckeye (Ohio); ILN (Ill.); BUN (Utah); GBN (Ont.); SCCW (S.C.); SCN (Calif.); RISPN (R.I.); MSPN (noon), MSPN (eve.), MSN (Minn.); GEM (Idaho).

[3] TCC functions reported not counted as net sessions.

We broke the rate record this month, but traffic and sessions have dropped off considerably from last month. Now that "daylight saving" time is with us again, there will inevitably be some shifting of schedules.

Congrats to 2RN on 3 months in a row of perfect representation. K3MVO is the new manager of 3RN. K5IBZ reports Miss. representation has improved and hopes that all sections will soon be 100%. RN7 activity has dropped to one session per day. 9RN has set up alternate frequencies on 40 to combat summer condx; certificates were awarded to K9DKU and WA9AVT. WØLGG issued a TEN certificate to WØOHJ and reports representation is down now that spring is here. K1WJD requests comments on a possible 160-meter frequency for EAN in the fall. CAN will use alternate frequencies on 40 when necessary; certificates were issued to W2GVH, WA2VLK, K3FHR, K3GAD and



W3ELI, SEC E. Pa., accepts a Red Cross Certificate of Commendation presented by Samuel S. Baxter on behalf of the amateurs in E. Pa. for their cooperation with Red Cross Disaster Services.

K3MVO. WB6JUH reports "new blood" in PAN and hopes more new people will be forthcoming; certificates were issued to W7LQE and K7NHL, both from TWN.

Transcontinental Corps: W3EML reports some shifting schedules to get around summer condx, and 100% reports again this month. W4ZJY sent an interesting bulletin along with his report. W7DZX says reports dwindled off during the latter part of the month, but over-all, April was successful.

April reports:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	120	80.0	2360	844
Central	91	93.4	1692	951
Pacific	103	76.7	2780	1390
Summary	314	82.5	6832	3185

The TCC roster: Eastern Area (W3EML, Director) — *W1s* EMG NJM *W2s* GVH MTA *WA2s* BLV KQG VLK W3EML *K3s* FHR GJD MVO *W4s*DLA DVT K4POA WA4EUL *W8s* CHT ELW *K8s* NJW TIG. Central Area (W4ZJY, Director) — W4ZJY WA4AVM *W5s* PPE QMJ *W9s* AKV CXY DYG HAS JOZ VAY ZYK *K9s* DHN ZLA *WØs* BDR SCA WYJ KØFPC. Pacific Area (W7DZX, Director) — *W6s* EOT HC *K6s* DYX GID *WA6s* BRG ROF WB6JUH *W7s* DZX GMC WST/6 ZB *KØs* EDH EDK VE7AGF.

—•••—

Net Reports:

Net	*Sessions*	*Check-ins*	*Traffic*
Hit & Bounce	30	414	507
North Area Barnyard	26	859	8
North American SSB	25	260	486
Interstate SSB	30	1183	694
8 Ball Traffic	14	415	215
7290	46	1344	699

QST—

MEMBERSHIP CHANGES OF ADDRESS

Four week's 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.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Jeeves threw down his 'phones in disgust and snapped on the 'speaker. *Radio Petruvia* was blasting its nightly noisy hole in our 40-meter band. An interlude of schmaltz was followed by some sadly subjective news commentaries and a tourist come-on titled "Lovely Petruvia Greets the Summer."

Very legal and traditional, we assured Jeeves. That chunk of 40 is an international broadcast band in much of the world, shared with the Amateur Service in other regions. Those big fat signals are supposed to be a form of cultural exchange. Nationalistic advertising and good old PR, you might call it. *Voice of America* relays are there representing Uncle Sam, too, slamming through on 7130 (Greece), 7160 (Okinawa), 7190 (Monrovia), 7200 (Tangier), 7220 (Okinawa again), etc., etc. Jazz and news, news and jazz. Even *Radio Moscow* tries to outjazz us. Real potent, all that jazz. But don't get excited. Promotes international good will and understanding, you know.

Radio Petruvia's jazz was taking out a good 10 kc. on a fair receiver, all depending on the strength of the signals being QRMd. Some nights it was more; on other rare occasions *Petruvia* was weak enough to serve as a stand-by b.f.o. Taking the moderate 10-kc. figure, and knowing that amateur radio is the most direct and effective international-radio cultural exchange of all, we decided to estimate what a bunch of DXers might do with those precious ten clobbered kilocycles. How many simultaneous QSOs can be squeezed into 10 kc., not considering the bountiful benefits of skip and directional antennas? At roughly equal c.w. signal strengths and modest keying speeds, the limiting factors are essentially transmitter signal quality and stability, receiver selectivity and stability, and the competence of the operators. Fifty such signals equispaced in a 10-kc. bandwidth permit a comfortable tonal differentiation of 200 c.p.s. This is reduceable, but let's be conservative.[1]

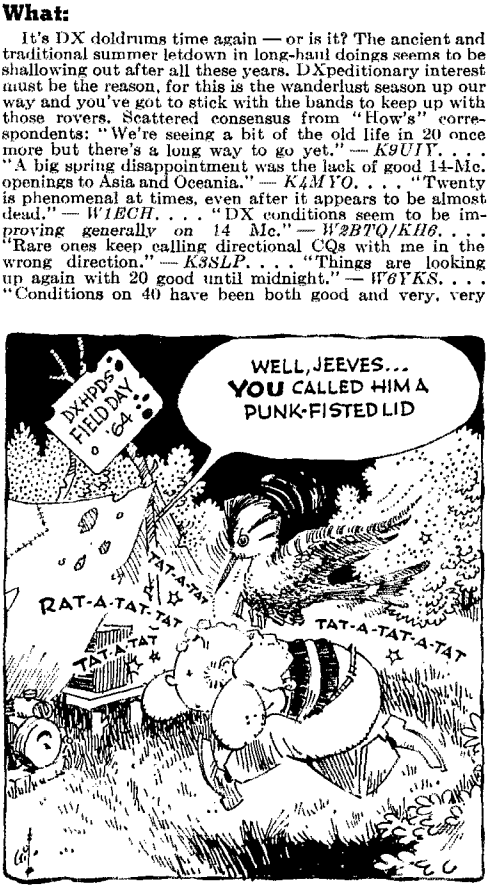
If there's room for fifty signals there's room for a hundred stations working each other, more in threeways and roundtables. So 50 Petruvian hams could conceivably befriend at least 50 hams in the rest of the world at one sitting. Does *Radio Petruvia* do as well? (And does *Radio Petruvia* provide Petruvian citizens with an equivalent civil defense potential, a fertile field for the encouragement of scientific pursuits, and so forth?)

When a U.S. ham makes a friend in Petruvia by radio his whole family and many of his friends hear about it. Hooray for Petruvia! Those Petruvians must be okay. They have the same everyday problems we have. They dig Satchmo and the Beatles, too. "Lovely Petruvia Greets the Summer?" Fooey — if we go to Petruvia we want to greet Zitchko, our Petruvian pal, and try his XYL's pizza. Petruvia must be okay because Zitchko is okay. With us hams it's a *personal* thing.

The next moves are obvious. Dismantle squawky *Radio Petruvia*, swap its oversized junk for some suitable amateur equipment, turn its premises into a club radio school, let the graduates use frequencies vacated by *Radio Petruvia*, and stand by for some real cultural exchange. By gollies, here come some Petruvian QSLs in the mail already. Well, waddaya know! On Zitchko's QSL there's a beautiful landscape titled "Lovely Petruvia Greets the Summer." *Must* visit Petruvia some day — soon.

What:

It's DX doldrums time again — or is it? The ancient and traditional summer letdown in long-haul doings seems to be shallowing out after all these years. DXpeditionary interest must be the reason, for this is the wanderlust season up our way and you've got to stick with the bands to keep up with those rovers. Scattered consensus from "How's" correspondents: "We're seeing a bit of the old life in 20 once more but there's a long way to go yet." — *K9UIY*. . . . "A big spring disappointment was the lack of good 14-Mc. openings to Asia and Oceania." — *K4MYO*. . . . "Twenty is phenomenal at times, even after it appears to be almost dead." — *W1ECH*. . . . "DX conditions seem to be improving generally on 14 Mc." — *W2BTQ/KH6*. . . . "Rare ones keep calling directional CQs with me in the wrong direction." — *K3SLP*. . . . "Things are looking up again with 20 good until midnight." — *W6YKS*. . . . "Conditions on 40 have been both good and very, very



* 7862-B West Lawrence Ave., Chicago, Ill. 60656

[1] For a demonstration to the infinite, scan our 3.5- and 7-Mc. Novice bands almost any evening.

bad. Spotty is the word." — *K5JVF*. . . . "Not much doing on 80 now so I'm busy with antenna work." — *W1SWX/1*. . . . "Fifteen's been FB here!" — *WB2ARD*. . . . "European openings on 21 Mc. have cooled off again." — *WN2LLJ*. . . . "Despite my new beam and IIT-44 I fear the sunspot slowdown is getting the better of me." — *W8YGR*. . . . "Thanks to Daylight Saving Time 14-Mc. now peaks after I leave for work." — *W1YYM*. . . . "Bands stinko as a whole with morning Europeans poor on 20, a slight pick-up in 7-Mc. conditions, and 80 fairly consistent for springtime JAs, VKs and ZLs." — *W7DJU*. . . . "Transatlantic paths stayed open longer than usual on 160 this spring, a good omen for the 1964-'65 season." — *W1BB*. It's up to our 14-Mc. range to carry the DX ball over the next few months, so let's see what the "How's" gang is digging up between those S9-plus short-skip signals.

20 phone favors **Ws** 3HNK 4HKJ 4RLS 5VSQ 6YKS, **Ks** 3SLP 4CSY 4JSZ 6KOI, **WAs** 2VOW 2WIJ 2ZVJ 4JJY 5AER 5CTD 5EAM, **WB6**IFC, **KH6**EUC and **KP4**BIQ/W6 with the companionship of **AP2**s AD (14,270 ke.) 1400-1600 GMT, MI (270) 14-16, reluctant **BY9**SD (250) 19, **CE9**AC (100) of Easter, **COs** 7RM* 8RA, **CPs** 1BH 1PJ 5EC, **CRs** 4AD (108) 14, 6FY 7GF (124) 19, 9AH (125) 12-13, **CTs** 1IP 1JJ* (148) 20, 3AV 22, **DU1s** AP (250) 13, EH (115) 13, **EA9s** AZ (273) 19, EO, **ELs** 2V (275) 0, 3D (348) 19, **EPs** 2AR 2AU 2EI (100) 12-13, 2RW 3RO*, **ET3s** GC RT (260) 21, MEN 19, F9RY/**FC** (112) 13, **FB8s** WW* (143) 13, ZZ (14,105-125) 13, **FG7s** XL (250) 3, XT (308) 13, **FH8**CD (275) 11, **FK8**AU (259) 6, **FO8**AQ (275) 3, **FR7**ZJ (103) 14, GB3RAF of England, **GC2**AAO (258) 16, **HB0**ZT of Liechtenstein, **HC8**FN 14, **HIs** 4XAB* 20, 8MMP 8MVF, **HKs** 1JJ* 4EB, **HL9s** KC (269) 15, KP (105) 1, KR, **HV1**CN (105) 11-14, **HP2**MR (159) 20, **HR1**SO 0, HZ2AMS/**8Z5** visiting Neutral Zones, **IS1**VAZ (110) 20-22, **IT1s** BXX (121) 21, ZGY (112) 20, **JAs** 1BRK (105) 0-1, 8HK (306) 1, Ks 2DCX/**TL8** (267) 21, 7VAX/**KS6** (338) 2-3, **KA5**MC (255) 12-13, **KB6**EPN, **KC4s** AAA/mm (265) 3, USB (340) 3, USH USK (342) 5, USN (335) 2, **KGs** 1FR 4AM 6AJB 6IJ 6SB (265) 6-7, **KR6s** GF MB, **KS6s** BA (270) 6, BB (260) 7, **KV4CQ*** (210) 12, **KX6**DB, **KZ5**AW, **LA1**LG/p* (130) 14, **LI2**C (108) 22 of the Staib Canadian Arctic Expedition, LUs 2XL/**9K3** (270), 8ZC* (100), **MP4s** BBW (100) 23, QBF 2XL/**9K3** (270), 8ZC* (100), **MP4s** BBW (100) 23, QBF (255) 17, TAV, **OA4s** BK* KY, **OE1s** IU ME (107) 21, **OD5s** AX (290) 18-20, LX, **OHs** 2NB 5TM (107) 13, **OX3**KW (110) 20, **OYs** 7ML (102) 16, 8KR, **PI1**J* (150) 15 of Holland, **PJs** 2AA 2CU* 13, 3AO (180) 0, 3AR, **PZ1s** AG, CE, **SPs** 5AR 9FR, **SU1**MS 0, **SVØs** WF WGG 15, **TF2s** WIA WIQ, **TIs** 2HP 2MS 3AA, **TU2**AU, **UAs** 2AW 13, 3BC, 9KTE 0SK (110) 0-12, ØKIF (120), ØKWA, **UB5**WI (110) 14-15, **UD6**BR 13, **UL7**FA, **UM8**KAB (251) 12, **UO5**RO (120) 13, **UR2**BU (112) 17, **UWØI**N, VEs 6AMX/**SU** (256) 22, 8RN, **VKs** 4JQ (300) 17-23, 6RU (106) 14, 9DR (104) 13, 9NT (270) 8, 9XI (273) 13, **VPs** 1DJ 2KJ 2KM (110) 20, 4BQ 5LV 6KL 22, 6WR 7NS 9FD 9FK (110) 12, **VQs** 1GDW 17, 1VGM 2AD 9HJB, **VR4**CM (320) 12, **VSs** 1FZ (105) 13-15, 1LP (269) 13, 1LV 1MD (105) 13-15, 4RS (118) 14, 5MH (111) 20, 5TA 6AZ (250) 12-13, 9ABAI (265) 18, 9AMN 9OSC* (120) 13-17, **VU2**NR, W5HWR/**VP9**, WA4JXV/VO2, **XE1**NE, **XW8s** AL (305) 14, AU (340) 16-17, YA1BW, **YK1**AA* (270-320) 22, YN1BN, **YSs** 1FQM 1MS 1RRD 2SA (115) 22, YU1AA (260) 21, **ZB1s** BX* CR (117) 16-17, **ZC5s** AJ (110) 16, AM (110) 14, **ZD6**PBD 20, **ZEs** 1AC 5JS, **ZP5s** EE OG 5, **ZSs** 2MI (320) 11, **3E** 21, **4U1s** ITU (115) 20, SU, **4W1s** B (120) 17, C (260) 21, D, **4X4**HW (253) 18, **5A1**TG (260) 21-22, **5H3**JR, **5N2s** CKH 23, JKO 21, JWC (111) 21, **5T5**AD (120) 14, **5U7**AC (110) 21, **5X5**JG (133) 20, **5Z4s** AA (110) 18, ERR 13, RF (255) 21-22, **6O6**BW (115) 20, **7Xs** 2VX (290) 22, 3CT 3VW (119) 18, **9G1s** BV 22, DM* (200) 23, EC* EW (110) 13, **9K2**AN (100-120), **9L1s** HX (119) 22, JR RO (264) 18, **9M2s** CR FR (110) 16, JJ (120) 14-16, **9Q5**AB (107) 19 and **9X5**MH 21, the asterisks representing non-s.s.b. specimens.

20 c.w. reports roll in from **Ws** 1ECH 2BTQ/KH6 3HNK 5VSQ 6BIL 6YKS 7DJU 7QB 7VRO 8YGR, **Ks** 1GO 3SLP 4CSY 4JSZ 4MYO 4TWJ 6KOI 7QXG 9UIY ØGSV ØGVA ØJPL, **WAs** 2KSD 2SRQ 2WIJ 2ZVJ 4CZM 4JJY 4MMO 5AER 5CTD 5EAM 6TGH 9FMQ 9ICQ, **WBs** 2FVD 2HBI 6FWW 6IFC, **H1**ER and **KP4**BIQ/W6 concerning consultations with **AP5s** CP HQ 14-16, SS, **BYs** 1PK 9SD, **CEs** 8AA ØAC (35) 12-15, **CN8**FW, **CO2s** AB AL BB, **CP5s** AB EZ, **CRs** 6AI 6BX (69) 21, 6CH 6DX 7CK 7IZ 8AD (50) 12-13, 9AH (49) 9, **CT3**AB, **DMs** 2BYN 3BA 3PBM 3ZOL, **DUs** 1FM 1OR (60) 6, 1RBG (61) 12, 7SV 5, **EA8**DO, **ELs** 1P 2AC 2AD 2AG 2KW 2P 8S, **EP2s** AS RC (35) 18, RV, **ET3s** BG (25) 23, FF JF 10-12, RR (63) 19-22, USA (73) 20, **FB8**WW (40) 12-14, **FG7s** XC XF XI XS, **FH8**CD, **FK8s** AH BD, **FM7**WZ, **FO8s** AA AC AQ BD BI BJ 6-8, **FR7s** ZD ZI, **FU8s** AG (61) 7, AM 10-12, **FY7**YF, **GD3**FXN, **HCs** 1LE 5CN 8LS, **HH3**SD, **HI8s** IDC XAD, **HKØ**AI (3) 14, **HL9s** KA KL (82) 13, HP1HE/mm, **HR2**FG, **HV1**CN, **HZs** 1AB 2AMS/-8Z4/8Z5, **IS1**FIC, **IT1**SDT, JA4BAA, **JT1s** AG CA KAA (49) 2, KAB, K2DCX/**TL8** (25) 23, **KC4**USK, **KGs** 1BO 1FR 6AIG 6AOX 6FAE, **KJ6**BB, **KM6**BI, **KR6**IQ, **KV4s** AA CI DE, **KX6s** BR (60) 8, BU CI DB, LA9MI/p, LU8ZC (100), **LX1s** CF DP, **MP4s** BBA BED BEQ TBE, **OA4s** BP EM FM, **OD5**LX, **OR4**VN of the Belgian antarctic, **OX3s** AY UD, **OY7**ML, **PJs** 2AA 2CK 2ME 5MG, **PK2**ET, **PZ1s** BD BW CM CP, SM3BPY/**9Q5**, **SU1**IM, **SVØs** WAA WC (15) 20, WO, **TAs** 1US 2BK, **TF2s** WIL W1O WIU WIW, **TG9**AD, **TI2s** AB PZ WD/8, **TL8**SW (55) 22-23, **TN8s** AF AH AU, **TU2s** AN (25) 22, AW, **UAs** 9KQA 9MR (9), 9WS ØAB (78) 2, ØEQ (50) 0, ØFR ØKCC ØKFK (60) 7, ØKIF ØKIG (18) 5, ØKYA (48) 2, ØKSS (55) 1, ØMC ØRC, **UB5s** FR SL (15) 22, **UF6**FE, **UG6s** AD AV, **UH8s** KAA KBA, **UM8**FZ (47) 1, **UL7s** BG LK, **UN1**BN, **UO5**BM, **UP2**OO, UPOL-10 on arctic ice, **UR2s** AT KAN, **UT5**EW, **UWs** 9DP ØFM ØIK (32) 1-2, ØIN ØIP (61) 5-6, ØIX, **VE8s** DL NO RN WN (20), **VKs** 9DR (50) 13, 9GC (28) 5, 9MD (50) 13, 9XI (50) 13-14, VO2s DP RN, **VPs** 1WS 2AV 2KT 3YG 4LC 4RS 5SG 6BW 6KL 6PJ 7BG 7NA 7NQ 7NT 7NY 8GQ 8HJ (35) 22-23, 8HK 9BO 9DC 9DL 9EB 9FK, **VQs** 2AMC 8BF, **VRs** 1B (12) 12, 2DK 4CM, **VSs** 1CW 14, 1FZ 14, 1JY (8, 32) 13-15, 1LD 1LP 1LS 14, 1LV (5) 13-15, 1ME 4RS (44) 14, 5LX 6FE (45) 13, 6FF (15) 13, 9ARC 9OC, **VU2s** GG XO, W9ZQA/**KJ6** 6-8, WB6BZS/**KJ6**, **XE1s** NY OE, plenty of YOs and YVs **ZB1s** BX LS, **ZC5s** AJ AM, **ZDs** 3A 6OL, **ZEs** 1AS 1AW 8JJ, **ZK1**AR, **ZLs** 1ABZ of the Kermedecs, 4JF (63) 1 of the Campbells, **ZP5s** DD LS, **ZSs** 3EW 7M, **4S7**NE (10) 16, **4U1**ITU, **4W1s** B D, **4X4**DK, **5As** 1TW 2TJ, **5B4**DL, **5H3JI**, **5R8s** AA AM RB, **5X5**IG, **5Z4**JD, **6O6**BW, **6W8**DN, **6Y5**MJ, **7X2s** DU (30) 20-22, DW, **9G1s** FE (40) 23, FK, **9K2**AN, **9L1s** NH TL (8) 22, **9M2**GJ, **9Q5s** AB (10) 22, AN HD TJ and **9U5**JH. Are you getting your rightful share of these delicacies? Well, KL7s and KP1s are fun, too.

* * *

Time to jump off the "How's" Bandwagon for other business. Next month we'll tour other frequencies with the cooperation of (15 phone) **W3**HNK, **K7**VMO, **WAs** 2WIJ 4JJY 5AER 5CIY, **WB2**FVD; (15 c.w.) **Ks** 1WPR 4MYO 4TWJ, **WAs** 2WIJ 4JJY 4MMO 5CIY ØAPN, **WBs** 2ARD 2GJW 6IFC, **WNs** 2GPR 2LLJ 9KCD; (40 phone) **W6**YKS, WA5CIY, **WB6**HSO; (40 c.w.) **Ws** 1ECH 2BTQ/KH6 6YKS, **Ks** 2UKQ 3SLP 4CSY 4MYO 4TWJ 5JVF 7QXG, **WAs** 2WIJ 5CIY, **WB6**IFC, **KH6**ACC, **WN9**KCD; (80 c.w.) **Ws** 1SWX/1 and 7DJU. Drop us a line and join the team!

Where:

AFRICA — "Who says it doesn't pay to be nice to those s.w.l. boys?" exclaims W5KHL. Scotty got this note along with his QSL from ZD7BW: "I bet you don't remember sending a W3PCB QSL to listener G-8263 in 1958. Yours was my first W QSL then. See where we s.w.l.s can get to!" Yes, indeed; next time you file an unanswered s.w.l. report in the wastebasket, OM, reflect a moment. The fellow may some day be your first ZC9 . . . . . No, 9Q5AB didn't change QSL managers. WA4STL is ex-W2HMJ/4 . . . . . W4RLS regularly schedules 5X5JG — Saturdays or Sundays, 2000 GMT, 14,250-14,135 kc. — but does not handle his QSLs. *Callbook*'s okay . . . . . Ex-5A5TW, now K4QOY, informs, "Box 372, Tripoli, Libya, is the correct 5A QSL Bureau address. Box 1281, APO 231, was the 5A5TW personal box and can no longer be used for QSL purposes." . . . . . DARC affirms that 7X2 represents the Algiers area, 7X3 the Sahara bailiwick.

ASIA — "Anyone who has not received a due confirmation from EP2s AB and/or DJ may obtain a duplicate from K3YZN/8," writes Phyllis, K7RNR, a member of the

YU2OZ is no stranger to the DX phone fraternity with this tabletop layout in Dubrovnik. Steve enjoys regular *QST* delivery thanks to a Stateside friend.

XYL-OM DX team that went QRT in Iran early in June. "QSLs already have been mailed to all first contacts. Many thanks to one and all for the opportunity to chat with you from EP-land." .. HL9TS (K2UVU) recommends nothing but airmail from W/K QSL applicants .. "International Reply Coupons bring rapid response from VS6FH," testifies K1IGO .. W2GKZ of LIDXC points out that Far East QSL chores by WA2WUV are performed for W/Ks only.

OCEANIA — "I QSL 100 per cent, via the VK2 bureau or direct if IRCs are provided," assures VK9GC of Rabaul .. "ZC5LS (VS1LS) QSLs thoroughly, via bureaus or direct if self-addressed envelopes and IRCs are supplied," advises WA6IVM .. KH6COY/KW6 confirms through W1ECH that KW6ED disappeared on a Pacific flight in late March. George, en route home for vacation, had his logs with him. "KW6ED was an active amateur of long standing. Since QSLs are arriving for him daily, I want all his many friends to know why they will not receive answers." .. ZK1AR thanks K4LRA sincerely for Jerry's three years of reliable QSL agency service. K4SHB now carries on in Trevor's behalf, stating, "All QSLs up to March 26, 1964, for which I've found matching QSO records, have been answered." .. "VK9LA, Cocos-Keeling, returned to VK6LA and caught up with his QSL chores in January. He feels he has QSLd 100 per cent, but those still lacking deserved VK9LA pasteboards should reapply via VK6RU." That from LIDXC's *D X Bulletin*.

EUROPE — International Short Wave League, relaying QSLs on a members-only basis (common policy for many overseas bureaus, by the way) does not handle cards for ZB2AH and 3V8IR as previously presumed. Secretary Bysh also relegates TA4SO to the booby-bin category .. LJ2S promises airmail reply to QSLs sent via the address in the listings to follow .. "I will be QSL manager for my brother, DL4FI (K9UGH)," declares K9YTP. Self-addressed stamped envelopes, to be sure .. No legitimate SV5s around, affirms RAAG secretary SV1AT. "Call signs in Greece at present are SV1AA-SV1BA, SVØWA-SVØWZ and SVØWAA-SVØWZZ."

SOUTH AMERICA — "As of May 10, 1964, I am QSL manager for ZP7FF," notifies W5ZBC. Edwin also represents YV5BLQ/1 QSLwise .. "Due to a change in my Navy duty station I will no longer handle QSLs for PZ1CE," communicates W1NTH. Walt's PZ1CE postal problems are inherited by K5YCP .. K6GMA records, "I now handle QSLs for VP8HO contacts dating March 24, 1964, and later, for the U.S. and Canada only. I still issue VS6AZ cards, too, s.a.s.e. required in both cases."

HEREABOUTS — "QSLers of the Month" in gay profusion are saluted by "How's" correspondents Ws 1SWX/1 3HNK 4HKJ 4NJF 5VSQ ØGER, Ks 1IGO 3SLP 7QXG 7STK, WAs 2WIJ 4JJY 5CIY and WB2ARD, as follows: CE8CG, CN8FW, DU7SV, EA6AM, FB8WW, FO8BJ, FR7ZD, Gs 2QT 3LHJ, HKs 3AUE 4BQ, HP1s IE MN, HV1CN, KC4USK, KV4CR, KX6s AJ BU, LUs 4AW 7FAG, LX3AX, OAs 4KY 4PD 4PF 5W, ON5AX, OZ3FL, SP6SO, VK9XI, VPs 2AX 8GQ, VSs 1LJ 1LP 6FH, XE2AAG, YVs 1DP 5AJ, ZD3A, ZL4s JF ML, ZP5EE, 5H3JR and 7X2NJ, plus QSL aides Ws 2CTN 2SNM 5ADZ 5PSB, Ks 4UFE ØBLT, G3PAG, ZL2GX and 5R8BC. Any swift QSL shippers you'd like to see commended here? Fire away .. W5ZBC, Ks 3SLP and 9UIY offer their services as QSL agents for overseas amateurs in bona-fide need, the former favoring South America applicants .. W4NJF hunts hints on confirming QSOs with AP5HQ, 9L1s HX RO; W6BCT will settle for 4S7AD data; and K9UIY desires data on C1DH, CS3AC of 1954, FAs 2VO '61, 8JD '46, GD2FRV '53, VKs 9PU '61, ØVK, XABY '46, ZD7SA '61 and the operators of TAs 1SS and 3AA in the '50s .. W1ECH and K1UDU find that K2MPS has no FP8 QSL connections .. ARRL Assistant Secretary W1ECH understands that Highgate Signal Station, Highgate, St. Michael, Barbados, is the QSL bureau address for VP6 amateurs. Check June *QST*'s "1ARU News" pages for other bureau tips .. K5LIL is unhappy with his sad s.a.s.e. results but 82/70 isn't a bad worked/confirmed ratio, depending on how fast he's working them .. PJ2AE knocks off for permanent return to W1HTE this month and will continue to answer all QSLs arriving for his DXtensive Netherlands Antilles action .. FDXC hears that W4HYW is considering a big bonfire to help clear the W4/K4 ARRL Bureau of an exasperating backlog. If you've ever worked DX from Fourland you'd better get off the dime and claim your stack .. Now let's sort out some individual items from this month's mailbag, keeping in mind that these recommendations are necessarily neither "official," complete nor accurate:

AP2AD, A. Ebrahim, P.O. Box 293, Lahore, W. Pakistan
DL4FI (via K9YTP)
ex-EP2AB, Phyllis B. Denham (K7RNR), c/o Maj. J. Denham, K3YZN/8, Det. 4, USA ROTC Instr. Gp., U. of Cincinnati, Cincinnati 21, Ohio
ex-EP2DJ (to K3YZN/8)
ET3RR, R. Syriac (WA1IWV), RM1 USN, U.S. Naval Communications Stn., APO 843, New York, N. Y.
FG7XF (via W2CTN)

FO8AQ (right) enjoys a visit from W6JFM on Tahaa island, Tahiti. Pat's baggage included a KWM-2, 14-Mc dipole and gasoline generator with which he and Raymond logged some 1500 QSOs.

FY7YK (via REF)
HBØZT (to HB9ZT)
HC8LS, L. Troya, Box 4311, Guayaquil, Ecuador
K2DCX/TL8 (to K2DCX)
K4s CQK/KP4 CQL/KP4, Navy 1506, Box 27, FPO, New York, N. Y., 09565
K4CSY/KP4/KV4/VP9/mm (to K4CSY)
KP4BIQ/W6, J. Freed, Box 121, 12360 Riverside Dr., North Hollywood, Calif.
LJ2S, Ken Olufsen, SBKP, Brig. N., Bardufoss, Norway
LU4GAU, G. Tirado-Romany (KP4BFE) P.O. Box 134, Villa Angela, Chaco, Argentina
LU7GAJ, Martha V. de Tirado, P.O. Box 134, Villa Angela, Chaco, Argentina
MP4BEM (via MP4BBW)
OA4s EM OX (via RCP)
OX3DG (via EDR)
ex-PJ2AE (to W1HTE)
PY2s AGI CZX (via LABRE)
PZ1CE (via K5YCP)
PZ1CP, P.O. Box 547, Paramaribo, Surinam
SMs 5CAK 6CPI 7CPI (via WA9AEA)
TI2RK, R. Moraga, P.O. Box 4580, San Jose, C.R.
TI2WD/8 (to TI2WD)
UAØSK, Box 21, Irkutsk 3, U.S.S.R.
VE8RH, c/o J. Williams, Williams Rd., Moodlu via Caboolture, Co. Canning, Queensland, Australia
VK4JQ (via W6IYG)
ex-VK0AS (to VK9GC)
ex-VO5C (to VO1BZ)
VP2AV (via W2CTN)
VP2KJ (via W4SSU)
VP4TR (via W2CTN)
VP7NA, H. North, P.O. Box 5321, Nassau, Bahamas
VP8HO (see preceding text)
VQ8BFC (via G8KS)
VR1S, P. Dunbar, c/o Box 288, Suva, Fiji Islands
VS6EY, V. Kershaw (G3GKD), 77 Robinson Rd., Apt. 54, Hong Kong, Asia
XE2DC, P.O. Box 425, Empalme, Son., Mexico
YV1LK, Box 3, Punto Fijo, Venezuela
YVBLQ/1, via E. Shell, W5ZBC, P.O. Box 5223, Bossier City, La., 71010
ZC5AT (via WA2WUV)
ZC5LS (to VS1LS)
ZL2AWJ/3 (via ZL2GX)
ZP7FF, via E. Shell, W5ZBC, P.O. Box 5223, Bossier City, La., 71010
ZP9AB (via RCP)
4S7EC, N. Walker, 27/4 Chandra Leka Mavata, Borella, Colombo 8, Ceylon
4W1C (to HB9AET)
5A1TG, M. Pickett, Box 1651, APO 231, New York, N. Y.
5A1TW, E. Walsh, Box 372, Tripoli, Libya
ex-5A5TW, W. Williams, K4QOY, 3335 N. Dixie Hwy., Ft. Lauderdale, Fla., 33308
5R8AJ (via W2MES)
9A1ZG (to DJ1ZG)

The gift committee for the preceding catalog consists of Ws 1BPY 1NTH 1YYM 2ECU 3HNK 5KHL 7QB 8YGR 9SCZ, Ks 1IGO 1SGV 3SLP 5JVF 7QXG 7VMO 9UIY 9YTP, WAs 2WIJ 6IVM 9AEA, DARC's *DX-MB* (DLs 3RK 9PF), DX Club of Puerto Rico *DXer* (KP4RK), Florida DX Club *DX Report* (W4HKJ), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa,

N. Y.), North Eastern DX Association *DX Bulletin* (W1BPW, K1NOL), Puerto Rico Amateur Radio Club *Ground Wave* (KP4DV) and West Gulf DX Club *DX Bulletin* (W5IGJ). Give us the benefit of *your* "Where" info to help the boys along, if you will.

Whence:

ASIA — KA2USF, manned by FEARL stalwarts on their annual field day, will be cruising 40 c.w., 20 c.w., and single-sideband, from 0600 GMT July 2nd to 1500 the 5th. "For the wallpaper hounds we'll have accompanying activity by KA5-7-8-9 stations," adds secretary KA2CM . . . . . More choice 160-meter DX in the offing. W1BB reports several JAs about to be licensed for powers up to 200 watts on 1880 kc. after recent successful loran interference tests. This go-ahead derives from thirteen years of patient promotion and negotiation by JARL and friends . . . . . WA6IVM has had about 5500 QSOs with more than 2000 JAs, 1600 QSLs resultant. Ray has acquired considerable JA language fluency in the process and will have a chance to try it out on a visit to the Orient this summer. JA1DCY is to return to the States with WA6IVM for classes at Utah State . . . . . Despite civil unrest in Cyprus, 5B4FB (G3NHF) tells K1IGO that 5B4s FL KW PC and RF continue very active at the Pergamos RAF club station, usually on 14 Mc. around 1200–1500 GMT . . . . . K1IGO applauds the consistent 10-watt 20-meter signal of VS6FH. Ernie does it with a mere quarter-wave vertical. More Hong Kong word from VS6EY (G3GKI): "It's very overcrowded here, so all available space is used to the fullest by 'cliff dwellers'. The HK concrete jungle is much like your New York. Most roofs are used for penthouses, so I have a 20-foot bamboo pole with 35 feet of wire wrapped around it, this suspended over a balcony railing. One consolation is that VS6s are always in wide DX demand. Everything is squeezed here, including radio frequencies; commercial and government stations spuriously clutter up 14 Mc. and other bands." VS6EY, a c.w.-forever type, runs about 35 watts to a v.f.o.-807 rig on 80, 40 and 20. Victor is particularly fond of his homemade two-transistor keyer, a device termed a "gutless wonder" by VS6 buddies. "We've been having daily W/K openings on 14 Mc., but very little is heard from the U.S. on 15 meters." . . . . . W8YGR recommends UAØKSS's Vera, 14,055 kc. at 0100 GMT, as a likely YL-WAC candidate . . . . . ARSI secretary VU2CK writes, "We are very happy to announce the first VU2/4S7 Contest to be held October 10–11 and 17–18 of this year." Participation particulars in due time . . . . . Aforementioned clubs and groups supply more Asiagrams: E. Pakistan's AP2MI pokes through nicely with 50 sideband watts and a 3-el. 14-Mc. spinner, 1400–1600 GMT, aided by neighbor AP2MR. The other Pakistan is ably represented by AP2AD, 14,100-kc. sideband, 1400–1800. The c.w. set includes AP5s CP HQ and SS, mostly 14 Mc. . . . VU2NR yearns to activate the Andamans, Nicobars and Laccadives by October but tight security in the Indian Ocean region discourages most such DXpeditionary ambitions at this time. . . . VS1s CW FZ LS on c.w., FZ and MD on s.s.b. all plug Singapore on 14 Mc. from 1300 to 1500 GMT. VS1JY does surprisingly well on 20 c.w. with a mere 25-watter. . . . OD5CG hopes for an early relaxation of restrictions that have kept most OD5s inoperative for the past two years. . . . BYs 1PK and 9SD, Red China, are reported extending their 20-meter work to include an occasional non-Curtain QSO. . . . UAØSK provides a rare Siberian region almost daily, 14,110-kc. s.s.b. at 1100–1400 GMT. . . . YK1AA's d.s.b. rides 14,270–14,320 kc. around 2200 GMT.

DJ4OP (left) performs as host to visiting DU1OR and XYL at his Munich station. As QSL manager for 9Q5TJ, Werner is almost as well known in the mails as on the air. (Photo via WØAUB)

AFRICA — ET3RR (WA1IWV) is adding single-side band to his 15- and 20-meter c.w./a.m. repertoir. Dick, regularly found on 14,050 kc. or so, also sends 18–28-w.p.m. code practice to the local gang on 14,100 kc. . . . . Ex-9G1DZ should be settling down as a K7 neighbor of W7DJU in the Seattle area about this time . . . . . 9Q5AB continues to hit the contests hard, boding writers cramp for QSL rep WA4STL. Harry may show up Stateside this month . . . . . Africa addenda courtesy the clubs and groups: ZD3A had to return his borrowed c.w./a.m. outfit. . . . An HX-50, 2B and TA-33 help FH8CD shake the s.s.b. crowd around 14,275 kc., 1100 GMT, from the Comoros. . . . Stormy weather and flat conditions throttled VQ9HB's springtime Chagos session as VQ8BFC. Only a handful of W/Ks made the grade with Harv. . . . Egypt's chief DXports appear to be SU1MS and VE6AMX/SU, 20 s.s.b. around zero GMT.

OCEANIA — "DX conditions are improving in the U.S.A. direction at this location," observes VK9GC, Rabaul. "I've worked many W/Ks lately on 20 c.w. between 0300 and 0600 GMT. I expect to be in New Britain for the next two years or longer." Quite a switch in climate from his old antarctic VKØAS post of the late 50s! . . . . . "The other night I was QSOing JA1BLC," recounts W2BTQ/-KH6, "and chanced to remark that I had never even heard a European here. When we signed, G2RO called me for a timely first." Turk's new TA-33 should get over that polar route with greater consistency . . . . . VR2DK would like a crack at 160-meter DX, according to K5JVF, but the band is not available in Fiji. Owen settles for much 80-meter c.w. sport . . . . . K5JVF says VK5NO's new 7-Mc. beam really chops into Oklahoma . . . . . W1YYM of ARRL QSPs ZL2GX's announcement of this year's VK/ZL/-Oceania DX Contest to be held (phone) on the 3rd-4th and (c.w.) the 10th-11th of October. We'll schedule details for September *QST* . . . . . ZL2AWJ discloses intentions of a Chathams venture later this year. W1YYM hears that ZL2GX's KWM-2 will tag along . . . . . Oceania wrap-up via club journalists. VK9NT's new quad is a standout from New Guinea around noon GMT, 14,105–14,125 kc. . . . A fresh battery supply pepped up Willis isle's VK4JQ, 14,300-kc. s.s.b. at 0800, 1700 or 2300 GMT. . . . KH6EDY caters to Kure seekers, 14,260-kc. sideband, 0700 GMT or so. . . . Saipan's KG6SB is catchable almost any day, 14,265 kc., 0630–0800 GMT. . . . VR1B tried his hand from British Phoenix in May. . . . K7VAX/KS6 shoots for the U.S. east coast Wednesdays and Thursdays, 14,338-kc. sideband at 0230 GMT. . . . VR4CM may keep the Solomons solvent for the rest of the year, 14,320-kc. s.s.b., noon GMT. Via KC6BK-K6VVA-W1YYM transoceanic relay we hear of VR4CU's electrocution while at work on a government rig. . . . VR1S expects to be on 14-Mc. c.w. shortly from Funafuti Island; QTH in the preceding listing.

EUROPE — ARRL's venerable WAS certification still tantalizes the overseas gang. K7QXG QSPs UB5ZV's plea for Idaho and Nevada code customers on 14,050 kc. at 0300–0700 GMT, while W2ECU says OE5LX hungers for a Utah candidate with a ground-plane planted near 14,090 kc. From farther north LJ2S writes, "I've had about 300 Stateside QSOs on c.w. and phone but I still haven't worked a U.S. Five. Please tell the gang in W5/K5 states to watch for me on (c.w.) 14,055 and 14,100, (a.m.) 14,205, and (s.s.b.) 14,200–14,350 kc." . . . . . K4MYO credits the Czech lads with plenty of c.w. operating savvy, especially OKs 1BY and 3CBR . . . . . K3CUI would save you delay in securing those U.S.S.R. certifications. "A list of contacts *and* QSLs are required in each case. Fourteen IRCs are necessary for R-150-S, R-100-O and W-100-U; ten Coupons will suffice for R-10-R, R-15-R, R-6-K and the Kosmos certificates. All applications are made to Central Radio Club, Postbox 88, Moscow." . . . . . SM6CKU/mm sailed into Chicago aboard MS *Braheholm* for a spring visit with W9GFF and friends. Ben added an SX-117 to his onboard CE-20A and 14-AVS layout and is workable on 14,100 kc. or so at 1600 GMT daily. "I'll continue on the U.S.-Europe run till 1965, then try for a Pacific berth." . . . . . DL4FI (K9UGH) just fired up an NCX-3 and log-periodic beam on 20 at APO 69 . . . . . W4BJ hoped to follow his HV1CN fun in May with an operational stopover at 4U1ITU . . . . . Remember that DARC's 10th WAEDC shindig hits DX bands on the 8th-9th (c.w.) and 15th-16th (phone) of next month. Stand by for details next *QST* . . . . . Check with SP DX Club of PZK, P.O. Box 424, Lodz 1, Poland, for specs on a certification based on QSOs with ten or more members . . . . . Did you work any East German stations with the suffix DT between March 1 and May 31, 1964? If so, you may be eligible for the W-10-DT sheepskin issued by RCGDR. Consult DM2AAO . . . . . How's your P-75-P rating? Czechoslovakia's CRC, P.O. Box 69, Praha 1, announces a new world-wide operating award based on contacts with 75 global "zones."

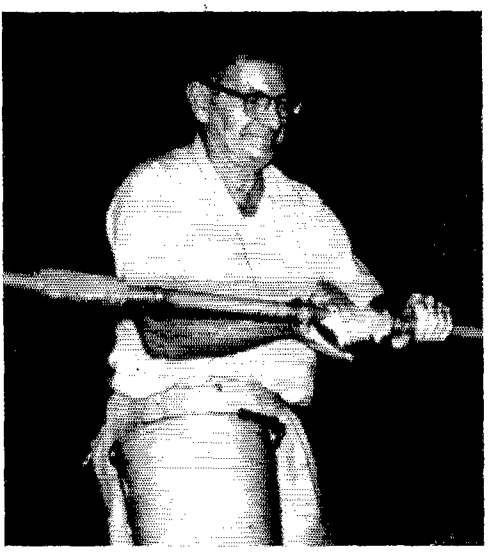
SOUTH AMERICA — K6GMA reports, "I'm building a single-sideband rig for VP8HO which he will receive sometime this summer. This should put the Falklands on s.s.b. for good because he's a native there." . . . . . KP4BFE tries far-south DX conditions occasionally as

CR6CH, one of the most active members of Angola's DX gang, was previously active as CT1UX and CT2AB. (Photo via W1YYM)

LU4GAU. The XYL signs LU7GAJ . _ . _ _ . CEØAC aids Easter hunters from time to time, c.w. and sideband near 14,105 kc. . _ . _ . _ LU8ZC, usually on 14,100-kc. c.w. from South Shetlands, will switch to voice when conditions warrant.

HEREABOUTS — "I've been signing '/mm' aboard submarine *Tusk* (SS-426)," reveals K4CSY. "A good part of my operation took place while 65 feet beneath the Atlantic." Barry tried all bands 10 through 80 meters with fine DX results on c.w. and sideband . _ . _ . _ Brothers K4s CQK/KP4 and CQL/KP4 are stationed with the Navy at Roosevelt Roads. They lament that QSOs seem to come much faster than QSLs . _ . _ . _ A neophyte c.w. man wondered aloud to W3HNK, "How come so many DX ops think I'm a doctor? They're always saying 'DR OM' and 'DR OB'." Reminds Jeeves of his early experiences on 80 in the ARRL nets. So many expressions of jubilant enjoyment — "WEE." He'd get right into the spirit of the thing with a WEE! or two in return . _ . _ . _ ARRL's W1YYM keeps chasing Russian oblasts, whatever they are, and is nearing the 100-mark. Housework piles up for Ellen when good conditions show up on 20 . _ . _ . _ Another League staffer, W1ECH, revels in his new Cromwell *QTH*. "Sunspots? Who needs those things?" . _ . _ . _ W4NJF finds surplus back issues of *QST* at a premium among the more isolated overseas chaps; 9M2DQ, for example . _ . _ . _ K4TWJ & Co. contemplate an early Nassau DX venture . _ . _ . _ WN6IIXY's sister WB6ADR has trouble breaking through the stag line for DX QSOs on phone. Perhaps that's why so many gals prefer the relative anonymity of c.w. . _ . _ . _ W4BPD/U.S.A., spinning rare yarns of rarer DXing, regaled thousands of DXers throughout the land on his farflung hamfest tour this spring and summer . _ . _ . _ NEDXA's *DX Bulletin* editorializes, "What has happened to the old-time roughing-it type of DXpedition? Nowadays nothing less than a KWM-2, a cabin cruiser with wall-to-wall carpeting and a floating bar will do." . _ . _ . _ More than 400 WPR-25 certifications have been issued, according to the records of KP4AQQ. The Novice version, WPR-10N, has attracted fifty successful applicants. W2QHH remains far and away the champion U.S. KP4 collector with 425 certified QSLs from Puerto Rico. QST

Strays



Well, the ARRL Program says "clean signals," but we didn't really have soap and water in mind. Here's W8LTF sudsing down his s.w.r., which had waxed high because of dirt and dust on the traps of his beam.

25 Years Ago this month

July 1939

The William S. Paley Amateur Radio Award for 1938 was presented to W1BDS for his work during the New England hurricane of September 1938.

. . . The ARRL presented an animated radio diagram of what goes on in transmitter and receiver circuits at the New York World's Fair, through the cooperation of the Westinghouse Electric and Manufacturing Co., the American Institute of the City of New York, and RCA Institutes of New York.

. . . Among the technical articles there was a description of a hurricane emergency transmitter and power supply by W4PBP, a discussion of the problems of high-frequency reception by W9CJJ and W9AUJ, and a write-up on the mechanical means of rotating beams by W1APA. W6TE described his "double pitchfork" antenna; W5CSU constructed a simple transmitter for 112 Mc.; and W4ATI wrote on the circuit design and tuning procedure in the new Terman system of r.f. amplifier modulation.

. . . 458 logs were submitted in the second ARRL QSO party.

. . . And in the "Correspondence From Members" section, there was a letter from W7FWB stating on behalf of YL operators, "Perhaps we should band ourselves together in a YLRL or something to that effect. . . ." QST

YL news and views

CONDUCTED BY JEAN PEACOR,* K1IJV

Results: Fifteenth YL-OM Contest

THE familiar CQ OM or CQ YL heard up and down the bands during the YL-OM contest week ends has once again produced interesting results. For the fifteenth year, this contest has proven to be much fun for the many contestants. Real pleasure is found in hearing once again the veteran contestants and also in meeting the many new stations as they discover the joy of this contest for the first time.

YL KØEPE, a high scorer many times, having been first place winner of the phone portion in 1962, third in 1963, has again captured first place honors this year. W3CUL, well known for her traffic totals (see April 1964 column), was first place winner in the c.w. portion. OM W5WZQ has maintained his top scoring record for four years in a row and K5MDX has done this for the past three years. They were joined in sharing top place honors with W4CHK this year, as he tied for first place in the c.w. portion with Dave Blaschke, W5WZQ.

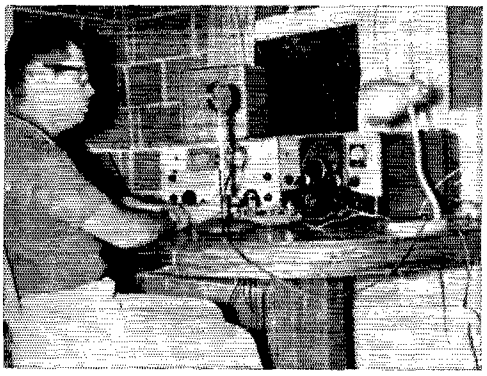
Comments from YLRL Vice President

"Thanks to all of you who wrote notes with your logs. They were greatly appreciated, especially the ones who thanked me in advance for the work of checking involved. With only three or four exceptions, the logs were all done either in ink or typed.

"From checking logs, I've discovered several things of interest. There are more YLs interested in and on c.w. than on fone. There were 59 YL c.w. logs entered and only 42 fone logs. There are apparently no c.w. YLs in Alaska, Arkansas, Canal Zone, Delaware, Idaho, Iowa, Manitoba, Maritime, Miss., Minn., Montana, Nebraska, Nevada, N. H., N. Mex., N. Dak., N. Tex., Ore., Quebec, R. I., or any of the sections in 6 land (except two in Los Angeles), Sask., S. C., S. Dak., Tenn., Utah, W. Pa., West Indies, W. Va., or

Many times a high YL/OM contest scorer, Marte Wessel, KØEPE, was this year's first place winner in the phone portion. DX enthusiasts will recognize the call WØJYW, Marte's OM, whose certificate representing 312 countries confirmed can be seen in the background.

*YL Editor, *QST*. Please send all news notes to K1IJV'S home address: 139 Cooley St., Springfield, Mass.



Recently back from a three-year tour with the Army Signal Corps, where he operated from both KL7WAF and W5USA, Fred Fraley, W4CHK, rejoined his favorite contest and tied Dave Blaschke, W5WZQ, for first place c.w. honors in the YL/OM contest.

From the 50th state, YL/OM second place c.w. scorer is Gladys Stickle, KH6BTX. XYL of KH6BLX, Gladys has two grandchildren and many interests which cut down on her radio activities at times, but not during the YL/OM or YLAP contests.

Feb. 29, Mar. 1, 1964

YL Phone

	Contacts	Sections	Score
KØEPE, Martha E. Wesse	1,101	90	99,090
WA6OET, Jessie W. Billon	613	82	50,266
WA9ENB, Frankye Prigg	531	86	45,666

OM Phone

K5MDX, David L. Thompson	95	45	5,343.75*
K4VFY, Mike Kirby	79	38	3,752.50*
K1NWE, Robert Young	52	31	2,015.00*

Mar. 14–15, 1964

YL CW

	Contacts	Sections	Score
W3CUL, Mae Burke	425	69	36,656.25*
KH6BTX, Gladys T. Stickle	381	80	30,480
K8ONV, Sally Mary Ryden	367	82	30,194

OM CW

W5WZQ, David Blaschke	72	39	3,510*
W4CHK, Frederick Fraley	72	39	3,510*
K6CJF, William M. Marriott	58	38	2,755*
W9LNQ, A. R. Truhlar	61	36	2,745*

YL Phone

K1LCI	13,895.50*
W1ANR	580
K2JYZ	3,250
W2OWL	1,917.50
WB2KFO	538.75
W3VNN	18,119.75
K3URP	75
K4RNS	28,060
WA4DBP	24,563
WA4BSJ	17,120
WA4FEY	6,350
WA4FJF	761
K5FXX	18,240
W5CXM	10,082.50
K5BJU	5,520
K5PFF	3,886
K5MIZ	1,625
K5MXO	62.50
WA6OET	50,266
WB6CGA	42,924
K6HUT	2,286.25
K6UHI	962.50
K7SKR	28,600*
K7MRX	21,037.50
K7RAM	16,568
K8ONV	32,487
K8PXX	775
K8ZJU	20
WA9ENB	45,666
K9WUA	16,167.50
W9KSE	10,400
W9DCA	16,630
K9LTQ	5,248
K9QGR	3,562
K9CCO	1,530
K9TRP	1,242
K9GMF	80
KØEPE	99,090
WAØEMQ	14,701
KØVPJ	10,050
KØGIC	900

OM Phone

K1NWE	2,015*
W1HOZ	1,000
W1BAB	720
W1PYM	580
K1BUR	391
W1PIJ	104
WA2QHQ	1,121.50*
WA2NEN	1,006.25
K2BX	777
W2QKJ	765
K2DEM	531.25
W2ASV	522.50
W2JB	70
WA2VOW	67.50
K3TOQ	1,885*
W3QLW	280
K4GSX/3	225
K3UHU	1
K4VFY	3,752.50*
W4LK	960
W4JUJ	852.50
K4DAD/4	825
K4CRS	473
K4JSZ	440
W4HKJ	394
W4RLS	9
K5MDX	5,343.75*
K5SVC	2,550
W5WZQ	2,520
K2EIU/5	1,188
WA5ALI	1,001
WA5ALB	240
K6CJF	1,235*
WA6KNE	551
WA6ECF	356
W6JVA	70
W7NKK	1,620
W7ULC	1,188
K7SAS	543.75
W7KOI	15
W8TN	902
W8WUO	760
K8CIR	480
W8NAN	204
W8SS	88
W8EZX	1
K9AKF	1,552.50*
W9WGQ	1,462.50
W9OKM	880
K9LVK	875
WA9KHW	637.50
WA9BWY	338
W9LNQ	325
K9VIE	287.50
W9LKI	260
W9GRN	206
K9DWG	120
W9UTQ	96
WA9GRK	16
WØBTD	1,332.50*
KØIUZ	1,110
KØQYX	527
KØETA	450
WAØASU	420
WØYQR	357
WØKZZ	325
WØPLN	192
VE1AFP	275*
VE3EVK	66*
VE4ZX	101.25*
VE7AKB	825*
VE7CE	442
KP4RK	264
G3NFV	80*
YV5BPG	154
PA0FAB	90
K3ICK/VO1	204
SM7CIR/MM	11.25*

YL CW

K1UOR	24,427.50
K1UZG	19,379
K1LCI	18,443.75
K1IJV	13,780
K1WZY	9,620
W1YYM	8,757
W1YPH	8,523.50
K1QFD	4,637.50
W2EBW	19,363
WA2CUZ	16,807.50
W2RUF	11,025
WB2HOK	9,525
WA2WHE	9,116.25
WA2ZEE	6,815
W3CUL	36,656.25*
W3TSC	22,791
W3SLS	19,212.50
K3TVH	7,500
WA4BVF	18,520
WA4PDS	15,045
W4NGE	14,897.50
K4LMB	13,620
K5LUI/4	13,510
WA4BSJ	11,550
K4BWQ	10,751.25
W4UF/4	8,372
K4VDO	8,262
K4ZNR	8,164.25
WA4FJF	6,854
WA4EPM	3,510
WA4FEY	360
K5FXX	21,775
K5MXO	13,570
K5MIZ	5
WA6OET	31,450
W7HXE	17,360
K7RQI	15,825
K8ONV	30,194
VE3AYN/8	23,152.50
W8WUT	14,111
K8VFR	11,990
W9KSE	28,760*
W9MLE	16,331.25
WA9CCP	12,316.25
W9USR	7,738
KØZSQ	18,880
KØGIC	16,050
KH6BTX	30,480
VE3EZI	26,492
VE3BII	12,756.25
VE6ABV	14,918.75*
VE7BBB	4,250*
PY2SO	345
VK3KS	1,063*
DJ9SB	1,820*
OH2YL	1
OH5RZ	375
G3ORU	292.50*

OM CW

W1PYM	2,457
W1HOZ	2,232
W1WHQ	1,855
W1EIO	1,664
K1SGU	1,631
K1YKT	1,300
W1UOT	1,260
W1FPS	1,080
K1ITU	836
W1IFM	637.50
W1OPZ	400
W1AW	288
W1DPJ	266
W1PLJ	132
K1VII	112.50
K2PXX	2,053.75*
W2AAU	2,060
W2LQP	1,937.50
W2CUC	2,040
WA2OJD	2,030
WA2ONH	1,575
WB2LBJ	1,428
K2DEM	1,365
W2BWW	1,156
WB2EQP	800
WA2PDJ	712.50
WA2WIJ	709
WB2ABD	641
K2KD	562
WA2VQV	420
W2NIY	322.50
W2WL	286
W2UAP	192.50
WB2COR	123.75
W2IP	61
K3NEZ	1,267.50*
K3ZMH	1,121.25
WØGKY/3	1,092.50
W3JET	988
W3QLW	440
W3QQL	432
K3HNP	308.75
W3MSR	60
W4CHK	3,510*
K4VFY	2,557.50
W4DMS	2,475
WA4FAT	2,280
W4HTV	2,160
WA4SHD	1,960
W4LK	1,792
W4JUJ	1,762.50
W4MXU	1,632
WA4BXZ	1,247
W4HSJ	1,187.50
W4WHE	1,064
W4ZOK	1,034
W4HOS	1,026
K4MYO	494
W4KMS	450
K4WVT	175
W5WZQ	3,510*
W5DQK	1,802
K5OCX	1,595
W4SKI/5	151.25
K6CJF	2,755*
K6BFZ	2,584
W6OEO	1,904
WA6ECF	1,388
W6JVA	1,341.25
WA6TKQ	1,330
WA6WTD	906.25
K6IMT	644
W6CLZ	528
WB6DPV	150
W7ULC	1,747*
K7KHA	1,377.50
W7EWR	522.50
K7YQI	272
K8KFP	2,625
K8GWK/8	2,227.50
K8VTC	1,350
W8NAN	1,802
W8SS	792
K8KPM	682.50
W8DM	292
W8RGF	150
W8IET	12
W9LNQ	2,745*
W9WCE	1,715
W9LKI	1,705
W9SIE	1,397
W9CHD	1,350
W9YDQ	1,300
W9DTE	1,232
WA9FDJ	1,180.25
K9QKY	1,170
K9DWG	962
W9UTQ	880
W9SFM	782
W9CRN	593
W9AEM	480
W9TCU	368
K9HRC	255
K9VIE	100
WA9FBG	80
WA9BWY	50
WØGWT	1,920*
WØVFE	834
WØJTC	143
W7UXP/KH6	101.25*
VE1AE	641.25*
VE1DB	280
VE2AQO	1,592.50*
VE2BOW	1,023.75
VE3DXD	1,772.50*
VE3FHV	1,176
VE3EVK	272
VE3CNA	220
VE4ZX	1,069
VE6UP	1,518
VE7BDJ	1,271
XE1FE	400*
JA2CKS	25*
TF3AB	20*
HK7ZT	625*
G3NFV	52.50*
G3WP	11.25
IT1AGA	215*
KP4RK	1,881
KP4CC	1,364
PJ2AE	300*
PY2CQ	1
SP6FZ	143
OH2OD	1.25*
OH2BH	1
XEØCS	1.25

* Low Power Multiplier shown only for top district scores.

Wyo. The fone men are luckier as there were no YLs in just N. H., Del., N. Mex., S. J. V., Sask., Wyo., and Vt. There were 42 YL logs entered in the fone section and 80 fone logs from the OMs. There were 148 c.w. logs entered by the OMs — which goes to prove that c.w. is not a dying art, or something! Many DX logs did not have the proper section for states which are divided and therefore lost multipliers.

"Now, I need your help. Many of the OMs commented that they would like to have an idea where to find the YLs, especially on c.w. What do

(Left) Bob Young, K1NWE, of Florence, Mass., won third place YL/OM honors in the phone portion. His XYL Doris, K1UOR, placed first in the first district in the c.w. portion. (Right) Having said "Can do," this candid shot of Eunie, W1UKR, shows the pleasure derived as it's being "Done."

Portland, Maine, was the scene of the WRONE spring luncheon in May. The attendance of 40 YLs made this meeting, the first ever held in Maine, highly successful. Shown at the head table are: (l. to r.) Mary McLam, K1ICW, Secy., Treas. of WRONE; Peggy Harnois, K1GSF, Hospitality assistant for the occasion; Ginny Powell, K1LCI, Pres. of WRONE; Blanche Randles, K1IZJ, Pres. of YLRL; and Helen Harris, W1HOY, Editor of the *Miss WRONE's Chatter* and Contributing Editor to *QST*.

you think of setting frequencies, not arbitrarily, near which YLs can be found? Drop me a postcard with your thoughts on the matter or tell your D/C or nearest YLRL officer.

"While you are industriously writing pro and con postcards on the idea of set frequencies, how about comments on having a separate YL-OM VHF contest? 33 and 73 — it's been fun checking your log!" *Martha Edwards, W6QYL.*

AWNEAR

Twelve planes with 24 women pilots were airborne from Barnes Airport at Westfield, Mass. on May 16th for the All Woman New England Air Race (AWNEAR). The course of the race covered five New England airports and approximately 300 air miles. Of particular interest to amateur radio operators was the fact that Millie Doremus, W1SVN, womanned plane number 5 in the race.

The chairman of this N.E. section of the Ninety-Nines race had unsuccessfully tried to obtain amateur radio coverage for the occasion until, three days prior to race time, someone told her about Eunice Gordon, W1UKR. Eunie merely said: "Sure — can do!" When Saturday morning rolled around, a radio net operated covering all points which displayed efficiency personified. Every amateur radio operator contacted for assistance willingly organized his particular area to provide liaison stations. Several rearranged normal working hours in order to assist. This fine cooperation resulted in the necessary information being relayed back to the base of operations at Barnes Airport many times within one or two minutes of the actual happening at the different airports.

Paul Caputo, K1PKZ, who together with K1PIM and K1PIL manned the Barnes Airport radio station for the net's activities, summed up the sentiments of all radio amateurs who assisted throughout the day in his statement of "amateur radio operators are quite a fraternal group." Others who greatly aided in the success of the net's operations were: at Southbridge, Mass., W1EFC, his XYL K1ICW, and K1FPE; at Nashua, N. H., W1BXM and W1SWX; at Laconia, N. H., K1UYA, his XYL K1NOS, and K1OXO; at Claremont, N. H., W1AD, his XYL K1BQB, W1ATJ, and W1WIA; and at Turners Falls, Mass., XYL K1UUE and K1SHD. NCS of the central net covering all points was Eunie, W1UKR, who operated from the QTH of K1IJV at Springfield, Mass. Much credit also goes to all who stood by on 3810 kc. from 9 A.M. to 2 P.M., allowing this radio net to operate with no QRM. Yes, amateur radio operators *are* quite a fraternal group!

YL Club News

The annual Floridora business meeting was held at the Orlando Hamfest in April. The following officers were elected for 1964–1965: Pres., Ellie Hornor, K4RHL; V. Pres., Ev Shea, K4UIZ; Secy., Gale Moorehead, WA4NRO; Treas., Sue Beckman, W4VSG. The president appointed the following chairmen: Historian, Ev Shea, K4UIZ; Cert. Custodian, Marge Campbell, K4RNS; Membership, Fran Adams, K4PPX. QST

The World Above 50 Mc.

CONDUCTED BY SAM HARRIS,* W1FZJ

THE AMATEUR MOONBOUNCE RECORD

January 27, 1953 — The first moon echoes on 144 Mc.

July 21, 1960 — The first two-way moon echoes, Massachusetts to California on 1296 Mc.

August 9, 1962 — new moonbounce record, Massachusetts to Hawaii on 1296 Mc.

April 11, 1964 — The first two-way 144-Mc. moonbounce, U.S.A. to Europe on 144 Mc.

May 20, 1964 — The first 432-Mc. moonbounce, Massachusetts to Puerto Rico on 432 Mc.

June 13 and 14, 1964 — The first . . . (you fill it in).

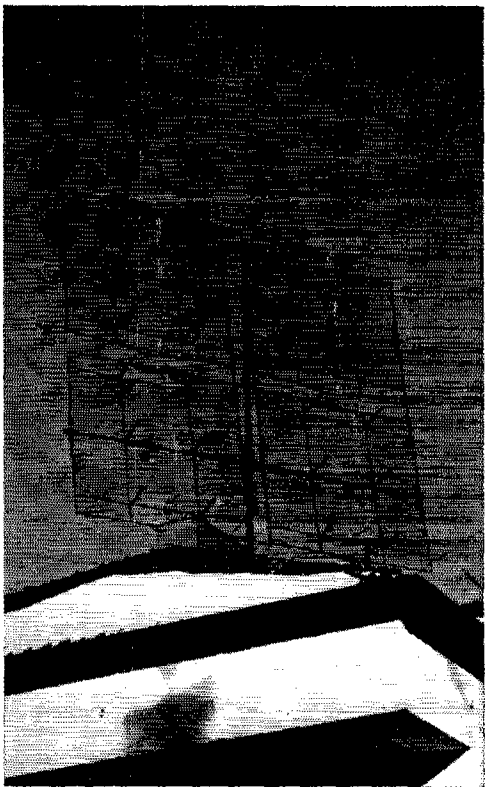
Note the rapidly descending time intervals between events. Note the bands used. Examine the equipment used. Give a little thought to the effort put in by each of the participants. Surely they worked hard. Certainly they had to use the best "state of the art" techniques and equipment available to an average amateur with a limited budget. Oh! They suffered all right but after all pioneers are supposed to suffer. The point is that they suffer less and less as time goes by. The techniques are becoming more routine. The equipment is becoming more standard. The contacts are becoming more repeatable. You can't buy your moonbounce rig "ready made" from your local supplier yet, but at least you can find out what you need. You can choose the band you want to work on and know in advance that there will be someone to work with. Now is the time to get on with your moonbounce project. Don't wait until everyone else has had all the fun. Do it now!

PUERTO RICO TO MASSACHUSETTS ON 420 MC.

May 20 at 0020 to 0040 GMT the first two-way 420-Mc. moonbounce contact was made, when KP4BPZ at Arecibo, Puerto Rico, and W1BU at Medfield, Massachusetts, exchanged reports and congratulations via the EME route. Signals were R4 S6 on both ends. Equipment at W1BU consisted of 150 watts output into a 28-ft. parabolic reflector on a polar mount. Receiver was a parametric amplifier into a crystal controlled converter into a 100-cycle bandwidth receiver. KP4BPZ was feeding the 1000-ft. hemispheric reflector at Arecibo, P. R. Details on transmitter and receiver at his end have not been received. One thing is certain. It sure does help to have a big antenna. Tests made on the succeeding night with an improved feed and 300 watts into the antenna at W1BU yielded signals which were 20 to 40 db. over the noise in a 1-kc. passband. Plenty strong enough for phone work using s.s.b. (Guess who is frantically getting his 420 s.s.b. rig working!) Hopefully, by the time you read this there will have been any number of two-way contacts with KP4BPZ on both 432 and 144 Mc.

Southern Rhodesia 50-Mc. Beacon

A 40-watt f.s.k. transmitter on 50.046 Mc. was recently installed on a 5000-foot elevation 25 miles north of Salisbury, Southern Rhodesia. It runs 24 hours per day, sending "QRA de ZE1AZC," with a 200-cycle upward shift on "mark." Provision is included for changeover from commercial to emer-



OH1NL used this 24-element phased array in front of a screen reflector for his end of the record-breaking 144-Mc. moonbounce contact with W6DNG. The whole assembly is mounted on his rooftop and is tiltable to +30 degrees above the horizon.

*P.O. Box 334, Medfield, Mass.

gency power, if the latter is required. The transmitter will operate through the International Years of the Quiet Sun.

The project is the result of cooperative effort by Fred Anderson, ZS1LA, and Ray Cracknell, ZE2JV, the Southern Rhodesia Electricity Supply Commission, and Ivan Wood, ZE3JJ, an engineer with SRESC, who holds the experimental license for the beacon. Reception reports are solicited, and these should be sent to Mr. Wood, c/o ESC, PO Box 377, Salisbury, Southern Rhodesia.

144 Mc. and Up

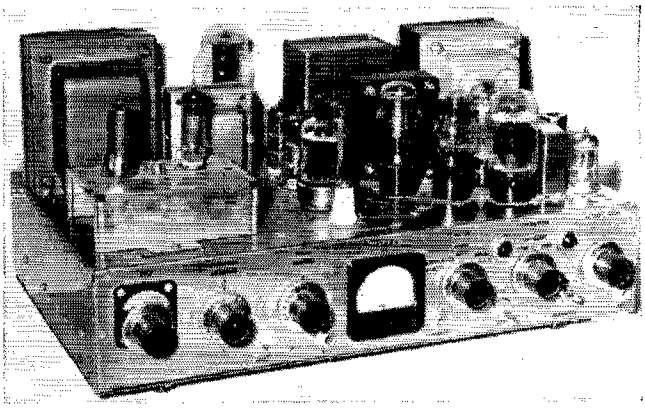
With the coming of spring and early summer, reports of activity on 144 Mc. and higher bands are beginning to dwindle. However, those reports received are worthy of notice. For instance — WA9FNS is still working on his equipment for 2300 Mc. and it is now almost completed. Skip sez he has had much difficulty in getting the transmitter to oscillate and if the present problems persist he will go to a klystron. He is also working on a teletype terminal unit which should be finished by the time this appears in print. In Louisiana WA4JAY is working on a number of things including a "10-kMc. super-regen, 1296-Mc. converter and i.f., APX-6 conversion." Out in Alabama K4IQU notes that 1296 Mc. is good line of sight (as usual) and he is now working on crystal controlled transmitter and receiver for the band. Transmitter is now up to 10 watts out at 432 Mc. and receiver is being done triple conversion. Next project for Dave is a parametric amplifier for the same band. WB6DMB who operates at 1230 Mc. sez best times for general propagation seem to be around sunrise and sunset, with dry weather helping quite a bit. Bob also mentions that the 16-element colinear broadside array seems to be working out beautifully for the APX-6 on 1230-1250 Mc. Future plans for Bob include building a 32-element colinear array and an ARN-21 i.f. strip in the APX-6. Another Californian, K6HEP, is trying to arrange contacts for 1215 Mc. Equipment already going well.

Report from WA9FUH sez: "Present amateur television activity in the Milwaukee area consists of K9ADX, K9ESK, K9KGA, WA9DKC and WA9FUH. These boys are either on the air or are building equipment for ATV, and are holding skeds, most of them being for adjustment of their rigs. All of the equipment in the area is of the flying spot type. I hope to have my scanner operating in closed circuit by mid-June and on the air by July. I get two questions thrown at me when talking to potential TV amateurs. These are, 'Who is up there?', and 'What is the range, a block or two?'. I can answer the first question but the second gives me some doubt. I know some hams claim 50-mile range. What is the record ham TV contact on 440 Mc.?" (O. K., gang. Come through with some answers to this question.) Also working on T.V. on 420 Mc. are WB2DDW, WA2OOD and WB2GFU. These boys would appreciate knowing where they can locate TV camera equipment, especially closed circuit. Anyone with information on this point please write to any one of the boys. They hope to have test transmissions with A5 made by the end of the summer.

An old-timer on v.h.f. has once again changed his QTH and must start at the bottom on "states worked." Al, K8AXU/8 is now living at Marietta, Ohio and hopes to be on 144, 220 and 432 Mc. very soon from the new QTH. K7NII in Arizona is interested in all v.h.f./u.h.f. bands above 144 Mc., and next band he will be operating is 432. On April 6, another well known v.h.f. man, K7ICW, made the first known QSO on 220 Mc. between two Nevada stations. K7RKH was the other lucky station and although his antenna was practically lying on the ground he received Al's signal at 5–9 plus and report to him was 4–4. The DX antenna for 220 Mc. at QTH of K7ICW blew down in a windstorm so Al has been forced to cancel his 220 skeds with K6IBY until Fall. W6IEY is busy building a new driver unit for his 432-Mc. rig, "a little two-meter unit ending up in a 6146." A frequency standard is also in the works at Lou's QTH. May 7 was a big day for Jack, W5UKQ, at Baton Rouge. It started off at 0430 when he worked W4TLV at Demopolis, Alabama on two meters and then on 432 Mc. Almost three hours later, at 0710, he worked W5RCI in Mississippi on two and then 432. On May 3 Jack had worked into Texas (K5LLL, W5LDV, W5AJG, W5FSC and K5SDM) all on 432 Mc. Combination of the two days brought his total up to 19 states worked on 144 Mc., longest distance 1150 miles; on 432 Mc. grand total is now 3 states, distance 500 miles. WA4FIJ reports a 432-Mc. QSO with W4GJO at Sarasota and another with WA4BYR at Englewood (302 miles). Dick is running 50 watts c.w. and is looking for contacts on 432 Mc. At Hialeah, Florida, WA4AMG and W4VCF have built a 432-Mc. rig. Transmitter is homebrew with the final out of the '63 *Handbook*. The converter is also out of the same volume. Jim sez: "We had no trouble adjusting either one." Antenna system is 2 eleven-element beams with the top one at 47 feet. These boys are looking for skeds on both 420 Mc. and 220 Mc. Frequencies are 220.077 and 432.100. W4CPX and W4TLC are holding down the 420-Mc. band in South Carolina with skeds into Charlotte, North Carolina. Results of these skeds have been very good.

WA2UDT is among the many builders. At present Bill is working on a 432-Mc. tripler and beam. Converts for 220 and 420 have been completed at his QTH recently. W4ZGS tells us that conversion of his URC-11 to 222.5 Mc. is almost completed and he hopes to be "on the air" with it soon. At Kalamazoo, Michigan, Walt, W8CVQ, sez that "220 Mc. is practically useless in this area because of number of listeners on TV Channel 13."

Reports received for 144 Mc. continue the upward trend in number of "States Worked" on that band. K3CFA upped his total to 12 states worked when he worked W2AMJ in New Jersey on May 3. Joel sez a mountain three miles to the east of me keeps K2IEJ at Oceanside, Long Island, down at the noise level during his nightly QSO with W8KAY which I usually monitor." (Mountains can make a difference, and sometimes they're even of some help.) At Orlando, W4MNT raised his total by one new state and almost had two new ones. George did work W1MEH in Connecticut for the new one and *almost* worked K3OBU in Delaware. However, this last one just didn't pan out. Total at Orlando (W4MNT) now stands at 19 states. George tells us that his converter went on the blink the night before his skeds and seeing as the converter is mounted on the antenna he stayed up and outdoors all night to get it going again. You guess what kind of weather he had for this all-night job! Of course! It was raining! He didn't mention such things as pneumonia so guess he came through all right. George would like m.s. skeds to Tennessee, Kentucky, Maine, New Hampshire, Vermont and states west of the Mississippi for future showers. All interested write to him



Who sez hams no longer build their own gear? K1UKX, Fred Randall, built this good-looking, efficient 75-watt transmitter for 50 Mc.

at 414 Oxalis Drive, Orlando, Florida.

During good sessions on May 3 and 7, W5UKQ added enough states to make a grand total of 19 for him at Baton Rouge, Louisiana. W5AJG added New Mexico to his two-meter list when he worked K5IQL recently. Sez it's so long since he's worked a new one that it gives him a very strange feeling. Leroy also sez: "432 is getting rolling again this spring. Believe we will have a good one. Several instances of openings toward the East. Have heard the Alabama radar three times during the last couple of weeks. Worked K5UKQ at Baton Rouge on 432. He was c.w., I was s.s.b. He had only 20 watts. Some activity going on 220 Mc. also. Houston stations coming on the air with 220 surplus fm gear. Conditions toward Houston on 432 can build up terrifically at times, even exceeding 144-Mc. levels." All very interesting news, Leroy. Thanks, and write more frequently. Out in Mitchellville, Iowa, WØBFB came up to the top of the list when he worked K7NII on May 1, 1964 for state number *41* on 144 Mc. John sez he hasn't been operating much recently except for his m.s. skeds, but they surely have paid off. Previous contact (#40) was with K5TQP (New Mexico) on December 13 of last year. John is looking for skeds with Maine and Idaho. Any takers?

From New Jersey reports received from WA2OOD, WA2ZOW and WA2UDT all agree that ground wave conditions were exceptionally good several times during the month of April on 144 Mc. Greg, WA2OOD, sez there seemed to be slight temperature inversions on the Saturday nights that he had a chance to listen. Mike, WA2ZOW, noted an opening on April 19 when he heard a station about 75 miles away on a "Twoer" and a 19-inch vertical whip. Work is progressing on a beam at Mike's QTH. WA2UDT, Bill, noted good ground wave conditions on April 4, 5, 12 and 14 plus the 25th and 30th. "A pretty good month for groundwave. Hope it foretells a good summer for two meters," sez Bill. According to reports, WB2CCY is now a two-meter sidebander. Look for him. WA2ZPD and WA2TQT in New York go along with the Jersey opinion. "Excellent ground wave conditions" sez Norm, WA2TQT, "with many stations heard in Pennsylvania, Maryland, New Hampshire, Connecticut, Massachusetts and New York." Ray, WA2ZPD tells us that the 144-Mc. band is showing good activity in the Elmsford, New York area, and that a number of s.s.b. stations are heard between 144.0 and 144.2. Delaware via K3OBU also agrees. According to Joe, conditions were good on April 8 when "the band was very lively for a change;" April 12 when it was good up and down the coast once again; and April 15 when W1RJA was worked with signal up to 9$, plus a number of other New England stations being heard. Joe has been busy recently arranging skeds for m.s. and also with the gang that will operate atop Mr. Le Conte, Tennessee during the contest. Hope his skeds pay off. He will be portable himself during the contest, and will be operating from the northeast corner of Maryland hoping to give out the Maryland, D. C. section to many comers. K3VGX in Maryland sez that two meters is still coming in strong with many new stations now active. Joel Balogh, K3CFA, has found the simple way to find a two-meter opening. He monitors the nightly contact of W8KAY and K2IEJ and can judge from their signals just what shape the band is in. Convenient, isn't it? Joel hopes that sometime in the near future Ernie, K2IEJ will find his (K3CFA) signal after he signs with Art. Activity at Lemont, Pennsylvania (K3CFA) now includes building of a 24-element colinear antenna for 144 Mc. operation. It will be a 16-element colinear plus directors and should be much better for m.s. work than the 50- to 225-Mc. log periodic dipole now in use.

Apparently Florida had some good days during the month of April on 144 Mc. also, although we received few reports from the area. W4ZGS at Fort Walton Beach tells us that on April 11 he worked WA5CKI in New Orleans on two meters, and on the 22nd he worked K4ZAJ in Montgomery, Alabama. WA4EVQ sez he has completed his two-meter mobile rig and is looking for contacts; and WA4FIJ at Panama City reports that two-meter ground wave is still good out to 300 miles. Dick is running 80 watts c.w. W4YRM has been busy building lately. Projects include a speech amplifier and modulator for 144 and a two-meter beam. Just completed are a 2-meter 20-watt 2E26 c.w. rig and a two-meter converter. Julian is looking for 144-Mc. contacts and is monitoring 144.35 Mc. nightly from 1900–2200 CST.

Only one report received from 6-land this month and that seems well worth quoting. Jim, K6JC writes: "I set up skeds with K6KV, Mac, at Santa Barbara on two meters about three months ago for each Saturday and Sunday at 7:00 A.M. (Good grief!) I was soon joined by K6QHC, W6ITF and W6SPB. Mac's signals came through at times and also W6DEE at Wilmington near L. A., who joined Mac's end on skeds. No two ways occurred until K6QHC built a linear. Jerry worked Mac right off and then made it two way just about every time for ten days in a row. Meanwhile I (K6JC) put up a 16-element J slot to replace the old 6-element long john and worked Mac the very next morning and

have been making it two way with him almost every sked since. (3 weeks.) In the meantime WA6MGZ and K6HCP, both running over half a kw. joined in the skeds and now Max is working all of us and expects others with power to be joining in soon.

"The outstanding thing about this path to San Francisco area and also Sacramento and San Joaquin Valley is the very rugged terrain, especially to this area. The mountains stand up right in Mac's face and range from 3000 feet to 6000 feet practically all the way to the Bay area." Now, those of you with low power, small antennas and mountains in front of you have heard from an expert who has overcome these obstacles 'cause he's a determined v.h.f. man. Take ye note and do likewise. Jim goes on to say that although he has not been on 432 very much due to balun and antenna troubles, more fellows are getting on that band all the time.

K7ICW reports tropo path to the L.A. area good, but not good enough for A3 on 144 Mc. to K6LZC. After several weeks of skeds, Al worked K7NII in Scottsdale, Arizona on April 8. "K7NII heard me every time I was on, and K7RKH heard K7NII almost every time he was on. Local terrain features at both ends make the path difficult as K7NII is running only 150 watts input. Attempts at meteor scatter from his station to WØBFB in Iowa have been quite surprising. K5TQP has been running skeds with him and can almost always hear something from him. Regular skeds with W6NLZ, W6DNG and K6LZC during April were routine. Attempts to use s.s.b. here were unsuccessful due to equipment trouble at this end. Made a 2-way QSO with K7RKH on two meter s.s.b. on April 22. First known two way s.s.b. on 144 Mc. in Nevada." Congratulations, Al. Looks like a number of your efforts are paying off in one way and another. From 8-land we hear that a new station on 144 Mc. in the Detroit area is K8PEJ who works into Pennsylvania every night for a QSO with W3GLC. At Royal Oak, Michigan WN8LCZ notes that on April 5 the band was good around 10:00 P.M. when he heard W8MVE in Republic, Ohio. Byron mentions that on a QSL card received from WA8AQS signal report read 5–9 when he (Byron) could just copy WA8AQS. Strange things do happen on the v.h.f. bands! At Saginaw W8FZ observed a lot of carriers on April 21 around 2100 EST. However, no readable signals due to poor antenna in Saginaw. K8PBA in Ypsilanti noted good conditions on April 24 and 25 on two meters into eastern Pennsylvania, and Bob also mentions an auroral session of ten minutes duration on April 30. From Willowick, Ohio, W8ANQ sends us the information that several members of the Eastshore v.h.f. Radio Club are now operating two meter F.M. Out in Villa Park, Illinois, WA9AEN sez there is a lot of local activity on 144 Mc, that Michigan and Wisconsin have been heard regularly recently and that on April 5 he (WA9AEN) heard K8RZB in Connover, Ohio. Good ground wave mentioned again by WA9HQP with particular reference to April 18 when he worked WA9DOT. Dennis also mentions that his ground plane for two-meter f.m is now up to 50 feet and he notices appreciable difference from the 40-foot height. Also — K9ZSS, WA9IZR and K9LZV are all on 146.94 Mc. F.M. No more fishing for WNØILQ but with luck he'll be having better reports, etc. on two meters. Junior sez: "I've been trying a new type of antenna, a $\frac{5}{8}$ wave vertical. I have found that it is much better than the $\frac{1}{4}$ wave type and has about a 3-db. gain over the $\frac{1}{4}$-wave type. Construction was a fiberglas fishing rod and the braid from RG/11U is about four feet long." Sorry about the fishing bit, Junior, but good luck on two meters. KØJWN sez that local hams reported the aurora of April 30, but no major openings observed at his QTH in Harrisonville, Missouri. Larry has built a corner reflector for two meters which seems to be working fairly well.

50 Mc.

With the sporadic-*E* season still going full blast, it is appropriate to remind 6-meter sidebanders that the East Coast VHF SSB Association offers a trophy to the first ham to work 48 states on 50-Mc. sideband. If you make it, the man to tell is Abe Cutler, WA2ONB, 45 Birchall Drive, Haddonfield, N. J.

The following item will be of great interest to a number of the 50-Mc. fans. "This summer from June 22 to August 30, I (K8YUN) will be located on Corral Hill Lookout located 15 miles east of Grangeville, Idaho in the Nezperce National Forest. I will be working 50.2 Mc. from this location with a small 7-watt rig and a 4-element beam. I would be happy to make a sked with anyone in the area and will be looking for some DX during band openings. I had this same rig in Idaho last year and worked KØMVI, WB6GKK and W6QWT. Another ham will also be in this area for the summer, K5HGK and will also be looking for DX from the mountain tops." If you'd like to make a sked with Tom his summer QTH is Corral Hill Lookout, Nezperce National Forest, Grangeville, Idaho, 83530.

K6QKL/KH6 has written to say that during April things were generally quiet on 50 Mc., although a weak a.m. signal has been noted at 50.2 during the early morning hours. Too weak to copy, sez Charlie. He also reports that on April 11 at 1822–1826 Z, KH6CMM heard K7AAD 24 db. above the noise, c.w. at 50.023 Mc. Sounds very good to us.

Down Maine way K1NAN sez there is little v.h.f. activity in his corner of the state but he's working on a six meter rig with hopes of completing it before summer skip begins. (It has begun, Tom. Hope you were ready.) In New Jersey K2LNS sez the only half way decent conditions he heard during April was on the 27th when he worked stations in Western New York, Virginia, Western Pennsylvania, Massachusetts and Ohio on aurora. WB2EZY sez that on April 1 he was hearing 1's and 4's. WA2RAQ reports good ground wave during April and sporadic *E* on April 14 when 4's and 9's were heard. WA2TQT in New York City agrees as to ground wave and Sporadic *E*. At Schenectady, New York, WA2DRP notes aurora on April 1, 27 and 30; skip on April 26 and May 3. Down Philadelphia way K3FLQ reports that during the week of May 10 to 16 he heard W1's (except Maine), W2, W3, W4 (except South Carolina), Texas, Arkansas, W8, W9, Kansas, Iowa, Missouri and KP4AAN. Sounds good Ralph, keep a-diggin'. Another 3, K3NCQ in Maryland, reports a slight opening on April 17. In Washington D. C. K3AIZ wants to set up a facsimile station on 50 Mc. but doesn't know where to pick up a txc. Anyone help him out? Irv also wants to get RTTY going on six but must still build a converter.

Looks like the 4's have been too busy working "skip" to send in reports. However, we did receive a few. One from W4UAR in Alabama reports a few small openings on six during April but nothing exceptional to report on the openings. WA4JCS at Miami, Florida reports the openings coming right along with the summer weather. (Thought you always had summer down there Walt.) He would like

(*Continued on page 170*)

Correspondence From Members-

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

WHAT'S IN A NAME?

The commemorating issues of *QST* provide a most interesting account of the League's founding and evolution of amateur radio. However, in spite of the vast technical advancements and changes, it is ironic to note that the League's name has remained unchanged in five decades.

Indeed, since most communicating is now made direct rather than by relay, the name American Radio Relay League appears to have become a misnomer. True, many amateurs continue to engage in relaying traffic. However, by and large, the amateur radio fraternity has evolved into a group with many specialized activities and interests within the hobby. In addition to the traditional relay enthusiasts, we have the rag-chewers, brasspounders, DXers, observers, official bulletin stations, experimenters, builders and others. There are also literally thousands of inactive and would-be hams who maintain a general interest in amateur radio by supporting the League with their membership.

The evidence clearly indicates that relaying has long since become merely incidental to the art of ham radio. In recognition of this, the League's name should be changed to connote something more synonymous with the amateur radio service, or the radio amateur, per se. Along this line, the one time Federal Radio Commission was perceptive enough to make a suitable change when a change was obviously needed.* There are numerous other similar examples.

So what's in a name? Its basic purpose of course is to identify. A good name lends character and distinction. Above all, if it is to create a favorable image, it should be simple, meaningful and easy to recognize. Hiram P. Maxim, the dean of Amateur Radio, had the right idea when he suggested the American Amateur Radio League. Personally, I like the Radio Amateurs League of America, even better. What could be simpler or more becoming? — *K3UNR.*

[* Editor's *note*: A minor point, but the FRC didn't change its name to FCC. The latter was a new body created by the Radio Act of 1934, to handle some functions of the ICC and all those of FRC.]

ACCEPTED AUTHORITY

An out-of-place and strictly "sour grapes" comment by a ham on the air recently motivates me to make this observation: between the amateurs who like myself, are on the staff of the Air Force Special Weapons Laboratory here in Albuquerque there constantly are passed knowing smiles and proud nods of the head when other scientists and engineers find reference to League publications in even the most advanced electronic and physics books and periodicals. I personally have been amazed at how often *QST*, the ARRL *Handbook*, and even Hints and Kinks are cited in footnotes and bibliographies of scientific publications.

Let me hear no man make a half-witted judgment of the technical competence of the League, or of the respect in which it is held by members of the related sciences. — *W5MVP*, Albuquerque, New Mexico.

DX OPPORTUNITIES

Where will the population of ham radio concentrate in the next ten years or so? It will be in the v.h.f. and the u.h.f.

There are two main reasons for this. One is the ever overcrowding conditions on the lower bands, and also, the concerted movement of foreign governments to take over the lower frequencies.

To the DX hound, being crowded out of these lower frequencies will be almost as heartbreaking as it is for a young child to be without a Christmas tree and presents on Christmas Day.

The DX hound should review the early days of ham radio when the government put us on 200 meters claiming, "They will never be able to get out of their backyard."

This didn't stop the amateur from investigating ways of contacting that rare DX. So through their investigating they discovered the short wave frequencies where DXing could be made possible.

If we are willing to take the time and patience to explore and experiment as the old timers did, I'm sure that in the future DXing on v.h.f. will be as common as it is on the lower bands.

So when the centennial of the ARRL rolls around let's make working Europe on 432 as ordinary as it is on twenty and fifteen. — *KN1FZD.*

NOW INCENTIVE

I have been in amateur radio for twenty-three years today (my 33rd birthday), many years as an unlicensed s.w.l. and a few years as a licensed ham. On July 1, 1963, I took inventory of myself after catching some comments on incentive licensing proposals. Here I sat with a real fine rig, a Conditional license, and a blank wall. My total QSL stack amounted to about 50, both U.S. and foreign. I guess all I've ever done is rag-chew. I made a vow that night. I knew it was members like me that were not contributing anything substantially to the hobby. I set *four* goals — (1) General Class license, (2) 2nd class radiotelephone, (3) code proficiency participation, and (4) WAS and DXCC. I gave myself until July 1, 1964 to accomplish this. Today I have met my final objective — three months ahead of schedule.

Thank you for your incentive licensing proposal — while I don't understand your reasoning behind some phases of it, I understand your goals. I know in my case, I would never have "uprooted" unless the proposal had started me thinking. I am now enjoying amateur radio more than I ever have in my life. I now hold a General Class license, a First Class Radiotelephone license, a CP-20, RCC, WAS, WAC, 20-K, Nuclear Award, and now DXCC. I hope to try for Amateur Extra this coming June during vacation (the nearest FCC office is about 400 miles from here, at Dallas).

I think several thousand of our members would

be a lot better off if they spent half the time they spend griping on studying and operating techniques.

You know, I'm particularly proud of this DXCC. I have worked 125 countries now without ever getting into a pile-up. I never worked any of the big DXpeditions (Gus), and fewer than 25% of these are of the hit-and-run variety. I have received a readibility *5* on all but three contacts with less than 1000 watts p.e.p. input and a little TH-3 Tribander up 60 feet. I have a very poor location. The main thing, I never received a complaint on signal width or quality. This means a lot to me.

Thanks a lot! While you may make a tolerable error occasionally (who doesn't), I'm still behind you 100%. Maybe now I contribute a little more to radio than I did. — *W5EGS.*

INTRUDER WATCH

¶ What a magnificent article in March *QST* entitled "Intruders in the Amateur Bands."

It has made many things clear to me which I had not previously understood and I imagine the same applies to many other readers. This is especially true of the fact that countries may assign frequencies in the amateur bands to other radio services provided harmful interference is not caused to stations operating within the agreed allocations table.

Clearly we must all improve our interference reporting. — *G3BID.*

NEEDED — DAHS

¶ I guess I'm like most hams in that I have a tendency to save any kind of radio gear in hopes that I will be able to use it in my station. A little while ago I was copying code and noticed that a lot of operators throw quite a few extra dits into their sending, so I started to save all the extra dits. Well, pretty soon I had so many dits that it was hard to open the shack door without being buried by dits, and the house started settling because of all the dits in the shack. I still hated to throw all the dits out, even if I could have found someone to haul them away for a reasonable fee. Then it struck me that I could use them in a keyer. I shoveled a few thousand dits into an old pretzel can with a nail hole in the bottom. The dits fell out of the nail hole one at a time so you could get any desired number of dits by unplugging the hole a suitable length of time. I got another old pretzel can for dahs, but I went through all the surplus stores in Philadelphia without finding any dahs on sale. I tried to glue dits together by threes, but the glue got all over everything so now there are dits stuck all over the walls and floor. I sure hate to throw all these good dits out, so maybe you guys in the ARRL lab could figure out some way to use them — *K3SZE*

SATISFACTION

¶ I want to congratulate W8DRU on his great article (Resolve to Build Something). I agree with him thoroughly. It is far more satisfying to talk to someone halfway around the world or just around the corner knowing that you built the equipment with your own hands. — *WB6IWT*

ALWAYS HELPFUL

¶ I thank you for the fine *QST* articles. Lots of the articles are over my head, but that is my fault and not yours. If each article was clearly understood, the publication would be useless to me. As knowledge increases, the growing file of *QST*s make an invaluable reference library. Keep *QST* as it is. — *K3SRH*

SPACE SAVER

¶ Please publicize the good practice of "zeroing" on c.w. signals with receiver b.f.o. *off*. This would prevent the *bad* habit of so many c.w. QSOs on frequencies 1–2 kc. apart. — *W7KRR* QST

Silent Keys

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

W1ALG, Paul T. Grant, Marblehead, Mass.
W1AZW, Prentiss M. Bailey, Dalton, Mass.
K1DEN, Ralph A. Smith, Somerville, Mass.
W1HCJ, Richard W. Hook, Chelsea, Vt.
WN2AIS, Harry Whitford, Wayne, N. J.
W2AON, Ronald M. Cox, Spray Beach, N. J.
W2AWL, Robert A. Johnson, Long Branch, N. J.
W2BOX, Charles J. Roberts, Belleville, N. J.
W3COC, Charles W. Quick, Philadelphia, Pa.
W2DXM, Clayton J. Basen, Liverpool, N. Y.
WA2EBF, Robert A. Harris, North Haledon, N. J.
WA2FZW, Earl C. Dodge, Whitesboro, N. Y.
WA2WWQ, Randolph V. Wagner, Riverton, N. J.
W3ADM, John A. Roehm, Bausman, Pa.
W3AFR, George Hannah, Madison, Md.
W3BKE, Thomas B. Hedges, Washington, D. C.
W3CRB, John A. Kirk, Baltimore, Md.
W3FVY, Harold G. Washington, Philadelphia, Pa.
K3IGC, James F. Fisher, Reynoldsville, Pa.
W3LZY, Alfred Christie, Washington Grove, Md.
K3NVK, Harry G. Sessinger, Upper Darby, Pa.
K3SXN, Ellsworth J. Speicher, Wilkes-Barre, Pa.
W3WJV, John G. Pedone, Bowie, Md.
W4ACB, Samuel M. Douglas, Tallahassee, Fla.
K4AT, Guyton V. Harvey, Macon, Ga.
W4EYI, Paul Williams, Sarasota, Fla.
WA4FEF, Horace S. Wellons, Portsmouth, Va.
WA4GAJ, John E. Kelley, Sarasota, Fla.
W4KJ, Harold B. Doten, New Port Richey, Fla.
W4KQI, Frank L. Parsons, Louisville, Ky.
W5BEB, Richard W. Jones, Hamilton, Tex.
W5EUR, George H. Kristek, Ellinger, Tex.
W5KZC, Ben T. Beal, Lubbock, Tex.
K6AS, Hallie E. Midkiff, Colton, Calif.
K6EP, Paul D. Breeze, Los Angeles, Calif.
W6IR, Ercil C. Armold, Woodland Hills, Calif.
W6IX, Floyd W. Everett, Alhambra, Calif.
W6RRX, Morris D. Reynolds, Santa Monica, Calif.
W7EHQ, Lloyd R. Norberg, Steilacoom, Wash.
W7HBO, Don E. Stewart, Portland, Oreg.
W7ILA, Walter F. Antram, Ellensburg, Wash.
W8CMB, Edward Nau, Garfield Heights, Ohio
WBJN, Paul W. Towsley, Lansing, Mich.
K8PKS, Donald C. Hoover, Columbiana, Ohio
W8TUL, Frank J. Stuben, Royal Oak, Mich.
W8YDK, Benjamin F. Bragg, Milford, Mich.
W9MOW, Robert L. Peck, Lafayette, Ind.
W9NLV, Armin C. Schmidt, Milwaukee, Wisc.
W9OLO, Arthur J. Hooper, White Lake, Wisc.
WØZWQ, Jack J. Hudson, Trenton, Mo.
VE1BC, William S. Bligh, Halifax, Nova Scotia

Strays

Boy scouts or explorers interested in ham TV contact WAØDGZ.

—·—·—

Feedback

In Fig. 5, page 26, June *QST*, "An Electronic Storm Finder," there is a vertical lead joining the lead from the top of the 2700-volt winding to the junction of the 50K, 1-watt resistor and the 1-μf., 600-volt capacitor to the right of the rectifier tubes. A 0.1-μf., 3000-volt capacitor should be inserted in this vertical lead.

Operating News

F. E. HANDY, W1BDI, *Communications Mgr.*
GEORGE HART, W1NJM, Natl. Emerg. Coordinator
ROBERT L. WHITE, W1WPO, DXCC Awards
LILLIAN M. SALTER, W1ZJE, Administrative Aide
ELLEN WHITE, W1YYM, Ass't. Comm. Mgr.

DX'ing . . . Sanity or Vanity. "What's the sense of DXCC accomplishment (or any other) if you don't have some goal. Goals have to be meaningful before anybody in his right mind goes after them . . . This is a hobby, not a way of life to be rationalized by the defective personality who feels he must win at any cost . . .

We have in our temporary possession the power of personal communication that could change the course of world history. We in the United States live in a free society with free exchange of ideas. What better way to express those ideas in terms of good will and at the same time increase our understanding of other peoples as through DX'ing . . . (But) if you find the excitement of the chase to your liking and your pulse quickens over a choice morsel of DX now and then, go man, go! Make the honor roll as recognition of your efforts. Be rightly proud. Do it with a clean conscience . . . ARRL hasn't been entirely lax in enforcing its DXCC rules . . . It's up to all of us to make the DXCC Award an ultimate. The Honor Roll means something in terms of achievement on equal terms with everyone."

— *Excerpt from The D X-er,* (March)
Northern California DX Association.

Improve Your Code; More Proficiency Certifications. The twice nightly code practice time and frequencies of W1AW, and the *monthly qualifying run* dates of W1AW and W6OWP are publicized in *QST* each month. One submits his copy on the once a month runs to ARRL in applying for certification, 10 through 35 w.p.m. ARRL likewise publishes CD-139, in which we identify certain commercial stations whose speeds and times for sending weather, traffic lists, etc., at 20 w.p.m. or higher makes for interesting practice. This circular also lists some MARS, Naval Reserve, weather and bulletin schedules.

Here's a new one: K6USN-NDW transmits code practice covering a 5 to 45 w.p.m. range . . . also issuing code speed certificates on the transmissions made the second Friday evening of each month. These certificates cover only speeds from 20 w.p.m. through 45 w.p.m. Send any copies to 12th Naval District, Naval Reserve, K6USN, Building 7, Treasure Island, San Francisco, California 91430.

Station	*Day & Time*	*Frequency*	*WPM*
K6USN	M-T-W-Th. 0130-0230Z	1978, 3590, 7136 kc.	5–45 w.p.m.
K6USN	Fri. 0200–0330	1978, 3590 7136 kc.	20–45 w.p.m. 15 min. ea.
NDW	M-T-W-Th. 0230–0400–0430	4045 kc.	8–10–12 w.p.m.

Virginia Net Extends Coverage. W4QDY-SCM and W4SHJ-SEC report results from embarking on a vigorous public service improvement program in their section. W4SHJ reports the Virginia Sideband Net completely re-organized and following strictly NTS lines. Some research was completed to determine those localities in the section where little or no representation or coverage on section nets now exists. Then a questionnaire-type section letter was sent to 225 amateurs. With a 50% return the net membership has increased notably, as a result. Many amateurs were found unaware of the public service and self-training and enjoyment possible in net operations. Programs based on such approaches can use this pattern of approach to advantage, we believe. There are *732 net names in the latest Net Directory.* In emergency *every* net is a potential emergency net with stepped up activities continuing throughout the duration of a regional or local emergency. Where practicable section leaders will be happy to address clubs or assist in panel discussions that advance the working together of the Amateur Radio Emergency Corps and National Traffic System divisions of the Amateur Radio Public Service Corps.

Observers Requested For Non-Amateur Intercept. ARRL needs even more reports identifying those non-amateur stations improperly using our amateur bands. The League protests specific instances of trespassers in our frequencies but has to have date, frequency, and time notations which identify the amateur communications interfered with as a basis for action. We would like to hear from more amateurs who can follow the call for help in clearing our frequencies (page 26, March *QST*) and step up the pace of our intruder watch. On receipt of a request from you the ARRL Communications Department will send CD-36 forms to facilitate your reports.

W1BGW, W2BVE, W2MZB, K4JXG, K4KXP, W4ZBQ, W5M1VL, W5JLP, W6GDO, W8EMD, W9LFK and KØTDO, all RTTY equipped, are making a special effort to intercept and identify the radio-printer communications of non-amateur origin that turn up in the bands. We can use more fellows equipped with high-speed printers, but also more Observers with good receiving equipment and the endless patience needed to identify broadcast stations and high speed code straying into our band and belonging to services other than our own. — *F. E. H.*

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for April Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
W3CUL	336	1978	1371	592	4277
KØZZR	34	2000	1500	500	4034
K6BPL	83	1536	1460	76	3155
WØBDR	88	895	860	20	1863
WØLGG	133	770	696	37	1636
WB6BBO	67	623	591	2	1283
KØONK	67	590	536	12	1205
K9KZB	14	576	548	28	1166
W7DZX	8	579	525	15	1127
W1PEX	65	528	487	40	1120
W7BA	6	518	467	48	1039
WA9CCP	71	480	444	30	1025
W3VR	41	498	456	29	1024
W3EML	37	523	412	9	981
W6EOT	5	444	445	8	902
WB6JUH	29	434	391	37	891
W6RSY	29	394	349	85	857
K9IVG	73	386	341	3	803
WØOHJ	10	367	357	10	744
W5CEZ	11	338	313	4	666
W6GYH	141	261	258	2	662
W3IVS	17	322	311	11	661
K6MDD	0	328	300	28	656
K2YMU	29	274	291	52	646
K3OMP	55	285	271	27	638
WA6BRG	9	313	305	7	634
W5DTA	9	306	216	95	626
W2GVH	20	280	285	1	586
W7OEB	13	278	273	5	569
W8UPH	25	272	225	47	569
WA9AUM	18	278	260	4	560
K1VGM	50	296	71	137	554
WA6WTK	9	270	246	25	550
W6WPF	4	269	257	12	542
W9HAS	18	265	247	8	538
K7JHA	10	219	212	66	537
K6UTO	40	238	230	20	528
W1TXL	97	222	189	19	527
WA2RUF	51	243	196	37	527
W1ZLX	317	107	98	3	525
W5GDH	113	206	0	206	525
W7DIS	9	257	226	31	523
K4VFY	115	201	191	10	517
WB6JGA	15	243	223	35	516
W6JXK	4	256	29	227	516
K1WKK	18	247	243	3	511
KØTGU	6	251	244	9	510
KØTCB	7	251	243	8	509
W4DLA	27	239	237	2	505
K1UYZ	38	230	220	15	503
Late Reports:					
K4URX (Feb.)	10	699	699	30	1438
WB6BBO (Mar.)	103	677	442	12	1234

More-Than-One-Operator Stations

Call	Orig.	Recd.	Rel.	Del.	Total
W6IAB	1123	1824	1387	437	4771
KØZZR	34	2000	1500	500	4034
K6BPC	949	1532	1501	31	4013
W6YDK	1272	477	448	29	2226
W6CUS	22	454	416	50	942
W7HMA	54	327	304	21	706
KR6GF	609	28	36	24	697
Late Reports:					
W6IAB (Mar.)	858	3678	3340	354	8230
W6YDK (Mar.)	1750	576	538	38	2902
KH6USA (Mar.)	0	1114	350	25	1489

BPL for 100 or more *originations-plus-deliveries*

W7APS 224 K4SDS 121 WA9ESW 104
WB2DEP 189 W7ENU 113 K2SJN 102
K3GJD 187 K3HNP 111 WR1AE 102
W8ASH 176 W4PQP 111 WA5DQP 100
K6GZ 162 K4SJH 110 Late Reports:
WA4BMC 159 W9DYG 110 KØKPU/1 (Mar.) 218
W2EW 158 WB2HWB 108 W2EW (Mar.) 188
K1KSH/4 154 WA6TAW 107 K3GJD (Mar.) 133
WB2ECR 138 WA6GJR 106 W4SGH (Mar.) 127
WAØCIE/Ø 134 WØALA 106 K9IMR (Mar.) 123
WA4ECY 133 WA8FIC 105 K8BAB (Mar.) 113
W2URP 128 WA2TQT 104 K1SMT (Mar.) 105
WA8DGE 104

More-Than-One-Operator Stations

K7UGF 380 KR6MH 220 K8GRE 111

BPL medallions (see Aug. 1954 *QST*, p. 64) have been awarded to the following amateurs since last month's listing: K3SMT, WA4FYV, W6JXK, WA8FIC, WA9ECX.

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.

APRIL CD PARTIES

High-Claimed Scores

The April CD Parties seemed to have everything this year. Great activity, reasonably good conditions, savvy operators (as usual) even Alaska and the West Indies (*salud* K1AII/KL7 and KP4BJU). But what happened to North Texas!

Approximately the same total numbers made the high claimed scores (as in January) even though W3TMZ and K2EIU/5 were sorely missed. Have you ever noticed how well some of the high-scoring operators do on *both* phone and c.w., a tribute to the versatility of the appointee group. K9DHN showed up on 160 working a dozen of the gang and asks for a repeat try at 0400 both nights in July. Hey did anyone miss Connecticut with those umpteen Hq. stations on? As usual W4KFC appears in the high-claimed scores, repeating his previous dazzling display of technique with 319 two-ways in 4 hours and 18 minutes. We're happy to report that K8NJW is still with us after accidentally touching an exposed 2000 volt terminal. K9ELT suggests we publish time/frequency listings for each phone party to encourage activity. Can we all agree on spots?

The following are high-claimed scores, QSOs and sections. Final results will appear in the July *CD Bulletin*.

— *W1YYM*

C.W.

W9AQW	208,705-619-67
K1WJD	185,130-554-66
W9YYG	168,630-506-66
K1LPL	167,310-500-66
K8NJW	165,760-513-64
K8HLR	154,475-454-67
W1FJJ	152,960-472-64
W4DVT	150,810-450-66
WA2WLN	148,800-459-64
K7CHH	148,160-457-64
K9DHN	144,900-455-63
K5OCX	144,720-432-67
W9LNQ	137,150-417-65
W1ECH/1	133,900-405-65
K3QDD	131,625-399-65
W6WX	131,520-404-64
W8VPC	127,400-385-65
K7CTI	125,760-389-64
W9YT[1]	124,800-384-64
WA9AUM	124,110-388-63
W4MXU	118,140-351-66
W9MAK	116,865-364-63
W4LK	116,815-383-61
W2ZVW	114,985-370-61
K5ABV	114,975-360-63
WA4SHD	114,560-353-64
K8RDE	112,320-345-64
K3HNP	111,910-357-62
W6ASH	111,900-376-58
WA2UOO	109,190-355-61
WA8DGE	108,360-340-63
W4BZE	106,070-333-63
K9WIE	104,615-339-61
K1AEG	104,430-354-59
K2QDT	104,320-326-64
WA2YLL	102,600-344-59
WA2RMP	102,365-340-59
WA2THY	101,400-333-60
W4KFC	100,540-319-62
W1AW[2]	177,540-531-66
W8LT[3]	156,160-488-64

PHONE

W9EWC[1]	32,185-151-41
W1FJJ	17,515-107-31
W1JYH	15,500- 93-31
W1PYM	14,500- 95-29
K9MAN	12,040- 86-28
K2QDT	11,180- 86-26
W4BNU	10,790- 77-26
W9HAS	9520- 61-28
K3RFH	9360- 72-26
WA2UOO	7440- 59-24
K9IVG	7370- 65-22
WA2RMP	7150- 48 26
K5MDX	6300- 45-28
K9UCC	5865- 46-23
W2ZVW	5700- 50-20
K4BSS/1	5520- 46-24
W1ECH/1	5405- 40-23
W3HC	5300- 48-20

[1] K9ELT, opr. [2] K1EUK, K2UTV, oprs. [3] 6 oprs.

ORS OPS OBS Bill Tuck, K5OCX, has often appeared in the list above right. During the April c.w. CD Party, Bill met up with Murphy in the form of the biggest dust storm in many years along with winds of over 70 mph. The beam rotator went, ditto the 40-and 80-meter antennas and eventually K5OCX was out of the contest. Notwithstanding, Bill has one of the highest section totals claimed this party.

DX CENTURY CLUB AWARDS

Honor Roll

W1FH....310/336
KV4AA....310/334
W6CUQ....310/334
W8BRA....310/333
W4DQH....310/334
W2AGW....310/334
W8UAS....310/331
W8POQ....310/327
W7GUV....310/333
W9RBI....310/335
W1GKK....310/335
4X4DK....310/328
W8JIN....310/335
W2TOC....310/329
GX2CO....310/331
W4GD....310/331
PY2CK....310/333
W3GHD....310/334
W8MPW....309/327
W2JT....309/328
W8K1A....309/333
W8BF....309/330
W2LPE....309/330
W9NDA....309/333

G4CP....309/333
W9YFV....309/333
W2DEC....309/325
W7PHO....309/327
W4QCW....308/325
W9HUZ....308/328
W9LNM....308/331
W8KML....308/329
W3JNN....308/332
W2BXA....308/332
W8JBI....308/327
W1BIH....308/332
W1JYH....308/331
WØQVZ....308/329
W5MMK....308/329
CE3AG....308/332
WØDU....308/330
W6YY....308/328
K3UPG....308/332
W8EWS....307/331
W8DMD....307/329
W7GBW....307/331
G3FKM....307/324

G2PL....307/330
W1CLX....307/330
W6GPB....307/328
DJ1BZ....307/325
DL3LL....307/322
W8LKH....307/327
W6EBG....307/332
HB9J....307/331
W3KT....307/331
W2BQK....306/323
W2ZX....306/325
W5ABY....306/323
W3LMA....306/328
W2LV....306/325
W4ML....306/326
W8HGW....306/331
W6AM....306/331
K2DCA....306/323
K2BZT....306/323
WØAIW....305/328
W3JTC....305/328
W2WZ....305/328
WØBFB....305/323
WØELA....305/328

W2ZGB....305/321
W5KC....305/328
W4TM....305/327
W7ENW....305/329
OE1ER....305/327
W8DAW....305/328
W2SUC....305/322
W1ME....304/327
K2GFO....304/325
W5ADZ....304/326
VE7ZM....304/328
W6CYV....304/322
K6ENX....304/321
WØQDF....304/321
W4MR....304/324
W4AIT....304/327
WØSYK....304/322
W1ZW....304/321
W3EGR....304/321
W9AMU....304/321
W2HMJ....303/323
W5ASG....303/327
LU6DJX....303/327

W2OKM....303/321
W2FXN....303/317
K4LNM....303/317
G8KS....303/321
W5AFX....302/327
W2GUM....302/324
W1HZ....302/320
W4VPD....302/319
W7AC....302/326
W2AYJ....302/321
W2TVR....302/320
W8PUD....302/319
W5UX....302/317
K6EVR....302/319
W8BKP....301/323
W5GKY....301/320
W4OPM....301/316
DJ2BW....301/318
WØNTA....301/321
W4GXB....301/322
W2SAW....301/318
W2UVE....301/319
W1HX....301/321
W2QHH....301/322

Radiotelephone

W9RBI....310/333
GX2CO....310/331
PY2CK....310/333
W3RIS....310/335
W8GZ....309/332

W8BF....309/330
4X4DK....309/327
W7PHO....309/327
W1FH....308/329

W8PQO....308/325
W8KML....307/328
PY4TK....307/324
W6YY....307/327
5Z4ERR....307/329

W4DQH....306/328
W2ZX....306/325
W3JNN....305/326
W2JT....304/318

W2BXA....303/325
W9JJF....303/320
W8HGW....302/324
WØAIW....301/322
W4QCW....301/314

New Members

K6AHV....226
W6HJT....204
DL7AY....152
SM5BIU....152
JA1MJ....141
W1QAK....137
PAØUZ....136
YU3BH....136
DL5QB....134

WA6JLL....124
HB9AAW....122
F7DB....121
LA1H....121
K9TRP....120
UB5CG....115
WA4CXH....114
K3KUH....112
UA6FJ....111
K3EKO....110

VE3DDR....110
G3SDN....108
HA6NI....107
WA4FKJ....106
DL6KG....105
PY1BLT....105
W3CBY....104
K4ADT....104
DJ3CI....104
K2LAF....103

WØNCK....103
VE7NW....103
DL3OH....103
SM4AWC....103
SM5BDY....103
K3TVU....102
W9ALP....102
JA7OID....102
UA3KHA....102
WA2FIJ....101

K6JT....101
W7YWF....101
W8KXH....101
YO3AC....101
ZL2ASM....101
W3GJR....100
K3IKM....100
K3SLP....100
K4GVQ....100
W4NTE....100

WA6ECF....100
K9LIH....100
K9VKH....100
WØJWD....100
VE3NN....100
KA2RJ....100
UA4AZ....100
UA6KMP....100
ZS3EW....100

Radiotelephone

VE2NV....207
VE3RO....141
W6EPZ....137
W8JFD....136

DL5QB....125
W9PBY....118
WØPNQ....113
F7DB....108

DJ8EG....107
K3IVI....106
K1LWI....105
K3RFH....105

G3SDN....105
IIAHN....105
4X4HW....105
9G1EX....105

W1JSQ....103
UW3BV....102
WA2RNM....101
K7HJN....101

W2RIR....100
W4RZN....100
K8AJK....100
YU6CB....100

Endorsements

W6KEV....321
ZL1HY....321
W6TZD....320
DL7AA....313
VK2DI....313
K2UVU....312
K4AIM....311
W1BIL....310
W2PCJ....310
W6OSU....310
WØNLY....310
DL3RK....310
W2HO....306
WØPNQ....306
W4DKP....303
IT1TAI....303
W8GLK....302
WØBMQ....301
W9GFF....300
W5BUK....297
W8KBT....295
W1CKA....294
W4DQS....294
W4KFC....291
W2MUM....290
W3GJY....290
W4JDR....290
SM5CCE....287
W8PHZ....286
K8ONV....285
ON4FU....285
W5NW....284

DL9OH....284
W7BTH....283
YS1O....281
W9RCJ....277
W1QJR....275
DL3ZI....275
TG9AD....275
W4NT....273
W4PAA....273
W6PBI....270
K8OHG....270
W9EQM....270
ZS6EN....270
DL7CS....261
W7UMJ....260
VE2WA....260
W3KFQ....259
G6LX....258
W5VSQ....252
W4NO....251
WA6TGY....251
K3DCP....250
W3EYF....250
W6ATO....250
W8CUT....250
W6PLK....245
W4QVJ....244
W1LOP....242
W7ABO....242
W3WPG....241
SP7HX....240
W9TQL....236

W6ABA....235
W1BPW....234
W8ETU....233
IT1AGA....233
W8IJZ....231
W1RLQ....230
W8EVZ....230
W4EEU....228
W3ZQ....227
K1YRO....225
W9VZP....225
WA2RAU....224
VP7NS....223
W4PRP....221
W9LJU....221
W9NLJ....220
W8NXF....215
SP9TA....213
W6AAO....210
W6OUN....210
W4HKJ....206
W4SIB....204
VE7PU....204
F8SK....203
K1HVV....202
K6BPR....200
W9RDI....200
G3IDO....200
KV4CI....200
SM5AJR....200
DL9NA....198
W1ETF....195

K6EXO....194
WØCU....194
DJ2HI....193
W1ONP....192
K8ZPK....192
WA6KNE....191
K9PNV....191
K8ANX....190
PAØFAB....190
W3GOQ....185
W2CZF....184
W3AFW....183
II2PB....183
K6TWU....182
K2ZYR....181
W1SIK....180
W1YYM....180
K2ZRO....180
W3PVZ....180
K7BJE....180
K9QUE....180
OE8KI....180
VE3XK....178
DJ5DA....176
K5UYF....174
KØJPL....173
W6VX....172
II8F....172
W4HOS....171
K2KEI....170
W4NI....170
W9KXZ....170

K9OJJ....170
W2FVI....167
K8RDE....167
K4GRD....164
W6OMR....164
DL1ES....164
K8GJD....163
W6LDA....162
W2ZTV....161
W1JVZ....160
WA2FMK....160
W2KOY....160
K2OXN....160
W4JPW....160
WA6OHJ....160
W6UMI....160
K8YCM....160
WØICQ....157
DL9NF....154
K5EJQ....152
K8RBB....152
W4KJL....151
W1ECH....150
W2BTG....150
WA2LWJ....150
WØTDR....150
F9TE....150
UT5CC....150
W2PEV....148
PA0VER....148
K8QVA....146
K3CNN....143

W1EHT....142
W1AIO....140
W3KQD....140
WA4EDY....140
W5NXF....140
K8EHD....140
K8YEK....140
VE2BCK....140
DJ1IK....140
SP2LV....138
W4GYP....133
VE3BCF....133
W2CC....132
K8LNL....131
K9EUZ....131
W8RCM....130
WØPAH....130
SM3BNV....130
K2GTF....127
W1ET....122
K1PVG....122
F7CP....122
HC1DC....121
WA2LMW....120
K8ONW....120
KP4BJU....120
K3JLL....119
W5EGS....111
VE3HL....111
W2RIR....110
K3NBJ....110
WA6MAR....110
WØLBS....110

Radiotelephone

TI2HP....320
W3GHD....310
Z88JM....305
W2FXN....301
W4ANE....301
W5PQA....301
W1LLF....300
HB9J....300
W8PUD....292
W2TP....290
PAØHBO....283
K1IXG....280
W1ZW....280
DL9OH....278

YV5AB....276
YV5AJK....272
W4AZD....270
CX2AX....270
DJ2BW....270
YV5AFF....270
TG9AD....265
WØBMQ....261
ZS6FN....261
W5KC....260
G6LX....251
W4MS....250
W6NJU....250
W9NZM....246
K8ONV....242

W2PTM....238
YS1O....233
W8IJZ....230
K2CNX....223
WA2RAU....220
W4EEU....214
W7CMO....214
9M2DQ....212
VK2DI....211
K8OHG....204
W2WMG....202
XE1HHT....201
W8ACT....200
F8SK....200

IT1TAI....199
W9GMY....195
W1ETF....194
K6EXO....191
YV2AJ....191
F2MO....190
W4JDR....184
SP7HX....182
W4PRP....176
II2PB....173
W1WKO....170
K5YY1....170
II8CA....165
W2CZF....163
W2LEC....161

W4AVY....161
K2OEA....160
W4HKJ....160
W8EVZ....157
W2GKZ....154
W3SW....153
DL3NE....152
W2ZTV....143
VE3CJ....143
II8F....142
W1AJV....140
W5NXF....140
W2PEV....139
VE7HJ....139

OA4PD....136
DL2OX....131
K4SBH....130
W6LDA....130
W8CUT....130
VE3CTX....125
VE2BCK....123
IICAO....123
KR6OF....121
WA2FQG....120
K4FTY....120
K9TRP....120
W2EVV....114
G3DOG....111
W5EGS....110

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, MST −7, PDST −7, PST −8, Hawaiian −10, Central Alaska −10.

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 July 18 at 0130 GMT. Identical tests will be sent simultaneously by transmitters on 3555, 7080 and 14,100 kc. The next qualifying run from W6OWP only will be transmitted July 10 at 0400 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, 0130 GMT July 18 becomes 2130 EDST July 17.

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 2330 and 0130 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 0130–0220; 15, 20, 25, 30, 35 w.p.m. on Tues. Thurs. Sat. (days in GMT) from 0130–0220; 10, 13 and 15 w.p.m. daily from 2330–2440 GMT.

To make the practice more beneficial the order of words in each line of the text is sometimes sent reversed. The 0130–0220 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist 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 0130–0220 GMT practice on those dates:

Date Subject of Practice Text from May *QST*

July 1: *It Seems to Us . . .*, p. 9
July 7: *An All-Transistor 50-Mc. Station*, p. 11
July 16: *Communicating Through Oscar III*, p. 26
July 20: *The OHS 160-Meter Transmitter*, p. 29
July 23: *The Amateur Radio Emergency Corps*, p. 32

Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition

July 27: *Inductive Reactance*, p. 21
July 31: *Capacitive Reactance*, p. 21

A.R.R.L. ACTIVITIES CALENDAR

Dates shown are per GMT

July 10: CP Qualifying Run — W6OWP
July 11–13: CD Party (c.w.)
July 18: CP Qualifying Run — W1AW
July 18–20: CD Party (phone).
Aug. 6: CP Qualifying Run — W6OWP
Aug. 18: CP Qualifying Run — W1AW
Sept. 4: CP Qualifying Run — W6OWP
Sept. 10: Frequency Measuring Test
Sept. 12–13: V.H.F. QSO Party
Sept. 16: CP Qualifying Run — W1AW
Nov. 15: Sweepstakes Contest (phone)
Nov. 22: Sweepstakes Contest (c.w.)

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of *QST* issue in which more details appear.

Aug. 1–2: Illinois QSO Party (next issue).
Aug. 8–9: WAE DX Contest (c.w.), DARC (next issue).
Aug. 15–16: WAE DX Contest (phone:, DARC (next issue).

SS FEEDBACK

Our apologies to W2SNI for getting his call wrong in the May report of the '63 November Sweepstakes. His phone effort won him the club phone award for the Rochester Amateur Radio Association. W7WUC's phone score inadvertently appeared in the Arizona c.w. listing. Larry's total of 70,308 points earns him the top Arizona phone honors.

W1AW SCHEDULES

(July, 1964)

Operating Hours

Daily: 2230 to 0430 GMT.

While the reconstruction program is in progress, there is *no* provision made for visiting of the station. Visitors to the ARRL headquarters building, located on the same premises, are of course welcomed during regular office hours from 8:15 A.M. to 4:30 P.M. EDST Monday through Friday. The station will be closed July 3, in observance of Independence Day.

Operating Frequencies

C.w.: 3555 7080 14,100 **Voice:** 3945 7255 14,280

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., 0000; Tues. through Sun. 0100.
Voice: Mon. through Sat. 0100; Tues. through Sun., 0330.

Caution: Note that in the U.S. and Canada bulletin hours usually fall on the evening of the previous day by local time.

W1AW NOTE

The ARRL Headquarters Station, W1AW, will be undergoing extensive reconstruction this summer. Operation during this period (2230 to 0430 GMT daily) will be conducted from temporary positions in the basement of the building on a curtailed schedule on 80 40 and 20 meters only. Full W1AW services will be continued for the transmission of voice and c.w. bulletins, as well as both periods of tape-sent code practice, as noted elsewhere on this page. During most of this period, with the building in disarray as construction progresses, it will not be feasible to invite visitors.

We hope you will bear with us in these slight but necessary inconveniences with the expectation of renewed and extended complete schedules when the changes are completed, from a rebuilt and better W1AW.

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activitiesfor 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. Breiner, W3ZRQ—SEC: W3ELI. RMs: W3EML, K3MVO. PAM: K3CAH. V.H.F. PAMs: W3SAO, W3SGI. The Cen-Penn 6-Meter Net, 50.4 Mc., had 29 sessions with a QTC of 173. The PTTN and the EPA C.W. Net had 18 and 418 QTC, respectively. K3YVG, now ORS and manager of the Pennsylvania Training and Traffic Net, welcomes anyone interested in learning the art of traffic-handling. It meets nightly on 3610 kc. at 2300 GMT. K3RUA is a new OPS. W3RV has been absent from the EPA Net because of illness. W3CUL and W3VR dread the thoughts of the coming summer months with traffic dead spots. W3IVS spent a few weeks in the hospital after a spine operation. K3OMP made his first BPL. Milton area stations will have to wait until the Bulletin station, K3-LTI, makes some repairs. The time shift makes it hard for K3KTH to QNI the EPA Net. (He's not the only one; me, too.) K3TEJ was active in the recent Missouri QSO Party. W3BKF is president of the Penn-York Hamfest Assn. K3MNT made phone WAS and his mother broke her shoulder. K3RZM asks where all the Vermont stations are hiding. (Suggest he "eves-drips" on the next CD Party.) W3CBH is a regular on the PTTN Net. K3RFH made phone DXCC. W3NOH finally is back to work. K3-SWZ made WAS and CP-15 and needs Asia for WAC. W3EU got a new Chrysler for hamfest visiting. W3ZRR has been down with a bad cold. New Gear Dept.: K3SFP a triple conversion receiver. K3KPA adds a v.h.f.-s.s.b. transmitter. A full gallon has been installed at W3KEK. K3JHF has a new QRA in the Havertown area. K3KTY is a new General Class op. The Abington ARC operated in the V.H.F. SS with the call K3CSG from Mt. Pocono. New club officers: Bucks County ARC—K3HHS, pres.; K3ODM, vice-pres.; W3MJR, treas.; W3UAX, secy. Ivyridge ARC—K3OQM, pres.; W3FDG, vice-pres.; K3-MDB, treas.; W3MIC, secy. K3FLT held Field day on Sand Mt. Fire Tower. WA3AFB, General Class, is the first "WA" to send us an activity report. Don't forget, send your FD logs in early. Traffic: W3CUL 4277, W3VR 1024, W3EML 981, W3IVS 661, K3OMP 638, K3MVO 312, K3MQE 176, K3HNP 150, K3YQJ 143, W3RV 138, W3TMR 116, K3BHU 91, K3LTI 90, K3KTH 83, K3JSX 67, W3-QDW 53, W3SGI 42, W3LC 33, W3ZRQ 32, K3ARR 24, W3LXN 21, K3RUA 16, W3BKF 15, K3YVG 15, K3-MNT 12, W3OY 12, K3SFP 12, K3VKX 10, K3RZM 9, K3TSO 9, K3EMA 7, K3JHF 7, W3BFF 6, W3CBH 4, W3PDJ 4, K3NZD 2, K3HTZ 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Andrew H. Abraham, W3JZY—SEC: W3CVE. RM: W3-QCW, K3JYZ. The MDD Net meets on 3649 kc. daily at 0000Z. MDDS (slow) meets daily on 28.1 Mc. at 0130Z. MEPN meets M-W-F on 3820 kc. at 2200Z Sat. and Sun. at 1700Z. The MDD Picnic will be held July 12 at the Patapsco State Park (Route 40 west) near Baltimore. The MEPN Picnic also will be held July 12 at the "Marylander" in Aberdeen, Md. It is my sad duty to report that W3AFR, W3BKE (ex-SCM), W3CRB and W3LZY are Silent Keys. K3AIZ would like to acquire some facsimile gear for 6 meters. W3CDQ is on 20-meter c.w. for awhile. W3CJT helped with the Alaska emergency traffic. W3CVE reports the TCRN-3 and TCRN-4 are operating continuously and need NCSs, to help out during the 24-hour watch each day. W3ECP is now on 2 meters. W3EOV is building a new transmitter. W3HQE was in the hospital with a slipped disc but is now home. K3LLR is planning some antenna changes. W3MCG has had lots of fun in the contests. K3MDL is a new OES. W3MSR sends in a fine OO report. K3PEJ and W3IVC are busy with school work. K3OSX is having v.f.o. trouble. W3QCW put out a very fine bulletin for the MDD Net. The MDD Net would like to have some more traffic outlets in the Baltimore area. K3QDD had a ball in the CD Party. K3QOO is leaving this area. W3OHI is busy on the MARS Nets. K3QOY/3 has organized an amateur radio club at the Mt. St. Mary's College, Emmitsburg, Md. K3SMT has a new TR-3 transceiver. K3SGD reports that the BAAREC held a very successful SET in the Baltimore area. K3TJE has worked his WAS and WAC. K3-UFV is NCS on 3RN Sat. nights. K3YBK worked into Delaware on 6 meters. W3YKQ has a new "V" beam 175 feet long and is doing a lot of transmitter construction. W3ZNW is net manager for MDDS (slow) Net on 28.1 Mc. and meets daily at 0130Z. The newly-formed Baltimore Chapter of the QCWA held a dinner meeting in Catonsville with 48 attending. The following were elected as officers: W3QA, pres.; W3WA, vice-pres.; W3OZ, secy.; W3GR, treas. Charlie Ellert gave a very interesting talk on "I Remember When." Traffic: (Apr.) W3CVE 386, K3GJD 271, K3UFV 180, K3LLW 98, K3QOO 75, W3AHQ, 70, K3JYZ 56, W3GZK 54, W3PQ 54, K3QDD 50, W3ZNW 40, K3OSX 36, W3ATQ 31, W3OHI 31, W3ECP 26, K3-LLR 21, K3TJE 20, K3VGX 16, W3EOV 14, K3SMT 13, K3CXX 22, K3URZ 11, K3SGD 8, K3THF 8, K3YBK 6, W3CQG 4, W3MCG 3, K3NCQ 2, K3VPZ 2. (Mar.) K3-GJD 271, K3URZ 50, W3IVC 30, K3OSX 26, K3RGD 10, K3VPZ 8.

DELAWARE—SCM, M. F. Nelson, K3GKF—PAM: K3LEC. RM: W3EEB. DEPN meets Sat. on 3905 kc. at 1830 local time. DSMN meets Tue. on 50.4 Mc. at 2100 local time. NTS is via MDD on 3649 kc. at 000Z daily. Appointments: K3YHR and K3YZF as ORSs. Renewal: K3BYJ as ORS. New General Class operators: K3FPB, K3RMZ and K3SFD, Kent; K3YHR and K3YZF, New Castle. The First State ARC and the DSMN got together for a 6&2 transmitter hunt Apr. 19. K3EWK, K3OWS, W3CFA, W3DEO and W3FEG have been taking turns at NCS for DEPN. W3EEB is readying his mobile rig for the KL7 trip. W3DEO took an April vacation. W3CGV, W3FUD, K3MPZ K.3OBU, K3VWX, K3KRH and K3AZH furnished communication for the U. of Del. 13-mile Cross Country race. None of them participated in the jaunt, however. The DSMN Field Day chairman was K3OBU. Traffic: W3EEB 229, K3KAJ 7, K3YHR 5, K3AZH 4, K3DZG 2.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: K2ARY, PAM: W2ZI. RMs: WA2-BLV and WA2VAT. New appointments: WB2JFJ, Mt. Holly, as ORS and OPS; WA2KIP, Trenton, as ORS. We are glad to have the new traffic-handlers reporting this month. Novices are invited to ANI on 3725, Mon. through Thurs. WN2ILU is NCS, designation NJNN. WA2BLV, NJN Mgr., reports 30 sessions, QNI 604, traffic 332. WB2-GUK clears Atlantic City area traffic. All section nets did a fine job handling Alaska traffic during the emergency. NJ Phone & Tfc. Net Apr. totals: 30 sessions, QNI 653, traffic 183. We welcome K2GIO/2, Woodbury, to the section. WA2KIP, Trenton, was 2nd-place winner for Mercer County in the Aug. '63 NJ QSO Party. Glad to report that W2JAV is back at work. K2SWZ is considering going RTTY. The SJRA has many active in RTTY nets. K3EH, ex-W2EH, is one of the original members of the SJRA who still is active. The club will celebrate its 50th anniversary in 1966. K2PWV, Blackwood, is now located at Lowery AFB, Colo. W2HBE, Westmont, is SJRA's Field Day chairman. Kindly report all Field Day activities to the SCM. Gloucester County ARC has completed another training class, code instruction by W2MMD and theory by K2JKA. The Southern Counties ARA plans its hamfest for Sept. 20 at Lenape Park, Mays Landing. WA2KIP and WB2FJF will receive net certificates for their fine work in NJN. W3EUL, former EC of Oklahoma County, Okla., is now located at Northfield, Atlantic County. Applications for appointment as EC for Mercer and Cumberland Counties will be considered at this time. Traffic: (Apr.) WA2BLV 241, W2ZVW 183, WB2GUK 111, W2RG 94, WB2FJF 68, W2ZI 40, W2MMD 36, K2GIO/2 33, WA2KIP 31, K2RXB 29, WN2ILU 21, K2SHE 12, W2BEI 8. (Mar.) K2SHE 24.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ICZ. RMs: W2RUF, W2EZB and W2-FEB. PAM: W2PVI. NYS C.W. meets on 3670 kc. at 1900. ESS on 3590 kc. at 1800; NYSPTEN on 3925 kc. at 1800; NYS C.D. on 3510.5 kc. and 3993 kc. S.S.B. at 0900 Sun. and 3510.5 kc at 1930 Wed; TCPN 2nd call area on 3970 kc. at 1900; IPN on 3980 kc. at 1600; 2RN on 3690 kc. at 0045 and 2345 GMT. NYS C.W. held 39 sessions in 2½ days to handle Alaskan Quake traffic. BPL certificates to W2GVH and W2RUF. Appointed: WB2MLK as OES. Endorsed: K2KTK as OO and ORS; K2KNV as OO and ORS. K2LWR now has 314 countries. He's thinking of extending his 100-ft tower another 50 feet. The RAWNY staged a ladies night attended by many real old-timers. NYSPTEN elected K2HOH, chair-

man, WA2ANE, 1st asst.; WA2TUI 2nd asst.; WA2RLV secy.-treas. WA2KTI represents the Buffalo area in the Eye-Bank Net, a coast-to-coast circuit which meets three times a day. WB2KQI passed the General Class exam. WA2STG and K2DNN received ARRL Public Service awards. WA2FJW received the DXCC award. W2ICZ and W2NW gave a talk at a recent ARATS meeting regarding their work on 20-meter beams with 3 and 4 driven elements. GRAM (Genesee Radio Amateurs) reports these new Novices: WN2MXO, XB, XN, XD, XE, XC and XA. The RARA elected K2SKO, pres.; WA2KND, vice-pres.; WA2IKB, secy.; K2UCI, treas. WA2YTK and WA2GCF were married in May. They are both members of the Rochester v.h.f. group. All amateurs are invited to report to the SCM each month. Form 1 report cards may be obtained free from ARRL or a simple note will suffice. All the news for this column comes from these sources plus what is gleaned from the various news letters and bulletins that are received from clubs. Club secretaries are invited to report any activities which may be of interest such as elections or local news. Our section comprises 44 counties. It includes Delaware, Schoharie, Montgomery, Saratoga, Washington *and* all counties in the state north and west of these counties. Let us hear from your area. Traffic: (Apr.) W2GVH 586, WA2KQG 394, WA2DPR 306, W2RUF 218, W2OE 199, W2HYM 147, W2FEB 81, WA2HSB 65, K2QDT 64, K2OFV 54, W2-RQF 37, K2JBX 36, W2FCG 33, WB2DPR 30, K2IMI 22, WA2RLV 21, WB2JCE 17, W2RUT 14, K2DNN 11, K2-RYH 11. (Mar.) W2HYM 220, WA2RLV 23.

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) has suspended operations during the summer months. K3ZMH is traveling to Kuwait and Iran during May and June. The Tri-State Semi-Annual Sideband Dinner was held at Monroeville May 2. Silent Key: K3HKV, of Oakmont. The Etna RC reports via *Oscillator*: W3BVV is having antenna trouble; W3TFU is working DX on 15; W3KTW is on 20-meter c.w.; W3RTV's new call is W8EYO, Stevensville, Mich.; W3UHP is working 40-meter mobile; K3IZQ has a new S-300. K3AKR is building a 432-Mc. parametric amplifier. WA3AHP is a new call on 10-meter phone. K3HSE is on s.s.b. with an HT-44 and an SX-117. The Horseshoe RC reports via *Hamateur News*: W3KQD now has a sticker for 140 countries worked; W3LIV won both the phone and c.w. trophy in the club's DX Contest; W3AOL is on 6 meters. K3SYW is president of the Allegheny-Kiski Amateur Radio Assn. (W3RVC). W3YA is retiring this September after 44 years of teaching at the Pennsylvania State University. The H-Car Club is using a Seneca and a beam on 6. Two Rivers RC reports via *Spark Gap*: a new call is WN3AGA; K3QHM has a Drake 2-B; K3SQP is using a *ZL special* antenna. The Cumberland Valley ARC reports via *Valley QRM*: W3-RIH, W3ZUX and W3RFO have mobiles in their cars; the club Cancer Drive utilized both 10 and 6 meters this year; K3FFJ is on 10; K9BEN/3 is on 6. The Uniontown ARC reports via *Magpie*: W3CAV handled Alaska earthquake traffic; a new Novice is WN3AKX; the date of the W3PIE Gabfest is Sept. 19. The Nittany ARC reports through *QST de K3HKA*: K3AHY, K3CXZ, W3ZZO, K3AKR and K3LVO furnished 6-meter communications for the Lewistown Canoeing event; W3TYL is in Germany; W3ZUH is in the District of Columbia area; W3-JTS is now in W6-land. K3AGE is working on a new s.s.b. rig. K3FLA is sporting an SX-115. K3QKC handled Alaska earthquake traffic. The Coke Center RC is having difficulty getting electric power to its range station. W3NAV. The Western Pennsylvania Mobileers monthly meetings are held the 2nd Mon. of each month at the Westinghouse Research Center, Churchill Boro. Traffic: K3PIF 204, K3PYS 165, K3NZB 141, W3MFB 125, W3KUN 88, W3NEM 69, W3SMV 56, K3SOH 49, W3LOS 33, W3IYI 31, K3ZMH 26, K3TEZ 19, K3SMB 14, W3OEO 11, W3UHN 11, W3TOC 6, W3YA 6, K3RGV 3.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: Grace V. Ryden, W9GME. SEC: W9RYU. RM: W9USR. PAM: W9VWJ. Cook County EC: W9-HPG. Section net: ILN, 3515 kc. Mon. through Sat. at 1900 CDT. New Novices heard in the Springfield area are WN9LDC and WN9LDL. The North Shore Amateur Radio Club was given a demonstration of Lasers by Lloyd White from the Office of Naval Research. K9YZQ, W9-TZN, W9REC, K9RAS, K9JPH, W9ING, W9HPG, K9-VVL, W9WYB, W9GFF, W9IMN, K9JTD, W9JUV/K9-OSO, W9NPC, W9HYI, W9GLQ, W9BNO, W9QKE and W9PWL participated in the latest ARRL Frequency Measuring Test. This column's congratulations go to George Hart, W1NJM, National Emergency Coordinator, upon completion of 25 years with the League. The new officers of the Wheaton Community Radio Amateurs are WA9-JXT, pres.; K9WTU, vice-pres.; W9RFS, treas.; W9-NWK, secy. Our sympathy to the family and friends of Willard A. Hayward, W9CTZ who became a Silent Key Apr. 24. K9STB is a new General Class licensee. W9-YQC has been appointed Deputy Director of Kankakee Civil Defense. WA9GEQ is using a new Pawnee on 2 meters. WA9ICQ recently made WAS and WAC. WA9-BKA won the 2-meter receiver given as an award for building a semi-conductor receiver sponsored by the Central Illinois Radio Club. K9TKT lost his tower in a recent windstorm. W9TNL has gone s.s.b. The Hamfesters will hold its annual outing at Santa Fe Park in the Chicago Area Aug. 9. The committees are planning an FB outing. W9HAS is monitoring with a new Heath HO-10. Tragedy struck in W9IDA and W9XT's family when their son and brother suddenly passed away in his home town of Galesburg. The North Central Phone Net handled 572 messages and the ILN's traffic count for April was 69. W9NIU has returned from a siege at the Mayo Clinic. K9ABH is recuperating in the Hinsdale Hospital from a slipped disc. A new OO appointee is K9KWV. K9KZB, WA9CCP, W9HAS and WN9KWN are BPL recipients this month. Traffic: (Apr.) K9KZB 1166, WA9-CCP 1025, W9HAS 538, K9BTE 136, W9AKV 114, WN9-KWN 108, W9USR 107, W9DJF 103, W9SMD 94, W9JXV 76, WA9AJF 73, W9IDA 63, W9CYZ 42, WA9DXA 23, W9IFY 11, W9PRN 10, WA9FVD 8, K9KWV 6, K9RAS 4, W9LNQ 2. (Mar.) W9JXV 81, WA9DXA 10, K9UCG 10.

INDIANA—SCM, Ernest L. Nichols, W9YYX—Asst. SCM: Donald Holt, W9FWH. SEC: K9WET. PAMs: K9CRS, K9GLL, K9IVG. RMs: W9DGA, K9DHN, W9-JOZ, W9TT. Net skeds in GMT: IFN, 1330 daily and 2300 M-F on 3910 kc., ISN 0030 daily on 3920 kc., QIN daily at 0000 and RFN at 1200 Sun. on 3656 kc. New appointment: W9DKR as OBS. BPL awards: K9IVG and WA9AUM. QIN honor roll: K9VHY, W9QLW, K9DHN, K9HYV, WA9IZR, WA9AUM, W9ZYK, WA9HQP K9-UXX. A 9RN certificate was awarded to WA9AVT. WA9-BWY is rebuilding after extensive lightning damage. WA9HQP sports a new sixteen-element 2-meter broadside array. Randolph Co. AREC meets each Tue. at 2430Z on 3850 kc. 6-meter activity on 52.525 Mc. is flourishing, with 52.640 Mc. an alternate. The Tri-State ARS is conducting a radio school in Evansville with over 100 students. W9IGW operated PJ5MG for a week on Saint Martin Island. *Amateur radio exists because of the service it renders.* April net traffic: ISN 488, IFN 259, QIN 170. Hoosier V.H.F. 59, RFN 32, 9RN 598 with Indiana represented 100 per cent. Traffic: (Apr.) K9IVG 803, WA9AUM 560, W9VAY 462, K9DHN 431, WA9ECX 323, W9JOZ 323, W9QLW 313, K9ZLA 186, WA9BWY 185, WA9EED 98, W9YYX 84, WA9ZYK 82, W9MM 76, K9KTL 74, WA9CJR 62, K9CRS 53, W9TT 47, W9BUQ 34, W9DGA 33, K9RWQ 32, W9CC 30, W9RTH 30, W9FZW 28, K9HYV 26, K9VHY 17, W9FWH 16, K9UXX 16, K9ILK 13, W9DZC 12, W9-DOK 11, K9BSL 10, WA9ELY 10, WA9HQP 8, W9QYQ 8, K9WWJ 8, WA9IZR 5, K9UEO 5, W9BDP 4, WA9-DFQ 3, WA9GKF 2, WN9KFQ 2, WA9AQW 1, W9JSV 1, K9MAN 1. (Mar.) W9SWD 224, W9TT 215, W9VAY 95, K9ZLA 94, W9AR 88, W9DZC 14, WA9IZR 3.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9BCC. RM: W9KQB. PAMs: K9IMR, W9NRP and W9NGT. New appointees: WA9CEQ as ORS and W9IQW as EC for Wood County. Renewed appointments: W9CBE and K9UUT as ORSs and K9QKG as EC. Net certificates went to W9GOC, W9BSS, W9NVH, WA9EDZ and WA9CWW, all for WSBN. Don't forget the WNA Picnic to be held at East Park in Hartford, Wis. Further information can be had from W9NGT. K9BTQ has a 75A-4 receiver. K9DKU received his WAS and DXCC certificates. Wisconsin had 90 per cent representation in April 9RN, represented by WA9AKE, W9CCO, W9-CXY, K9DKU, W9DYG, K9GSC, K9UUT and K9WIE. K9UML is now on 2. W9DOO is helping Hallicrafters test their new gear. WA9FNS is working on 2300-Mc. gear. W9CCO handled traffic for 36 high school students on student exchange from Brentwood, Pa. WA9CEQ has a new Viking Challenger. Explorer Post No. 401 in Madison is forming a radio club. W9DFS is running 250 watts on 6. K9GDF now is in the Army. CAN had 100 per cent representation in April assisted by Wisconsin stations W9CXY, W9DYG, W9IQW, K9DKU and K9GSC. FMT results: W9PFK, 7 p.p.m. error, K9EYY 5.8, W9GFL 19.1, K9DSZ 30.9, W9LFK 72.3 and W9UEB 129.1 p.p.m. K9GDF led the OOs with 4 notices in April. BPL certificates went to K9IMR for March and W9DYG for April traffic. Traffic: (Apr.) W9DYG 378, W9CXY 362, K9DKU 160, K9IMR 115, WA9AKE 104, K9GSC 100, K9DXO 72, W9IQW 66, WA9AOI 60, W9NRP 58, W9YT 50, W9CBE 41, W9DOO 38, K9DGY 35, K9GDF 33, W9CCO 31, W9AOW 18, W9OTL 16, K9QKU 14, K9DJY 12, W9HPC 12, K9WIE 12, K9NRS 9, W9UEB 7, WA9CEQ 6, K9-DBR 6, WA9EDZ 6, WA9HJN 6. (Mar.) K9IMR 481, W9CXY 343, W9AOW 137, K9LGU 96, W9DOO 78, W9YT 57, K9WIE 33, WA9FOM 28, W9HPC 21, WA9CEQ 13, K9DJY 12, K9FPM 5, K9QKG 2. (Jan.) WA9AKE 81.

(Continued on page 118)

THE NEW NCL-2000 linear amplifier incorporates an important new circuit development (patent pending) by National. As a result, it achieves high efficiency and excellent linearity while still providing easy tune-up and effective output circuit protection during operation. The '2000 combines these usually incompatible features as the result of its operation in grid-controlled class AB_2.

MODERN LINEAR amplifiers are typically operated in class B, class AB_1, or class AB_2 service. To appreciate the performance of the NCL-2000 it will help to briefly review some of the advantages and disadvantages of each class of operation:

THE CLASS B amplifier offers two important advantages — it draws negligible idling plate current and therefore dissipates no power when no drive is present, and it has relatively high efficiency when operated with grid current flow and with the grid driven well into the positive region. On the other hand, operation in class B results in relatively high distortion because of non-linearity of the tube characteristics in the cut-off region — a few very high transconductance tubes have been specially designed for class B operation for just this reason. A second, and not well-known, disadvantage of the class B amplifier appears when excessive drive is available and the amplifier is heavily loaded. Under these conditions, accidental application of excessive excitation (from a whistle into the microphone, for example) will drive the grid, screen, and plate currents to destructively high levels and the amplifier may be permanently damaged. The class B amplifier is subject to this effect because of the necessarily well-regulated bias supply required to maintain linearity by preventing changes in bias voltage as the grid is driven positive.

THE CLASS AB_1 amplifier overcomes two disadvantages of class B operation; but with one disadvantage of its own. Linearity is excellent in class AB_1 because the presence of idling plate current eliminates non-linearity near cut-off; and since by definition the AB_1 amplifier does not draw grid current the grid bias supply usually is designed to have relatively poor regulation. If excessive excitation is applied, the amplifier tube will draw grid current and make the bias voltage more negative — the result is effective self-limiting of plate and screen currents to safe operating levels, even when the tube is severely overdriven. The disadvantage of class AB_1 operation, of course, is that an AB_1 amplifier is the least efficient of the three types under discussion.

THE CLASS AB_2 amplifier operates with the same idling current as the class AB_1 amplifier, and therefore offers the same low distortion and excellent linearity. However, a well regulated bias supply is necessary, as in class B operation, since the tube draws grid current. Accordingly, the AB_2 amplifier demonstrates the lack of limiting action which is characteristic of class B operation, and it is again possible to damage the tube with excessive drive. The advantage of class AB_2 operation over class AB_1 is a substantial increase in efficiency because of the ability to drive the grid positive as a result of the well-regulated bias supply.

IT SHOULD be apparent that an optimum class of operation would be one in which linearity and efficiency is high, as in class AB_2, but with protective limiting, as in class AB_1, to simplify tune-up procedures and to prevent inadvertent damage to the amplifier as a result of overdrive. Therefore, the NCL-2000 operates in class AB_2 to satisfy linearity and efficiency requirements, and incorporates an electronically regulated bias supply which automatically limits plate and screen currents to safe values as soon as excessive driving power is applied. The NCL-2000 bias supply is series regulated to hold *constant* grid bias at normal driving levels. When grid current exceeds 15 ma., grid bias is abruptly increased in the negative direction and plate and screen current is limited just as in class AB_1 operation!

THE DEVELOPMENT by National of grid-controlled AB_2 operation, as applied to the NCL-2000 amplifier, offers important advantages to the owner of a '2000. He enjoys high efficiency (output as high as 1400 watts PEP) and linearity to the absolute limit of the amplifier tubes. Grounded cathode operation allows exciter output to be as low as 20 watts and as high as 200 watts PEP, with no interaction between amplifier and exciter tuning (characteristic of grounded grid amplifiers). The non-inductive swamping resistor used in the NCL-2000 provides an extremely high degree of exciter load regulation to further improve overall linearity, and finally, tune-up and operation is remarkably easy and safe because of the electronic limiting circuit.

MIKE FERBER, W1GKX

National Radio Company, Inc.

Station Activities

(*Continued from page 116*)

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel, WØHVA—SEC: WØCAQ. PAM: KØTYY. KØDVA is now operating mobile. WØBHT is now being heard from Milton, N.D. KØCFK is operating from Ft. Yates. Good news for those looking for Sioux County—WNØELO is now WAO. By the time this is in print KØTYY will be operating mobile. Your SCM attended the hamfest at Fargo. There were 160 licensed hams attending. WØLNA was the computers' choice as the Most Average Ham. The North Dakota 75-Meter Phone Net reports for April: 23 sessions, 291 check-ins, maximum per session 21, minimum 6; 35 pieces of formal traffic handled and 35 informal with 7 relays. The North Dakotas RACES Net reports 21 sessions, 735 check-ins, maximum per session 49, minimum 26; 44 pieces of formal traffic handled, 85 informal. Traffic: KØITP 140, WØCAQ 120, KØTWH 15, KØGGI 13, WAØEUA 11, KØTYY 10, WØBHT 2.

SOUTH DAKOTA—SCM, J. W. Sikorski, WØRRN—SEC: WØSCT. RM: KØGSY. Newly-appointed ECs: KØHQD, WAØCKH, KØYAA and KØSZJ. KØCER is back on c.w. after four years on a.m. WAØINJ lost his v.h.f. antenna in ice and wind storms. KØCXL has earned a Section Net certificate on the c.w. net. KØGSY has a new daughter. With the closing of the South Dakota Weather Net on Apr. 11, KØBMQ reactivated the S.D. morning Phone Net. WAØCVZ, Yankton, is a New General. KØWJT has AF67 and a Regency converter operating in his Falcon. WAØFGV reports a c.w. net operating on 3690 kc. in the Hills Area each Sun. at 7 P.M. (MST) known as the SLO-NET. Traffic: KØGSY 303, WAØAOY 240, WØSCT 147, WAØCIJ 88, KØVYY 80, WØDVB 52, WAØCWX 42, KØBMQ 36, WØZWL 17, WØCQN 15, KØYJF 14, KØZBJ 14, KØBSW 8, KØYGZ 8, WAØCVZ 7, WØRWM 5, WAØCKH 4, KØKOY 4.

MINNESOTA—SCM, Miss Helen Mejdrich WØOPX—Asst. SCM: Emerson Mejdrich, WØRIQ. SEC: KØKKQ. RM: KØZRD. PAMs: WØYHR, KØVPJ. MSSB: WØHEN. Appointments issued: WAØDGW, WAØEDN and WAØBZG as OPSs, WAØEPX as RM and WAØDGW as EC. Renewals: WAØBYO and WØGCR as OPSs, WØLUP as EC. PAM/OO WØHEN. WØRA and KØCKT took part in a recent FMT. Fr. Michael, WØYZH, has taken over the parish at Watertown, Minn. KØGCG, WNØFNN, WAØBUX, WØBEQ and WAØGOS gathered for an antenna raising at the QTH of KØAOH. Harriet is the XYL of the late WØEYW. WØOSJ signs as WAØIOU while at his Wood Lake summer home. Rig troubles plague WAØDVH and keep him off the air. EC WB6CDQ/Ø now signs as WAØIML. Paul and six AREC members lost their antennas in a recent storm. EC WAØBZG reports the Itasca AREC Net includes stations from 14 northern counties and two Canadian provinces. This net now operates on 3820 kc. at 1900Z Sun. New General WAØFIE is working 80-meter c.w. with a DX-35 and an SX-71. WAØEDC is a new General from Hardwick, Minn. OPS WAØBYO is off the air while moving to Rochester, where he will assume duties as a printing plant superintendent. ORS/OPS WAØARA and OO WØWAS have home-brewed k.w. linear finals working. EC WAØDGW has added a k.w. linear to the Drake 2-B, Apache SB-10 station. John has named WAØARA as Asst. EC. WØATO is off the air while performing jury duty. EC KØZZR and two other operators handled over 3000 messages in two nights and three days following the Alaskan earthquake. Traffic: (Apr.) KØZZR 4034, WØOPX 89, WØKJZ 84, WØHEN 73, WØGRW 69, WØRIQ 63, WAØARA 58, WØUMX 49, WØATO 37, KØIJU 37, WAØDSH 35, KØSRK 33, KØZIW 33, WAØDGW 31, WØYHR 31, WØLIG 28, WØMXC 26, WØOSJ 26, WAØEDN 25, KØERQ 24, KØJYJ 20, WAØEPX 19, KØFWC 19, WAØBZG 17, KØMIA 17, WØKYG 16, KØFLT 15, WAØDVH 12, WAØDXV 12, KØFTB 11, KØVPJ 11, WØEQO 10, WAØFCJ 9, WAØFIK 6, KØLWK 6, KØIIP 5, WAØFIE 3, KØSXP 3.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: W9PHR/5. PAM: WA5GPO. RM: K5TYW. The S.W.B.T. Explorer Troop 330 put on a fine demonstration of amateur radio at the 1964 Scoutacular in Little Rock with WA5HNN, WA5EJH, WA5BQI and WA5FGT operating. The May ARPSC Bulletin carries detailed traffic-handling instructions and can be had by asking. Apr. net reports:

Net	*Freq.*	*Time*	*Days*	*Sessions*	*QTC*	*QNI*	*Ave.*
OZK	3790	0100Z	Daily	30	156	278	9.2
AEFN	3885	1200Z	M-Sat.	26	102	1060	40.4
RN(SB)	3817	0030Z	Daily	20	8	177	8.8

WA5EFL worked some nice DX,OD,5, CN8, 4X, etc. The first net certificates on the Arkansas Single Sideband Net go to W9PHR/5, W5DTR, WA5GPO, K5KWK, K5ALU, W5JWL, K5GKQ, WA5CRE and W5CAM. Arkansas again was represented 100% on RN5. If you are not an AREC member, contact your local EC, SEC or SCM and join. Everyone who joins will receive a copy of the State Emergency Communications plan. A new Paragould ham is WN5JJO. WA5CSJ is trying to arouse interest in a radio club in the Paragould area. If you are in this area, let him know (QTH 500 Canal). W5YM reports a successful emergency communications drill on 10 meters. K7RWI/5 proved a rhombic works well on 20 with a 599 report from 9Q5-Land; he also worked VP9, G3, KH7, DJØ, KH6 and KG4 in two hours. Traffic: (Apr.) WA5AVO 216, W5JWL 172, W9PHR/5 166, W5DTR 140, K5TCK 40, K5TYW 37, WA5HNN 33, K7RWI/5 21, WA5CSJ 19, WA5BBS 18, K5IPS 18, K3JYY/5 12, K5GKQ 10, W5YM 10, WA5GPO 9, K5AKS 3, WN5JJO 3, K5ALU 2. (Mar.) WA5GPO 29, K5GKQ 18, WA5CSJ 5.

LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—Your SCM, after a talk with W5PM, initiated a petition in his behalf nominating him as SCM. W5PM, recently retired from the Navy, lives in Covington and is very active on the bands. Route Manager W5CEZ made the BPL again with a total of 666. LAN is going FB with 50 or more QNI for WA5FNB-112, W5CEZ-97, W5IQH-85, W5MXQ-60, W5MYZ-57 as of Apr. 1, 1964. All interested in handling traffic on c.w. should look in on LAN, which meets daily at 2330Z on 3615 kc. K5IGW worked 72 stations in 31 sections in his first CD Contest on c.w. WA5JAY is building a transceiver for 6 with a nuvistor r.f. and 5763 final. W5JFB expects to work maritime mobile this summer on 50.49 Mc. from the Gulf of Mexico. Last year's results +100 QSOs, 17 states, 7 call areas with a sixer and beam. W5MXQ is resigning as Section Emergency Coordinator because of his health. Al is recovering from two very serious operations and cannot be too active. He has held the job for several years and contributed greatly in organizing a fine emergency setup in Louisiana. I would like to take this opportunity to thank Al for his fine cooperation. Traffic: W5CEZ 666, WA5FNB 223, K5LZA 178, W5IQH 64, W5MYZ 62, WA5BLO 34, W5EA 16, W5MXQ 12, K5IGW 3, K5FYI 2, WA5JAY 2, K5WOD 2.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. W5HKR, the Jones Co. Amateur Radio Club, has been reorganized and now has a fine club shack. The Civil Defense Emergency Weather Net was alerted 7 times in the recent tornado activity. Thanks to W5IZS and others who did a fine job. All Novices are especially invited to check in to the Miss. Novice Net on 3645 kc. at 6 P.M. CST. WA5BMC is NCS,, with WA5EIN as assistant. K5MDX logged country No. 296. WA5CAC reports a fine QSO with K2US at the World's Fair. Contratulations to K5MPL on winning a 4-year scholarship. Thanks to W5JDF for tops in traffic-handling for Mississippi, helping Mississippi's standing to go up as far as traffic-handling is concerned. New appointments: W5JDF as SEC. WA5BMC as OBS and Itawamb Co. EC. W8VDA/5 as ORS, K5RIX as OPS, WA5CAC as RM, W5VYJ as OO. Traffic: W5JDF 189, W5VDA/5 143, W5WZ 127, WA5CAC 117, WA5EIN 17, WA5BMC 16, K5MDX 6, WA5DXI 4.

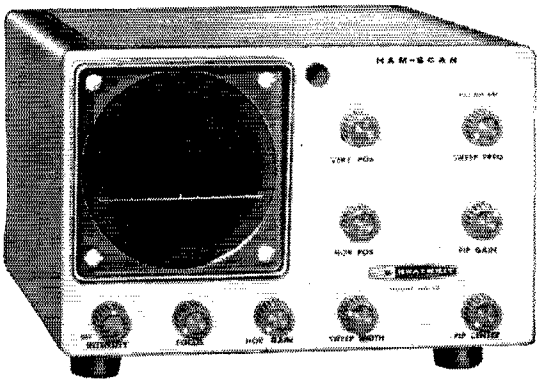
TENNESSEE—SCM, William A. Scott, W4UVP—RM: W4MXF. PAMs: K4WWQ, W4RMJ, WA4AIS. Many thanks to the RM and PAMs for retaining their work on behalf of the Tennessee section. Your cooperation is deeply appreciated.

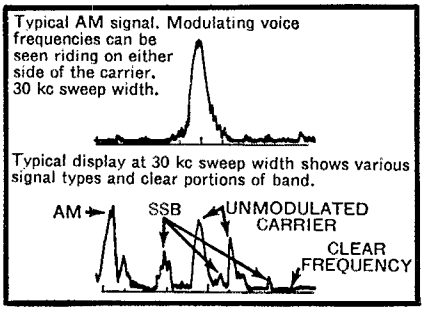
Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI*	*Ave.*
TN	3635	1900C	M-Sat.	26	138	199	7.6
TSSN	3980	1830C	M-Sat.	26	90	865	25.6
TPN	3980	0645C	Daily	30	140	1122	24.4
ETPN	3980	0640E	M-Fri.	22	58	439	20.0

The Crossville Hamfest, sponsored by Oak Ridge, will be held July 18-19. The first meeting of the Tennessee Federation will be held in conjunction with this hamfest. Contact the OR Club for details. Congrats to K4CSY on winning a Navy scholarship after a session as /mm aboard a submarine. W4RRS is busy working mobile with a new NCX-3. W4BV continues to make recovery from a recent illness. OOs W4ZBQ, K4VKA and W4YAU had excellent results in the Feb. FMT. The Delta RC is planning its annual hamfest for Aug. 29-30 in Memphis. Have you sent your building fund donations to Hq. yet? Traffic: (Apr.) W4ZJY 256, W4PQP 229, WA4GQM/5 207, WA4HRG 182, W4RMJ 53, W4MXF 50, K4WWQ 48, W4HPN 26, W4PFP 24, K4UMW 23, W4TYV 22, K4JXG 21, WA4IHG 17, WA4NUJ 17, W4WBK 16, W4VNU 14, K4NRZ 12, K4LTA 10, W4UVP 10, W4LLJ 11, W4CVG 9, K4EWI 8, WA4EWW 8, W4VTS 7, WA4BUP 6, WA4-

(*Continued on page 124*)

WATCH IT!... WITH THE





NEW HEATHKIT® "HAM-SCAN" SPECTRUM MONITOR

What many hams have been asking for to supplement their Heathkit HO-10 Monitor Scopes!

Another Heathkit First! The new Heathkit "Ham-Scan" is the first *low-cost* spectrum monitor in kit form and an extremely useful accessory that will greatly increase the versatility and enjoyment of amateur radio operation.

Monitors band activity! With the Heathkit "Ham-Scan" you can visually monitor up to 100 kc of frequency spectrum centered on the frequency to which you are tuned, eliminating "hunting" or unnecessary tuning across the dial to monitor band activity. All signals appearing up to 50 kc on either side of the frequency to which you are tuned are displayed on the screen of the cathode-ray tube as vertical pips. As the receiver is tuned, the display moves horizontally along the baseline with the signal you hear always appearing in the center of the screen.

Identifies signal types. SSB, AM & CW signals are clearly identified with the "Ham-Scan" even though they may be up to 50 kc away and clear portions of the band are easily identified without continuous tuning. It will also prove useful in spotting both phone and CW DX stations operating off your frequency and is invaluable during VHF band openings. Also checks carrier and sideband suppression of SSB transmitters and aids in identifying "splattering" received signals.

Operates with all receivers. The Heathkit "Ham-Scan" may be used with virtually all receivers in amateur service today. Parts and instructions are included to match your receivers I.F. frequency (see specifications). Retaining these few extra parts means your Heathkit "Ham-Scan" will not be obsoleted should you purchase a new receiver.

Order now! Be one of the first to enjoy the many advantages of this most-requested "Ham" accessory! Place your order now with the handy coupon below.

Kit HO-13...11 lbs.....$79.00

SPECIFICATIONS—Receiver IF: 455, 1600, 1650, 1681, 2075, 2215, 2445, 3000, 3055, 3395 kc. **RF Amplifier—Response:** ±0.5 db at ±50 kc from receiver IF. IF—350 kc. **Sensitivity:** Approx. 100 uv input for 1" vertical deflection at full gain setting. **Horizontal deflection—Sweep generator:** Linear sawtooth, recurrent-type (internal). **Frequency:** 10 to 50 cps, variable. **Sweep width:** 30 kc or less, to 100 kc ±20%. Continuously variable. (Approx. 15 kc to 100 kc for 455 kc IF). **Resolution:** 1.5 kc (frequency difference between two 1" pips whose adjacent 3 db points coincide. Measured at slowest sweep speed and at 30 kc sweep width). **Power supply:** Transformer operated, fused at ½ ampere. **Low voltage:** Full wave voltage-doubler circuit provides 250 volts @ 20 ma, & 580 volts @ 6 ma. **High voltage:** Half wave circuit provides −1600 volts @ 1 ma for CRT. **Power requirements:** 120 volts AC, 50/60 cps, 40 watts. **Tube complement:** 3RP1 CRT (medium persistence green trace), 1V2 HV rectifier, 6AT6 detector, 6EW6 RF amplifier, 6C10 sweep generator/horizontal amplifier, (2) 6EW6 IF amplifier, 6EA8 Oscillator/mixer, (4) 500 ma silicon diode low voltage rectifiers, crystal diode, IN954 voltage-variable capacitor. **Controls:** On-off/intensity, focus, horizontal gain, sweep width, pip center, horizontal position, pip gain, vertical position, sweep frequency/AGC, astigmatism. **Dimensions:** 5¼" H x 7¾" W x 11" D.

FREE CATALOG

Fully describes over 250 different Heathkit products at savings of 50% or more! See the complete line of "Mobile" and "Fixed Station" amateur gear plus many others. Send for your free copy today!

HEATHKIT® by Daystrom

HEATH COMPANY, Benton Harbor, Michigan 49023
In Canada: Daystrom, Ltd., Cooksville, Ont.

9-7-2

☐ Enclosed is $_____ plus postage. Send model HO-13 "Ham-Scan" Panoramic Adapter.
☐ Please send Free 1964 Heathkit Catalog.

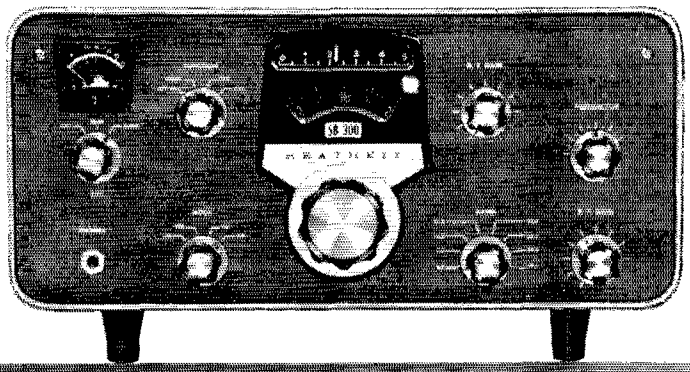
Name_____
Address_____
City_____ State_____ Zip_____

Prices & specifications subject to change without notice. AM-138

Now there are two in

#1

HEATHKIT
SB-300
SSB-RECEIVER



• Everything you could ask for in a deluxe receiver and more! • Complete coverage of 80 through 10 meter amateur bands with all crystals furnished, plus provision for VHF converters • Crystal-controlled front-end for maximum stability on all bands • 1 kc dial calibrations—100 kc per dial revolution provides bandspread equal to 10 feet per megacycle—tuning knob to dial ratio approximately 4 to 1 • Provision for transceive operation with matching SB-400 Transmitter • Pre-built Linear Master Oscillator (LMO), wiring harness and two heavy-duty circuit boards for fast, easy assembly • Professional styling and features at 60% savings

Good news travels fast! . . . especially on the amateur airwaves! Since its introduction, the Heathkit SB-300 has set the amateur world on its ear as one of the finest values in the industry! Deluxe styling and features now bring you a new dimension in quality, performance and dependability never before thought possible in kit form! . . . and by doing the easy assembly yourself you'll save 60% the cost of comparable units!

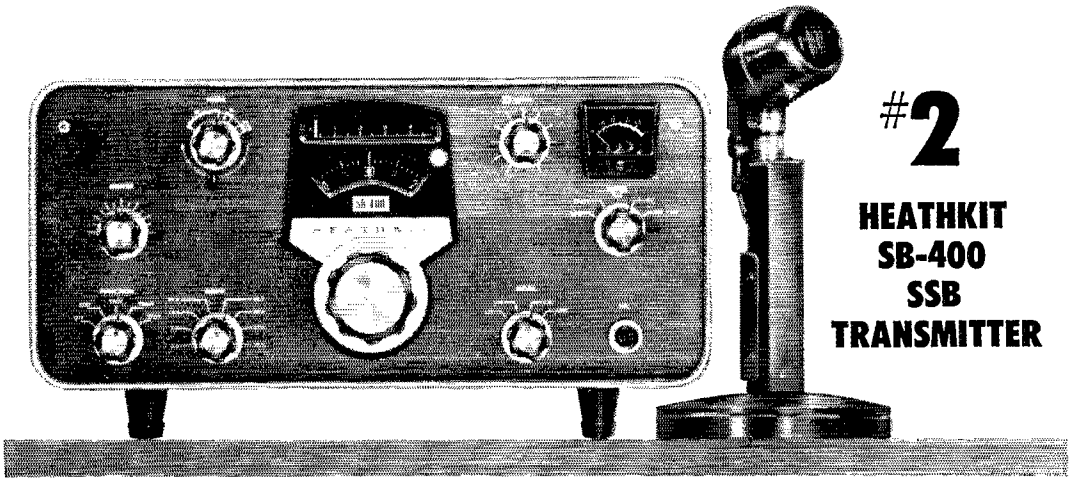
Experienced amateurs will quickly recognize the high standards to which this receiver was designed. Its many superb features include a crystal-controlled front-end for optimum stability on all bands, a pre-built Linear Master Oscillator (LMO) for linear tuning with 1 kc dial calibrations, a built-in crystal calibrator, hermetically-sealed 2.1 kc crystal band-pass filter, smooth non-backlash vernier dial mechanism . . . and many, many more! Order yours today!

Kit SB-300, less speaker
22 lbs., $27 dn., $22 mo.....$265.00
SBA-300-1 Optional AM crystal filter
(3.75 kc) 1 lb.....$19.95
SBA-300-2 Optional CW crystal filter
(400 cps) 1 lb.....$19.95
Export model available for 115/230 volts AC, 50-60 cps; write for details.

SB-300 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:** Less than 100 cps per hour after 20 min. warmup under normal ambient conditions. Less than 100 cps for ±10% line voltage variation. **Visual dial accuracy:** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps on all bands after calibration at nearest 100 kc point. **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. **Audio output impedance:** Unbalanced nominal 8 ohm speaker and high impedance headphone. **Audio output power:** 1 watt with less than 8% distortion. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at Mute socket. **Crystal calibrator:** 100 kc crystal. **Front panel controls:** Main tuning dial; function switch; mode switch; AGC switch; band switch; AF gain control; RF gain control; preselector; 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:** 14⅞" W x 6¾" H x 13⅜" D. **Net weight:** 17 lbs.

FREE CATALOG
See the wide array of Heathkit Amateur Radio Equipment available at tremendous do-it-yourself savings! Everything you need in "mobile" or "fixed" station gear with full descriptions and specifications . . . Send for Free copy!

the HEATHKIT® SB series



#2

HEATHKIT SB-400 SSB TRANSMITTER

• Built-in power supply • Complete transceive capability with SB-300 Receiver • Linear master oscillator frequency control • Built-in antenna change-over relay • All crystals supplied for complete 80-10 meter coverage • Automatic level control for higher talk power, minimum distortion • 180 watts PEP SSB, 170 watts CW • Crystal filter type SSB generation • Operates SSB (upper or lower sideband) & CW • VOX & PTT control in SSB operation, VOX operated CW break-in using CW sidetone • CW "shift" transceive operation to eliminate transceiver chasing • Crystal controlled heterodyne oscillators • 1 kc dial calibration—100 kc per dial revolution • Dial bandspread equal to 10 feet per megacycle • 500 kc coverage per bandswitch position • Switched 120 V AC for external amplifier antenna relay • Sturdy, lightweight, heavy-gauge aluminum construction throughout • Neat, modern "low-boy" styling

Here it is . . . the new Heathkit SB-400 Transmitter . . . second in the exciting new Heathkit series of Deluxe SSB Amateur gear! Following the same high standards set by the Heathkit SB-300 Receiver, the new SB-400 Transmitter now offers a matching counterpart that permits complete transceive operation with a host of advanced engineering design features for unmatched performance, versatility and operating convenience!

Unique mechanical design . . . prebuilt Linear Master Oscillator (LMO) . . . built-in heavy-duty power supply . . . sturdy chassis construction . . . beautiful modern styling . . . and power-packed performance are just a few of the many features that make the SB-400 your best buy in an SSB Transmitter! Order yours today for "Deluxe" communications at tremendous do-it-yourself savings!

Kit SB-400. . 33 lbs. . . Write for credit details. $325.00
Export model available for 115/230 volts AC, 50-60 cps; write for details.

SB-400 SPECIFICATIONS—Emission: SSB (upper or lower sideband) and CW. **Power input:** 170 watts CW, 180 watts P.E.P. SSB. **Power output:** 100 watts (80-15 meters), 80 watts (10 meters). **Output impedance:** 50 to 75 ohm—less than 2:1 SWR. **Frequency range:** (mc) 3.5-4.0; 7.0-7.5; 14.0-14.5; 21.0-21.5; 28.0-28.5; 28.5-29.0; 29.0-29.5; 29.5-30.0. **Frequency stability:** Less than 100 cps per hr. after 20 min. warmup under normal ambient conditions. Less than 100 cps for ± 10% line voltage variation. **Carrier suppression:** 55 db below peak output. **Unwanted sideband suppression:** 55 db @ 1 kc. **Intermodulation distortion:** 30 db below peak output (two-tone test). **Keying characteristics:** Break-in CW provided by operating VOX from a keyed tone (Grid block keying). **CW sidetone:** 1000 cps. **ALC characteristics:** 10 db or greater @ 0.2 ma final grid current. **Noise level:** 40 db below rated carrier. **Visual dial accuracy:** Within 200 cps (all bands). **Electrical dial accuracy:** Within 400 cps on all bands after calibration at nearest 100 kc point. **Backlash:** Less than 50 cps. **Oscillator feed-through/mixer products:** 55 db below rated output (except 3910 kc crossover which is 45 db). **Harmonic radiation:** 35 db below rated output. **Audio input:** High impedance microphone or phone patch. **Audio frequency response:** 350 to 2450 cps ±3 db. **Power requirements:** 80 watts STBY, 260 watts key down @ 120 V AC line. **Dimensions:** 14⅞" W x 6⅝" H x 13¾" D.

Watch for the new SB-100 All-Band SSB Transceiver and SB-2001 KW Linear Amplifier soon to be released!

HEATHKIT® by Daystrom

Heath Company, Dept. 9-7-1
Benton Harbor, Michigan 49023

☐ Enclosed is $265.00 plus postage. Please send SB-300 Receiver.

☐ Enclosed is $325.00 plus postage. Please send SB-400 Transmitter.

☐ Please send Free 1964 Heathkit catalog.

Address _____

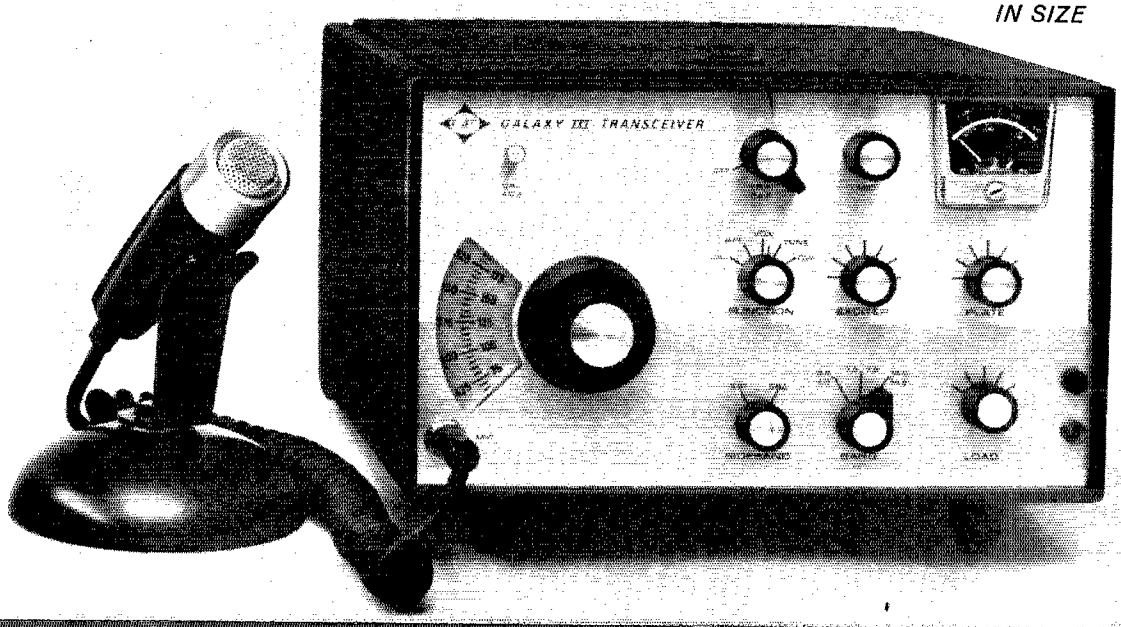
Name _____

City _____ State _____ Zip _____

Prices and specifications subject to change without notice. AM-142

USE AS DELUXE FIXED STATION . . .

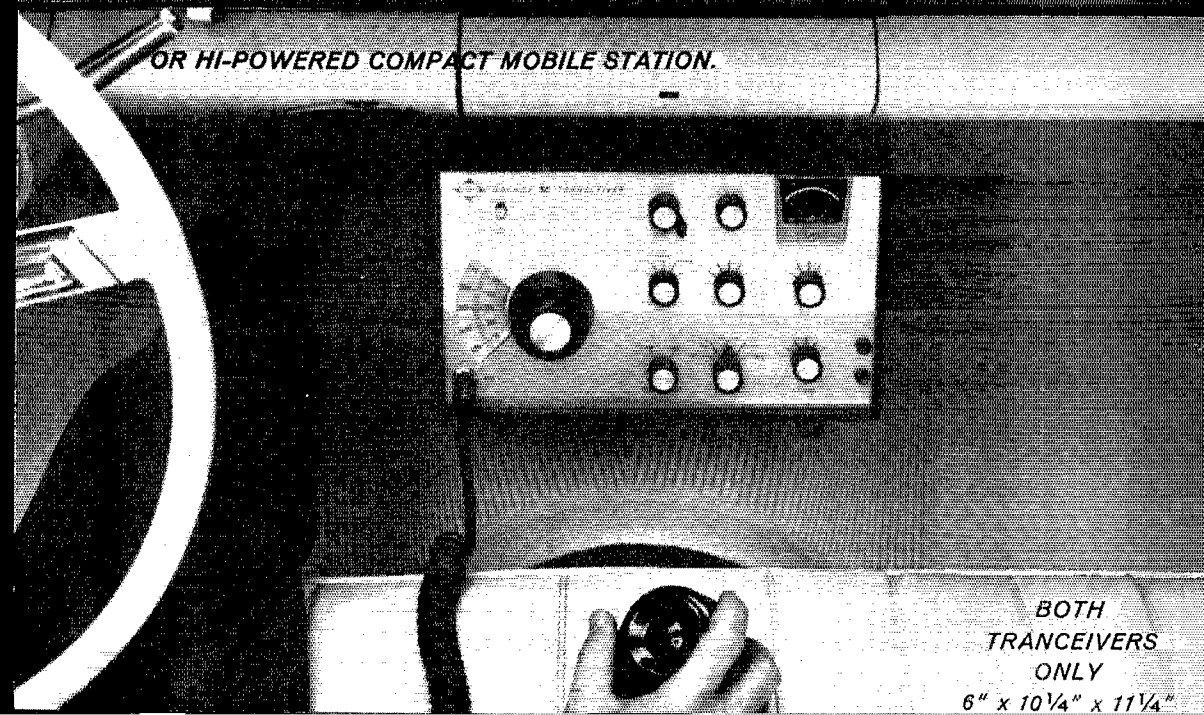
BOTH LESS THAN ONE-HALF CUBIC FOOT IN SIZE



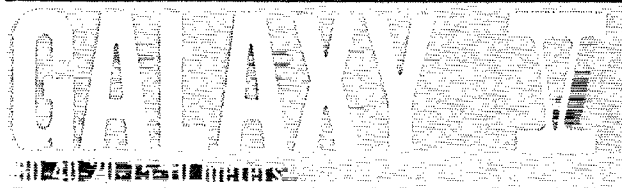
NOW!

TWO NEW COMPACT 300-WATT SSB/CW TRANSCEIVERS

OR HI-POWERED COMPACT MOBILE STATION.



BOTH TRANCEIVERS ONLY
6" x 10¼" x 11¼"



ONLY $469.95

GALAXY V COVERS 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5 and 28.0-29.0 *MC
*Factory supplied 28.0-28.5 and 28.5-29.0 MC.
Optional crystals available

ONLY $349.95

GALAXY III COVERS 3.5-4.0, 7.0-7.5, 14.0-14.5 MC.

SEE BOTH MODELS AT ALL LEADING HAM DISTRIBUTORS

GALAXY ELECTRONICS

10 SOUTH 34TH STREET COUNCIL BLUFFS, IOWA ZIP 51504

WRITE FOR COMPLETE DETAILED BROCHURE

GALAXY OF FEATURES (For both the V and III)

- ★ Suppression better than; unwanted SB 55 db, carrier 45 db
- ★ Highest receiver sensitivity; ½ uv @ 10 db S/N
- ★ "Smooth as silk" Dual vernier: fast.12:1, slow 72:1
- ★ Easy reduced-power tune-up
- ★ Exceptionally good AVC
- ★ Accessory compatability (see below)
- ★ Shifted carrier CW prevents Transceiver "leap-frogging"
- ★ Extra clean CW keying
- ★ New advanced hybrid circuitry – transistorized VOX/AUDIO/AVC
- ★ Highest stability – drift less than 100 cycles in any 15-minute period after warm-up
- ★ Panel selection of VOX/PTT
- ★ Panel calibrator adjustments
- ★ VFO Dial illuminated in three-color, and a well lighted "S" meter. Engineered for convenient mobiling.

GALAXY III & V ACCESSORIES

- ★ AC POWER SUPPLY $79.95
- ★ SPEAKER CONSOLE $19.95 houses AC supply
- ★ 100 KC CALIBRATOR $19.95
- ★ VEST POCKET VOX $24.95
- ★ REMOTE VFO $59.95 mobile/fixed station use
- ★ DELUXE ACCESSORY CONSOLE $99.95 speaker, phone patch, SWR bridge, VU meter
- ★ TRANSISTORIZED DC SUPPLY $119.95
- ★ UNIVERSAL MOBILE BRACKET $7.95

(*Continued from page 118*)

GLS 6, W4SGI 6, W4PUL 4, WA4BXH 3, W4CBN 3, W4OQG 2, W4ZBQ 1. (Mar.) W4WBK 25.

GREAT LAKES DIVISION

KENTUCKY—SCM, Mrs. Patricia C. Schafer, K4QIO—PAMs: W4BEJ, W4SZB, W4USE. V.H.F. PAM: K4KJQ. RM: WA4LCH. Appointment: K4JGB as EC. Silent Key: W4KQI. April net reports as follows:

Net	*Freq.*	*Time*	*Days*	*Sessions*	*QNI*	*QTC*
EMKPN	3960	0630E	M-F	22	244	54
MKPN	3960	0830E	M-F	31	460	60
MKPN	3960	0900E	S&S			
KYN	3600	0900E	Daily	60	501	226
KYN	3600	1900E	Daily			
KPN	3960	1930E	M-F			
6 Mtr.	50.3	2230E	M&Th	9	102	7

The Louis. and Jeff. Co. 6-Meter A.M. Net Section 2 held 13 sessions with 25 QTC and 142 QNI. K4DZM was top QNI on 9RN, followed by WA4LCH and K4QC'Q Kentucky was represented 96.6%. The Crescent Hill Baptist Church in Louisville is licensed as WA4KCD with 12 members. W4JUI has 3 new antennas. KYN members met in Frankfort for a dinner and get-together in May. A Ky. Post Office Net is in the process of formation. If interested, contact WA4AVV. Listen for it Sat. at 1300 EST on 3945 kc. W4GSH soon will have a 60-ft. tower to help his v.h.f. signals. K4UNE is a new papa. The Mammoth Cave Radio Club offers a certificate to those working 6 of its members. Traffic: (Apr.) WA4LCH 240, W4BAZ 137, K4DZM 115, WA4AGH 101, WA4BSC 87, K4TQZ 50, WA4DYL 34, K4HOE 26, W4CDA 19, WA4ELK 18, W4BTA 17, K4QIO 17, K4VDO 16, K4HSB 15, W4YYI 15, W4SZB 12, W4BEW 8, WA4GMA 8, W4PLN 6, W4KJP 5, K4KJQ 5, W4GSH 2, WA4KCD 1. (Mar.) W4BTA 21.

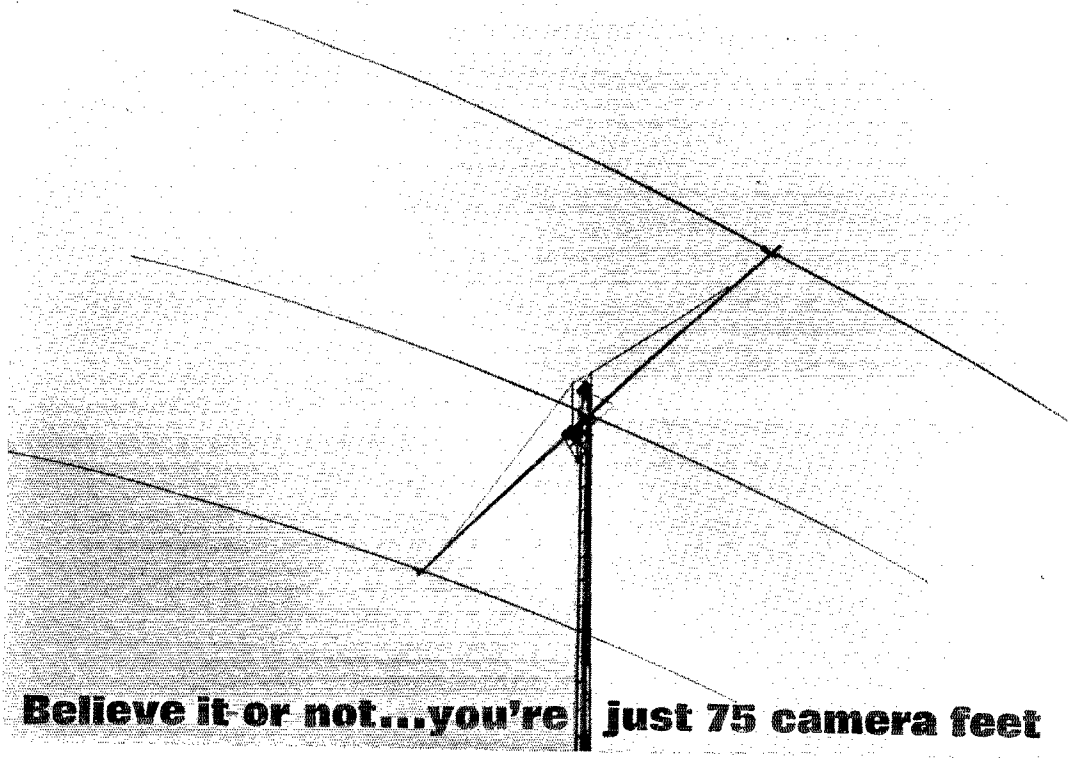
MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8LOX. RMs: W8EGI, K8QLL, W8FWQ, K8KMQ. PAMs: W8CQU, K8LQA. V.H.F. PAM: W8PT. Appointments: K8AEM, K8BZL, WA8CHA, K8GSW, K8HPO, K8IGQ, W8QQO as ECs; K8HLR as OO; W8HFA as OES; W8NWW as OBS; W8HKT, K8HLR, K8NHC, W8QFO, W8WQH, W8YAN, W8ZLK, K2SIL/8 as ORSs; K8BZL, K8EFY, K8LQA, W8QPO, W8TIC, W8YAN as OPSs. W8GTL asks that all college stations in this and nearby sections send him information on trustees and operators to form a college ham networks; or send to me. We regret to report that W8ZLK lost his XYL from a heart attack in April. Genesee County ham family: K8JXR, K8QNA, K8OOD, K8MEF. The Central Michigan V.H.F. Club is putting on a big Swap'N'Shop in September. K8ZZE is in charge. The Kent Radio Club awarded "Amateur of the Year" to K8BPT. K8GQG has a new HT-37 and K8BJG a TR-3. K8JJC made an HB 40/80 60-watt transceiver. The Huron Valley ARA still is fired up on "Bunny Hunts." W8FSZ writes up the story of ex-W8PLP very well. Lot's of us miss "Ziggy." Most Michigan clubs and mobiles took part in the mass polio drive. W8MPD got tired of phone yakking so joined the QMN nets. K3DCB/8 operates from the 8th floor of downtown Detroit YMCA. W8EJR is working on a gas-engine generator, a keyer and a t.r. switch. W8EGI finds the GZ-34 rectifier better than 5U4. So far in 1964, 113 eyes have been credited to the "Eye Bank Net." This is a vital job! W8PT is busy putting up new towers on the new "antenna farm." WA8CZJ now is General Class. The U.P. 16th Annual Hamfest will be held Aug. 1 and 2, at Sault Ste. Marie, sponsored by the Twin Sault Radio Club and the Kincheloe Radio club. W8CKK got the "Ziegenbein Award," an excellent choice. WA8CXG won an SX-117 and an HT-44 at the Dayton Convention. See your local bulletins for ham picnic dates. Traffic: (Apr.) K8NJW 418, K8KMQ 267, K8HLR 253, K8GOU 225, W8ELW 174, K8GRE 122, K8LNE 120, W8UUS 110, W8BEZ 73, W8GTL 27, K8LOS 70, WA8DZP 69, K8QLL 66, K8TIG 54, K8BYX 53, K8JJC 50, W8FX 45, W8FWQ 44, K8JED 44, W8EU 42, W8PGW 40, K8TWW 34, W8MPD 33, K3DCB/8 31, W8NJM 31, W8EJR 29, K8VCB 29, K8CIP 28, W8RTN 26, WA8FAO 25, W8ZHR 22, K8SJQ/8 20, WA8ASV 19, W8EOI 16, W8FDO 16, W8HKT 16, W8RHF 13, W8AHV 11, W8WVL 11, W8AUD 9, K2SIL/8 9, K8YRO 9, W8HK 8, WA8CXF 7, K8ZJU 7, W8EGI 6, K8VDA 6, W8TBP 5, K8VFR 5, K8GJD 4, K8ZZV 2, W8AAM 1. (Mar.) K8PKU 43, WA8CXF 39, WA8JJI 30, W8ZLK 24, K8TFE 14, W8IWF 4, K8ZZV 4.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE and K8LGB. PAMs: W8VZK, K8BAP and K8UBK. The 1964 officers of the Ohio Council of Amateur Radio Clubs are W8DN, chairman; W8TV, vice-chairman; W8OUU, secy.; W8EMK, treas. K8ONQ received his WAS certificate. Warren ARA's *Q-Match* tells us that W8UPB, our Great Lakes Division Director, explained and discussed incentive licensing and that high winds damaged the antennas of W8TAE and K8JUZ. K8RXD received the Cardinal Cities, Twin Cities, CHC and QRP-100 awards. Six Meter Nomads' *The Amateur Extra* informs us that K8AJB and WA8DXY have a new baby boy. W8EPM is in the hospital following an operation; K8INT has a new NCX-3 transceiver and WA8GEO has a new baby girl. The Ohio University ARC elected K8KPP, pres.; WA8BOV, vice-pres.; WA8ATG and K8UNV as 1964 officers. The Ohio Phone Net's March statistics are 131 member QNI, 68 breaker QNI, 37 formals and 26 informals. W8UPB spoke to the Babcock & Wilcox ARC. The Seneca RC toured W1MA, a u.h.f. television station in Lima, and Ray Chan of Ohio Bell spoke on the Laser. Toledo's *Ham Shack Gossip* states that K8GIJ received a Buckeye Belle certificate. K8DDG has a new CN6 converter. W8JBW returned to Warren after four years in Italy. W8UPB spoke to the Mahoning Valley RC. W8UPB also spoke to the Canton ARC. The Massillon ARC's *MARC Newsheet* states that W8GJO graduated from Ohio State as EE. Inter-City RC's *IRC News Bulletin* informs us that K8ERY demonstrated his teletype equipment and K8BAB spoke on traffic-handling. Hans Thunander gave a talk on Solid State Electronics, K8DKO has a new Lafayette HE-80 receiver. Parma RC's *P.R.C. Bulletin* tells us that W8LYD gave a talk on mobile radio and a new club known as the Greater Cleveland ARA was formed. Appointments made in April were WA8BZR as ORS, W8EIK as OBS, K8MMZ as OO, K8DII and K8TUT as OESs, W8DAE and W8UPH made the BPL in April. K8BAB made the BPL in March. Your Great Lakes Division Director, Dana Cartwright, W8UPB, and your SCM attended the Dayton Hamvention where 2331 registered and 622 attended the banquet. The FCC gave the General Class amateur examinations to 65, of whom 25 passed the code test. The SX-117, HT-44, CM44 and P-150 with power supply and speaker was won by WA8CXG. A Drake TR-3 transceiver with a.c. power supply and speaker was won by WA9ACF. Hope these winners' calls are correct as it was hard to hear because of so much talking around me. WA8AJZ received a certificate for placing 2nd in the N.Y.C.-L.I. QSO Party. Traffic: (Apr.) W8UPH 569, W8DAE 400, K8DII 291, W8TV 147, K8LGA 134, WA8CXY 132, K8UBK 107, W8BZX 101, WA8AJD 84, WA8AJZ 81, W8GRG/70, W8MGA 66, W8IEP 65, K8BPE 51, W8ECB 51, K8ONQ 40, W8DHG 32, W8LUP 31, K8RXD 31, K8BAB 26, K8BNL 25, K8LGB 23, W8RYP 22, K8BAP 19, K8VWN 18, W8ETO 15, W8WEG 14, W8ALS 7, W8DIH 7, K8HDO 5, WA8AWV 4, K8DDG 3, WA8JXM 3. (Mar.) W8CHT 420, K8BAB 113, W8LT 35, WA8EIF 22, K8MTI 16, K8MMZ 12, K8HVT/2 11, W8WEG 6, W8EEQ 3. (Feb.) W8CHT 390, WA8JXM 10. (Jan.) W8CHT 235.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RMs: W2PHX and WA2VYS. PAM: W2IJG. Section nets: NYS on 3650 kc. nightly at 2400 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. Appointments: WA2VYS as RM, WA2OOO and WB2FXB as OBSs. WA2JGL as EC. Endorsements: W2CYW and W2URP as OOs. WA2DRP as OES. Our congrats to the two BPL winners for April traffic, W2URP and K2SJN. Among those active during the Feb. FMT were W2ZBS, K2UTC, K2YXB and WB2CPV. The new officers of the Harmonie Hill Club include K2KYM, pres.; WB2FEU, secy.; WB2ISR, treas. The club's two HARC delegates are WA2ROJ and WB2FEU. Two new General Class licensees are WB2ISR and WB2ISL. Congrats. Westchester County AREC members list a new net on 21, 310 kc. each Thurs. at 0100 GMT. Call in. WA2OOO is net mgr. W1HDQ, of ARRL, was guest speaker at the New Rochelle Club. In Schenectary, club-owned test equipment was displayed and demonstrated. April was Spring Auction Night at the Albany Club, with K2UTQ as auctioneer. Also in Albany, W2ICE gave his slide show, "120 Years of Brasspounding," to the local chapter of the Morse Telegraph Club. Another successful auction also was held by the Westchester Club. WB2HZY reports activity on 40, 15 and 2 meters. April was a banner month with 21 traffic reports received. Traffic: (Apr.) WA2UZK 464, W2URP 286, WA2VYS 235, K2SJN 142, K2TXP 97, W2THE 78, W2EFU 75, WB2FXB 75, WA2LJM 71, WA2OOO 63, WA2PUM 57, WB2HYB 42, WB2FVD 36, WA2MHY 31, W2PKY 28, WA2JWL 18, WA2ZPD 18, W2ANV 17, WA2HGB 16, K2HNW 5, WA2VYT 4. (Mar.) WA2ZPD 16.

(*Continued on page 126*)

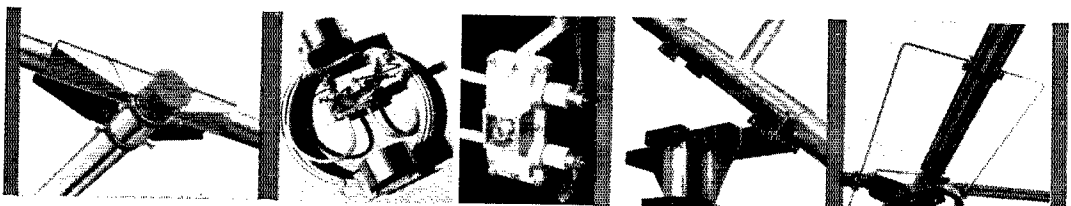


Believe it or not...you're just 75 camera feet from a full sized 3-element 40 meter beam!

- **Its longest element is 73 feet long**
- **Its heavy gauge, large diameter boom is 47 feet long**
- **It's constructed to last a lifetime**

...and, it will give you "Homestead Rights" on 40 meters

One glance at the non-drooping elements of the Model 403B pictured above tells you you are looking at a full sized optimum spaced beam that is *different*...it's one of Hy-Gain's new LONG JOHN beams. Like other Hy-Gain LONG JOHN beams – the 4-element 20 meter beam (Model 204B) and the 5-element 20 meter beam (Model 205B) – the Model 403B is constructed to deliver maximum theoretical gain and a lifetime of mechanical reliability. Electrically, LONG JOHN'S blend a balun fed Beta Match with optimum spacing and precision tuned parasitic elements to insure maximum gain and directivity. Structurally, they combine rigid commercial specifications with quality materials and the experienced know-how of craftsmen who pioneered and developed significant large beam construction techniques. Some of the unique, quality features of Hy-Gain's LONG JOHN beams include...



■ **Massive Heavy Gauge Parasitic Element to Boom Bracket**

■ **Super Power Balun with Permanently Epoxy Sealed Cast Aluminum Terminal Fitting**

■ **Giant Boom to Mast Bracket with Special Tilt-Head Assembly**

■ **Rugged Balun Fed Beta Match and Massive Driven Element to Boom Bracket**

hy-gain

For complete technical information...Send for a **free** TECHNICAL DATA REPORT on the LONG JOHN model or models of your choice.

ANTENNA PRODUCTS CORPORATION

8414 N.E. Highway 6 – Lincoln, Nebraska

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—SEC: K2OVN. Section nets:

NLI	3630 kc.	2315Z Nightly	W2WFL,	RM
VHF Net	145.8 Mc.	0000Z TWTh	W2EW,	PAM
VHF Net	146.25 Mc.	2300Z FSSnM	W2EW,	PAM
NYCLIPN	3932 kc.	Ex Sun.	WA2QJU,	PAM

Wanted: Traffic handlers! Experience helpful, but not a prerequisite. Excellent opportunity for advancement to ORS, OPS or OES. Hurry! Apply SCM, RM or PAM. BPL certificates went to K2YMU, WA2RUE, WB2HWB, W2EW, WB2ECR and WA2TQT. W2MTA is burning in a new SB-300 receiver. W2EW says, "Come swell the crowd at the '64 National Convention, Aug. 21, 22 and 23. And don't forget the bang-up banquet on the 22nd!" WB2ECR has moved to Ø-Land with a 100-watt 7854 rig. WA2QJU was elected vice-pres. of the Lincoln HSGO on the amateur radio platform. WA2EXP received an A1-Operator award. WB2DCG put up a new 20-meter dipole and is waiting for some DX to roll in. WA2KOS finished his college entrance exams and is back on NYCLIPN. WA2PXL built a new keyer, but it has a dubious dit-dah ratio. K2IDB has stacked the Big Wheel on 2 meters. So has W2WMG. The Kings 6-Meter AREC Net has grown from 5 to 25 stations since last August, according to WA2RAQ. WB2HWB has completed a differential keyer and is taking over K2YMU's EAN skeds for the summer. W2GKZ turned the Sat. NCS of NLI over to WA2RUE because of the press of other business. WA2LJT finished two sets of 432-Mc. receivers and transmitters and is now attacking the antenna problems. WA2IPC installed line filters to keep "boodies" from the TV and hash from the oil burner from irritating the receiver. And, he finished the home-brew power supply and modulator for the 6 and 2 transmitter. WA2JIS is active with Navy MARS even though the rig is stubbornly rebellious. New officers of the Columbia UARC are WB2CKU, pres.-treas.; K7GHU, vice-pres.-comm. dir.; WA2ZXW, tech. dir.; WA2LEN, secy. K2SJP completed a 710 grid-dip oscillator, Star Roamer receiver, P-2 s.w.r. bridge and built a code monitor during the month, but is unhappy because he didn't get the beam up at the new QTH. K2YMU has a new homebrew kw. New officers of the Telephone ARC of Manhattan are W2BPA, pres.; W2FPF, vice-pres.; W2NRI, secy.; W2HAJ, treas.; W2EXI, act. mgr. K2MJO reports visiting amateurs logging in at K2US, the World's Fair station, at the rate of 475 per week. Manhattan RACES marched down Fifth Ave. with walkie-talkies, mobiles and a communications truck during the Loyalty Day Parade. WA2KSP converted a BC-645 to 220 Mc. WA2FRW, the father of WA2FUL mobiled cross-country with a Gonset III and Saturn 6 on 6 meters. W2HSB is now s.s.b. on the low bands. The new secy. of the Five Towns Radio Club is WB2ASA. WA2VFD reports the formation of the Long Island Ragchewers Net on 50.5 Mc. every Fri. at 2100Z. W2YBU is helping K2MJO at K2US during the daytime. W2YSI is building a homebrew transceiver for 75 meters. W2MIZ is sporting a new Chevy mobile, but the rig is the same. W2BHJ continues to keep everybody plus-or-minus 1.0 kc. on 28.720 Mc. in Nassau County. We mobileers owe him thanks for reducing our need to retune the receiver in our heavy L.I. traffic. Traffic: (Apr.) K2YMU 646, WA2RUE 527, WA2VLK 379, WA2GPT 372, WB2HWB 349, W2EW 282, W2MTA 260, WA2UWA 209, WB2ECR 178, WA2LJS 108, WA2TQT 106, W2GKZ 84, WB2EUH 71, WA2QJU 63, WA2EXP 54, W2HSB 43, WA2PJL 26, WA2VKK 23, WA2OOL 22, W4TRU/2 20, W2EC 19, W2DBQ 14, WA2WAO 14, WA2WGN 14, W2GP 12, WA2RMP 9, W2PF 8, WA2PMW 8, WA2EFN 7, WA2RAQ 2. (Mar.) W2EW 378, W4TRU/2 46, K2SJP 3.

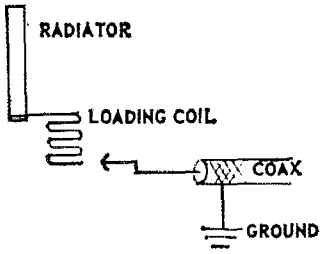
NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—Asst. SCM, Louis J. Amoroso, W2LQP. SEC: K2ZFI. RMs: WA2SRK, WA2QPX, WA2GQZ. PAM: K2VNL. ECs: K2ZFI, Morris Sussex Counties; W2COT, Maplewood; W2MZR, Forked River; W2KXO, Passaic County; WA2CCF, Englewood; WA2ZKT, Somerset County; WB2BCS, Red Bank; K2BEV, South Amboy; K2OEI, Kevport; WB2ALF, Old Bridge; W2DMJ, Wood-Ridge; W2IIN, Union County; WA2BNF, Belleville; W2HXP, Fanwood; WB2COZ, Paramus; W2ZAL, Jersey City. Asst. ECs: WA2UOM, Clifton; WB2AYQ, Pompton Plains. New appointments: K2IBF as OO; WA2ZFX as ORS; WB2DDB and WA2ZOW as OESs; WA2SEM as Sparta EC. We thank W2QNL and K2SLG, who have resigned, for their fine service to our cause. K2DQT and W2CCK were commended by Bloomfield C.D. for their help. The New Jersey Novice Net now meets Mon. through Thurs. at 7:20 P.M local time on 3725 kc. WA2UOO has a new antenna coupler and 20-meter dipole. K2ZFI visited Sussex County hams at High Point State Park and explained the AREC. K2UKQ has a vertical for 40 meters that helps the DX. WB2GFY is a newcomer to traffic. WB2CVN reports 35

(*Continued on page 128*)

HISTORY - AND THE BIG SECRET

It is an historical fact that the Gotham 23' base-loaded, all-band vertical antennas have been consecutively advertised in QST for a longer time than any other antenna, and perhaps consecutively longer than any ham product.

When a product is popular and long-lived we sometimes lose sight of those newcomers who are not familiar with the 'secret' of its design. Here is the basic circuit:



A single 50 ohm coaxial feedline (either RG8/U or RG58/U) connects to the resonant point of the loading coil for operation on 80 or 40 meters, at SWRs of close to 1:1. On 20, 15, 10 and 6 meters, the loading coil is bypassed and loading is accomplished by the transmiter pi-network output or antenna tuner output.

Note that the antenna is not grounded, and that radials are not used.

We are often asked if a Gotham vertical antenna will operate on MARS, C.D., C.B., MARINE, or other non-ham frequencies. Here is a simple method of tuning to any desired frequency within the range of the antenna: The inner conductor of one end of the coax is moved up the loading coil a turn at a time while the other end is coupled to a grid dipper tuned to the desired frequency. At one point, there will be a decided dip, and this is where permanent connection is made. With an SWR indicator, this point will indicate minimum SWR. With a field strength meter, maximum radiation will be achieved. Using a transmitter, this point will permit proper loading.

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.....

QNI in the East Coast RTTY Net. We are sorry to lose Charles as OBS. Any takers for OBS RTTY? W2EWZ has completed 19,000 QSOs. WA2ZOW has a new mike. We are sorry to report the passing of WA2FHJ, W2BOX and W2SN. DXers will remember W2SN as the long-time W2 QSL Manager. WB2ICH, WA2RIN, WA2SRK, WA2ZRR are among the many visitors to K2US at the World's Fair. W2ZAL has been doing a commendable job organizing the Jersey City AREC. WA2MNU has been preparing equipment for the GSARA Field Day. W2ZI made 130 QSOs in the recent CD Party. WA4RGS, ex-W2LFR, sends regards to the NJN gang. WB2AEJ has installed break-in. The Monmouth ARC, WA2DNI, meets Fri. on 146.124 kc. at 10:00 P.M. local time. Welcome to KØTKP, who is stationed at Fort Monmouth. K2UCY has a 1920 ORS-League certificate and challenges NNJ appointees to produce an older appointment certificate. WA2RIN has a new HA-5 v.f.o. OESs WA2OOD, WB2ALF, WA2ZOW and WA2UDT report some v.h.f. band openings. The Rutgers University club, WA2TWL, needs an instruction manual for an Eldico SSB-500. Any helpers? WA2QPX has received the WAS award. PAM/ORS/OPS K2VNL continues yeoman service providing liaison between NJN, NJ Phone Net and NJ 6 & 2 Net. It seems we have too few stations willing to provide such liaison, not only between these nets, but others too. Flexibility as to band and mode is the keynote to mutual cooperation and public service. Remember the 2-month delay in publication. Send me news of your fall activities during July and August! Traffic: (Apr.) K2VNL 324, WB2ALF 315, WB2DEP 314, K2UCY 245, WA2SRK 191, WA2MYB 120, WA2UOO 103, WA2TEK 97, WA2VID 86, K2SBS 58, W2CVW 49, W2PEV 48, WA2GQZ 46, WA2-WAJ 36, W2LQP 35, WB2AEJ 29, WA2KVQ 25, WA2ZKT 22, K2ZFI 18, W2TFM 16, W2ANG 13, WA2AKM 11, WA2QPX 8, WA2ZFX 7, WB2BCS 6, K2SLG 5, W2DRV 4, WA2MXR 4, W2NIY 4, W2OXL 4, WA2PWI 4, K2UKQ 4, WB2GFY 3, W2CFB 2, WB2CVN 2, W2EWZ 2, WA2-ZOW 2. (Mar.) K2SLG 14, WA2TWL 3, WA2GQI 2, K2UKQ 1.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke, WØNTB—Asst. SCM: Ronald M. Schweppe, KØEXN. SEC: KØVBM. RMs: WØLGG, WØUSL. PAMs: KØBBL, WØLSF. Your SCM wishes to take this opportunity to thank all the League Officials and good friends in the Iowa section who were so kind while his good wife was recuperating from a very bad injury. It proves in no uncertain way the value of friends and the strong bonds of fellowship among radio amateurs. Please bear with me until I get all the loose ends picked up. Thanks. New controls for the 75-Meter Noon Net are NCS KØBBL; alternates WØPZO, KØBRE, WØNGS, KØKAQ; secy., WØEEG. This net is being called on either of the voice modes at the discretion of the NCS for the day. The Story Country AREC has developed an inexpensive walkie-talkie on 6 meters effective for a couple of miles. It operates on four flashlight cells and is ideal for difficult terrain and over-water operation. If interested, contact KØYLO. Ray Callahan, EC for the Story County Net, reports: Interstate S.S.B. —QNI 1183, QTC 694, sessions 30. 75 Meter Noon Net—QNI 1073, QTC 118, sessions 26. Midwest 160-Meter Net—QNI 886, QTC 20, sessions 30. Hamilton Co. Net—QNI 199, QTC 10, sessions 30. Traffic: WØBDR 1863, WØLGG 1646, WAØESW 340, WØUSL 86, WØNTB 60, WØQVZ 16, KØBRE 15, KØTDO 14, WØYDV 7, WØGPL 6, WAØEYJ 4, WØBKR 3, WØNGS 2.

KANSAS—SCM, C. Leland Cheney, WØALA—SEC: KØBXF. PAM: KØEFL. RM: WØSAF. V.H.F. PAMs: KØVHP, WØHAJ. New appointment: WØHIJ as EC for Lincoln, Ottawa, Saline, and Ellsworth Counties, Zone 14. BPL certificates went to WØOHJ and WØALA. Traffic Net activity for April.

Net	*Freq.*	*Time*	*Days*	*Sessions*	*QTC*	*QNI*	*Ave.*
KPN	3920	1245Z	M-W-F	17	91	374	5.4
KPN	3920	1400Z	Sun.				
NCS's:	KØEFL, WØIFR, WØALA						
QKS	3610	0030Z	Daily				

Compliments are in line for WØPFG on his activity as OO during this past year. Al was the top Observer in the Ø are for 1963. The several hamfests and picnics during the last two months were well attended and all seemed to enjoy a good time. They presented a wonderful opportunity to meet with the amateurs in the area and many new friends were made. Thanks again to those clubs who keep the SCM informed through their monthly bulletins. If you are not already sending yours why not start this month. Sorry if your report did not get in the following listing but you probably forgot to mail or radio in your report. Why not make an extra effort to do so this month. Traffic: WØOHJ 744, KØGII 168, WØALA 119, WAØEDD 57, KØYTA 46, WAØCCW 31,

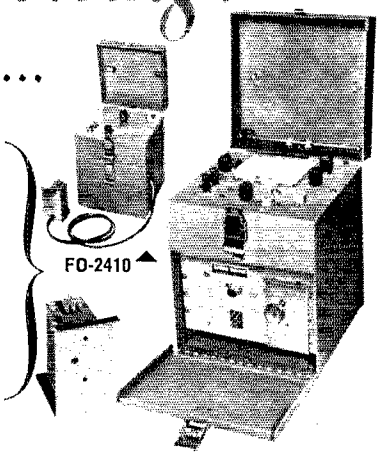
(Continued on page 130)

INTERNATIONAL FREQUENCY METERS

designed for servicing!

Equip your lab or service bench with the finest . . .

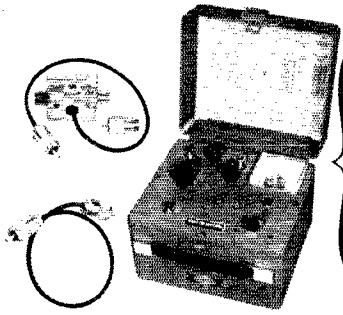
Discover new operating convenience.



FM-5000 FREQUENCY METER 25 MC to 470 MC

The FM-5000 is a beat frequency measuring device incorporating a transistor counter circuit, low RF output for receiver checking, transmitter keying circuit, audio oscillator, self contained batteries, plug-in oscillators with heating circuits covering frequencies from 100 kc to 60 mc. Stability: ± .00025% +85° to +95°F, ± .0005% +50° to +100°F, ± .001% +32° to +120°F. A separate oscillator (FO-2410) housing 24 crystals and a heater circuit is available. Dimensions: FM-5000, 10" x 8" x 7½".

FM-5000 with batteries, accessories and complete instruction manual, less oscillators, and crystals. Shipping weight: 18 lbs. Cat. No. 620-103 . . . . . $375.00
Plug-in oscillators with crystal $16.00 to $50.00



C-12B FREQUENCY METER For Citizens Band Servicing

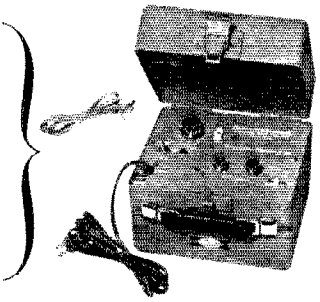
This extremely portable secondary frequency standard is a self contained unit for servicing radio transmitters and receivers used in the 27 mc Citizens Band. The meter is capable of holding 24 crystals and comes with 23 crystals installed. The 23 crystals cover Channel 1 through 23. The frequency stability of the C-12B is ± .0025% 32° to 125°F, .0015% 50° to 100°F. Other features include a transistorized frequency counter circuit, AM percentage modulation checker and power output meter.

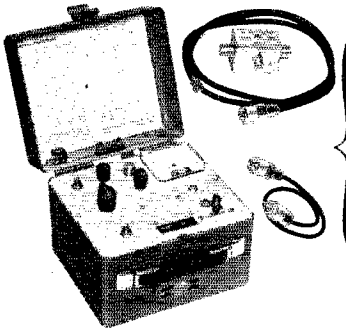
C-12B complete with PK (pick-off) box, dummy load and connecting cable, crystals and batteries. Shipping weight: 9 lbs. Cat. No. 620-101 . . . . . $300.00

C-12 CRYSTAL CONTROLLED ALIGNMENT OSCILLATOR

The International C-12 alignment oscillator provides a standard for alignment of IF and RF circuits 200 kc to 60 mc. It makes the 12 most used frequencies instantly available through 12 crystal positions 200 kc to 15,000 kc. Special oscillators are available for use at the higher frequencies to 60 mc. Maximum output .6 volt. Power requirements: 115 vac.

C-12 complete, but less crystals. Shipping weight: 9 lbs. Cat. No. 620-100 . . $69.50





C-12M FREQUENCY METER For Marine Band Servicing

The International C-12M is a portable secondary standard for servicing radio transmitters and receivers used in the 2 mc to 15 mc range. The meter has sockets for 24 crystals. The frequency stability is ± .0025% 32° to 125°F, ± .0015% 50° to 100°F. The C-12M has a built-in transistorized frequency counter circuit, AM percentage modulation checker and modulation carrier and relative percentage field strength.

C-12M complete with PK (pick-off) box and connecting cable, batteries, but less crystals. Shipping weight: 9 lbs. Cat. No. 620-104 . . . . . $235.00
Crystals for C-12M (specify frequency) $5.00 ea.

KEEPING YOU ON FREQUENCY IS OUR BUSINESS...

Write today for our FREE 1964 CATALOG

INTERNATIONAL CRYSTAL MFG. CO., INC.

18 NORTH LEE OKLAHOMA CITY, OKLAHOMA

KØBXF 22, WØBMW 17, KØEMB 15, WØBYV 11, KØEFL 9, WAØDZI 5, KØVQC 3.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL. New appointments: WNØILQ as OES, KØAEM as ORS, WAØEMS as OPS. Appointments renewed: WØBUL as PAM, WØOUD as RM, WØAIM as EC (Barry County added). I am sorry to report that WØZWQ, Trenton, is a Silent Key. The Mo. Valley ARC, St. Joseph, is a new ARRL affiliated club. KØERD is secretary. The Raytown High School ARC (WØCTV) elected WAØEMX, pres.; WAØFLS, vice-pres. and trustee. WAØDJG is pres. of Horton-Watkins High School ARC. Harrisonville ARC (HARK) elected KØFPC, pres.; WAØDSE, secy.; KØJWN, Field Day chmn. KØJWN is pres. and K7OAL/Ø is treas. of the new radio club at Central Mo. State College. WAØIHV, ex-WA5-FBW is a new call in Sedalia. The home of WØQXT and son, KØDNY, was destroyed by the Pleasant Hill tornado. Neither were injured. KØEVN lost his antenna in the same storm. WØOUD, WØDE, WØRGS, WØKY and KØZBO were active in the statewide c.d. drill Apr. 22. Reports say that Missouri stations were scarce but out-state contacts were plentiful in the Mo. QSO Party. KØGSV, KØECK and KØJPL operated an expedition to Reynolds County and report over 450 contacts for the QSO Party. KØFPC and WØQWS also report high scores in the party. Vol. 1, No. 1 of *Mo. New News* (MON) came out recently. WØWYJ looks great as editor and printer. Net reports for April:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2345Z	M-W-F	13	289	58	WØBUL
MON	3580	0100Z	Tu-Sun.	26	187	210	WØOUD
MNN	3580	1900Z	M-Sat.	25	82	25	WØOUD
SMN	3580	2200Z	Sun.	4	22	15	WØOUD
PON	3810	2100Z	M-F	22	281	96	KØBWE

Traffic: (Apr.) KØONK 1205, KØTGU 510, KØTCB 509, WØOUD 220, KØFPC 178, WØTPK 89, WØHVJ 72, KØBWE 54, WAØCWV 51, KØAEM 50, WØKIK 46, KØVDT 43, WAØDGT 40, KØLQH 36, WØBUL 28, KØWOP 15, WØRTO 13, WØAIM 12, WØRTW 12, KØPCK 10, WAØEMX 8, KØEQY 8, WØDE 6, WØGQR 6, WAØDJG 5, WØEOJ 3, KØVIQ 3, WAØEUE 1, WNØILQ 1, KØVYP 1. (Mar.) WØTPK 78, WØEOJ 21, WAØEMX 1.

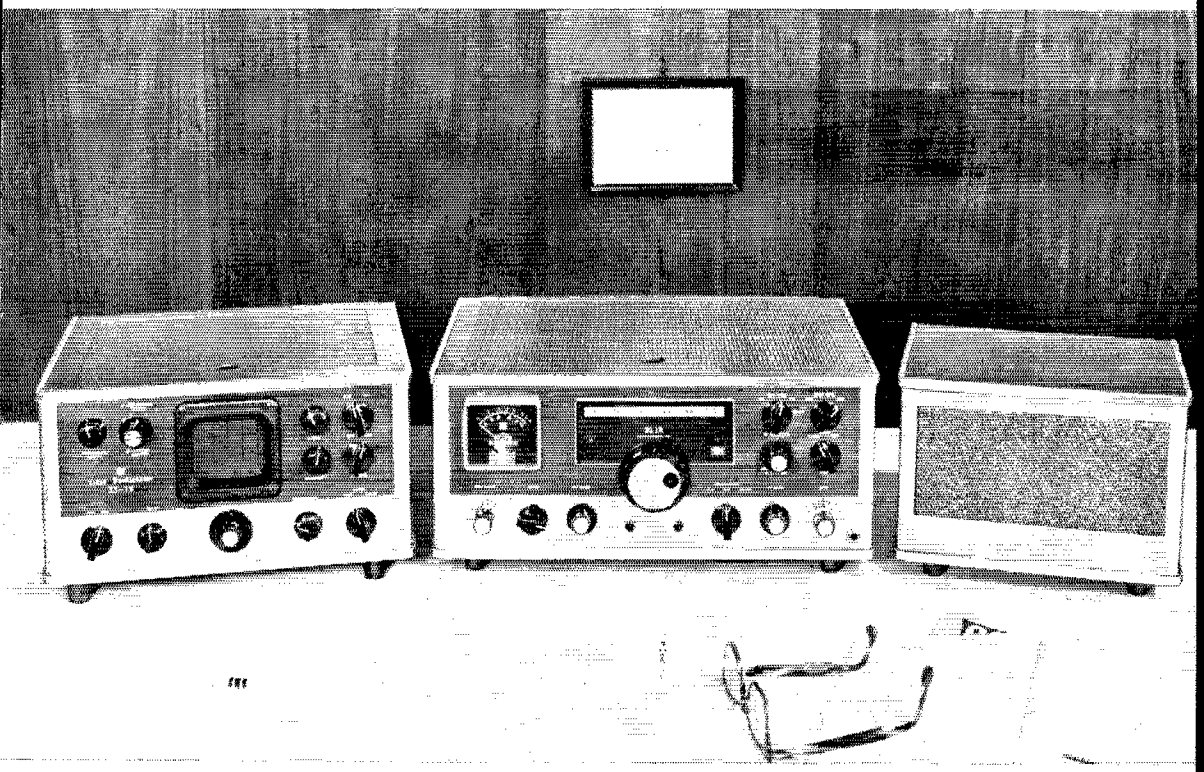
NEBRASKA—SCM, Frank Allen, WØGGP—Net reports for April: AREC Net, WØIRZ, QNI 71, QTC 4. Nebraska Storm Net, QNI 876, QTC 23. Nebraska Emergency Phone Net, QNI 808, QTC 92. Nebr. Morning Phone Net, QNI 510, QTC 45. WAØCFB NCS. Western Nebr. Phone Net, WØNIK, QNI 639, QTC 71, 100 per cent check ins: WAØAES, WØZHV, KØAIE, WØNIK. WØFIG, NCS for the Emergency Phone Net, reports a smooth transformation from a.m. NCS to s.s.b. NCS this year. However, *all* stations are urged to check in on any mode. The Central Nebraska Steak Fry will be held at Victoria Springs State Park, July 26. Mobile frequencies: 3982.5 and 3960 kc. The Nebraska Storm Net was activated for the Wolbach Tornado May 5. KØTSU has resigned as SEC. I'd like to take this opportunity to publicly thank John for his fine work the last few years as SEC. The Sandhills ARC in Alliance elected WØWZR as president for the coming year. New officers of the Tri-City Radio Amateur Club, Scottsbluff, are WØGGP, pres.; WAØCDQ, vice-pres.; WAØEYY, secy.-treas. Traffic: (Apr.) WAØCIE 280, WØLOD 91, WAØAES 64, WAØBID 44, WØFIG 40, KØDGW 34, WØNIK 31, WØZHV 28, WØNOW 20, WAØBES 19, KØHNT 18, WICJP/Ø 17, KØFRU 17, WØEGQ 14, WAØCDQ 12, WAØBIE 10, WØBKW 10, WØVEA 10, WAØCFB 8, WØGGP 8, KØRRL 8, WØYFR 8, KØJFN 6, WØOOX 6, KØSCN 4, WØAHB 3, KØHNW 3, WØMTI 3, WAØBOK 2, WAØEYY 2, WØHOP 2, KØJRH 2, KØUWK 2, WØWZR 2. (Mar.) W6JCF/Ø 40.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Robert J. O'Neil, W1FHP—SEC: W1EKJ. H.F. PAM: W1YBH. RM: K1GGG. ECs of the month: W1HHR, W1EOR and W1EKJ, for their fine performance during the V.F.W. Parade in Willimantic on Loyalty Day. Many of the AREC corps members were present to add their help with communications. Traffic nets: CPN, Mon. through Sat. at 1800, Sun. at 1000 on 3880 kc. ON, daily at 1845 on 3640 kc. Conn. Emerg. Coord. Net Sun. at 0900 on 3880 kc. All assistance is welcome. A new OO Class III is W1PRT. Net reports: CN, 30 sessions, 460 traffic, average per session 15.3, high QNI W1ZFM, K1WKJ, K1UYZ. CPN 29 sessions, 208 traffic, average 7.1, high QNI K1AQE, K1OJZ, K1LFW, K1NTR, W1FHP, K1DGK, K1UQQ and W1YBH. BPL cards went to K1WKK and K1UYZ. W1LAS and W1ILV, Waterbury, are on 80-meter RTTY. K1EKC and K1-KTM have new model 15 printers which they hope to have going very soon. K1TGX has a new 6N2 on the air looking for QSOs. W1QV has new large-size QSL cards

(Continued on page 132)

SS-1R, SS-1S, SS-1T, SS-1TF.....



THE SQUIRES-SANDERS family of HF amateur equipment—which started with the announcement last fall of a genuinely new approach to HF receiver design and performance (SS-1R) and original developments in noise silencing techniques (SS-1S) continues to grow. The original objective of a complete HF amateur *system* which is unsurpassed in quality and performance will soon be realized. The SS-1R receiver, SS-1RS matching speaker, and SS-1S noise silencer are currently available. The superb performance of this receiver and silencer—especially in frequency accuracy, rejection of strong adjacent signals, and the spectacular elimination of impulse noise (plus really fine construction)—has been talked about by hams the world over.

The SS-1V Video Bandscanner (see photo, left) is just as unusual as its predecessors. This unique oscilloscope display unit, when used with the SS-1R, shows all signals in the band in use, or any portion of the band can be expanded to full screen for detailed examination. Both linear and logarithmic displays are provided. A unique feature is that the *signals displayed do not move as the receiver is tuned*, but a marker pip constantly shows the exact frequency to which the receiver is tuned. The sharp resolution of this unit permits observation and measurement of two AM sidebands displaced only 2.5 kc. from the carrier. In addition provision is made for transmitter monitoring or analysis with automatic switching on "transmit."

The matching transmitter—SS-1T—has been released for production also and will be available shortly after the Bandscanner. Designed for transceive mode operation with SS-1R receiver frequency control, SS-1T will operate at 200 watts PEP input and will embody still other unusual Squires-Sanders developments which provide operating features not available in similar equipment. Complete specifications and operating characteristics will be published shortly. For those operators who prefer separate receiver/transmit frequency control, the separate transmit frequency unit (SS-1TF) will be available. Keep in touch with your distributor or write for further detail.

AMATEUR NET PRICES: SS-1R Receiver, $895; SS-1RS Speaker, $35; SS-1S Noise Silencer, $135; other prices to be announced.

Squires-Sanders, Inc.

475 WATCHUNG AVENUE, WATCHUNG, N.J. • 755-0222

for anyone. Bob has been act. mgr. of the Tri-City RC and president, was first licensed in 1924, and is believed to be the first to QSO Belgium on 80 meters in 1925. He is now OPS and OBS. The Shoreline Amateur Radio Club has been approved as an affiliated club. Don't forget to get those Field Day reports in as soon as possible, along with outstanding ideas on helping future clubs in getting started with their portable operation ideas. Every little bit helps. Traffic: (Apr.) F1UYZ 503, W1EFW 416, WA1ALZ 277, W1AW 248, W1RZG 119, K1DGK 93, W1FHP 87, K1PQS 77, K1GGG 59, W1MPW 56, K1YIX 56, W1CTI 45, K1JAD 44, W1OBR 42, K1WXN 36, W1YBH 35, W1BDI 29, K1AQE 28, K1ZND 28, W1ZFM 26, K1NTR 25, K1SRF 18, W1ECH 16, K1OJZ 16, W1CHR 11, W1QV 9, K1WLA 6, W1BNB 4, W1GEA 3. (Mar.) K1UYZ 208.

MAINE—SCM, Arthur J. Brymer, W1AHM—SEC: K1DYG. PAM: K1ADY. RM: K1MZB. Traffic Nets: Phone—Seagull Net, 3940 kc., 1700-1800 daily except Sun. The Maine State C.D. Net meets Sun. at 1100 EST on 3993 kc. and Wed. on 3530 kc. at 1900 EST with W1BYK as NCS. The AREC Net meets Sun. at 0900 EST with K1DYG as NCS. C.W.—The Pine Tree Net meets at 1900 daily Mon. through Fri. on 3596 kc. The First Regional Net meets at 1815-1930 daily on 3605 kc. The PTN still is looking for more stations to check in. All endorsed tickets are now due as the SCM has now been office one year and *two* months so send your certificate in. Several meetings have been held for the purpose of starting an s.s.b. net to supplement the Seagull and at a different time. It has been suggested it be held after the 1RN so that any traffic picked up can be passed on at that time. K1UXZ has a new beam on two stacked 5s. K1NAN is playing around on 2 meters lately. New hams: WA1BNQ, WA1BNS, WN1BMG, WN1BMQ, WN1BMV, WN1BNG and WN1BNP. W1OTQ has a new NCX-3 and worked Alaska in the emergency and also worked Hawaii for the first time. We have a new father-and-son team, WN1BMG and WN1BMV. Traffic: (Apr.) K1NAN 90, K1TEV 28, W1OTQ 11, K1UXZ 1. (Mar.) KØKPU/1 400.

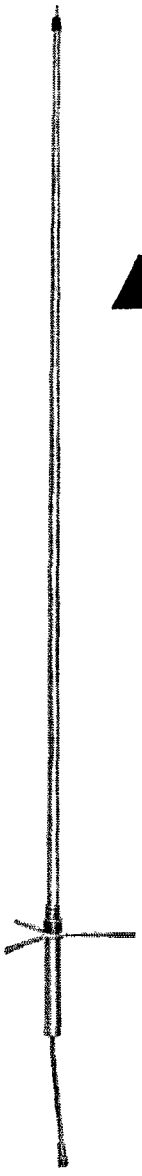
EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from the following ECs: K1s ICJ, QLG and PNB, W1s STX and AQI. K1DZG is the new EC for Somerville. K1OUM is RO. W1RST is a new OO. A Silent Key is W1BUG, who passed away in Florida. The following took part in the Feb. FMT: W1PLJ, K1QDR, W1AYG, W1RHN, K1WJD, W1HJP, W1MEG, K1IPA, K1RPA. The Central New England Net had 650 QNIs, 3 traffic 26 sessions. Heard on 75: K1TVY and W1KJ. W1YSX is on all bands. K1LVV is active as an OBS on RTTY. W5WPP and K2VJP are working in Braintree. K1WJD now is in Natick. W1CS is on 80-40-meter c.w. K1BIF has 90 watts on 2. The Barnstable RC meets the 1st Wed. of the month in the Fire Dept. The T-9 Radio Club's Annual Ladies Night was held in Danvers. K1s IMP, GGP, JLV, GHT, TPJ, VKY and W1JNV handled 1000 messages during the Alaska earthquake on the Navy MARS Net and our bands. W1RST handles traffic for KC4-Land. W1KCO and W1HKG flew down to ARRL in Art's plane. WN1s AVT, BHS and W1AOW are in our Novice C.W. Net on 3733 kc. Certificates have been issued to K1s YKT, SMT, UIW and KN1ETT. K1ZHS is putting up new antennas. W1JDP is on 6 and 10 meters. W1EPE is on 10. K1KMV is building an RTTY rig for 6 and also has a linear. K1PBQ has been ill but is better now. K1QAG is back home from Arizona. The Milton RC made a donation to charity in memory of their departed past-pres., K1NEU. The Framingham Club had an auction and an ARRL film. W1EHT was in the C.W. DX Contest. W1PSG taught a class for Novices at his high school. EM2MN held 22 sessions, 223 QNIs, 132 traffic. The 6 Meter Crossband Net held 22 sessions, 505 QNIs, 60 traffic. W1PEX, K1VGM and W1ZLX made the BPL. K1VGM is in c.w. nets. K1ESG, a new OBS, was on during the KL7 emergency. K1LPJ is attending Holy Cross. The North Shore RA held a meeting. K1UHN was in an accident. Mike Ferber, of National Co., spoke at the QRA. W1QXB is RO for Melrose. You have elected me as your SCM for two more years. Please give me your continued support. W1GLF built a new 2-meter converter. K1SNV has an Adventurer to drive a W1ICP final. W1ULJ has a Valiant 2. W1ECK has a new final for kw. WØPAN is Field Day chairman with W1CUY and K1AWP for the Massasoit Club. K1NKW is a new member of the Brockton Police Force. W1WLZ is at Bainbridge with the USNR. K1s DSU and CEZ are back on 10. K1HNP built a new shack. W1GRN and W1ZXC are mobile on 10 meters. W1AKN works his son, K8-MZD, on 80-meter c.w. Appointments endorsed: W1AKN Sandwich, W1EHT Wayland, as ECs; W1DOM as PAM for 2; W1HIL as OPS; W1JNV and K1WJD as OOs, W1ALP as OBS; W1AUQ as ORS. W1CAS is a new OBS. K1YSJ is Asst. EC to K1PNB. W1TZU is a Silent Key. W1MHN has given up ham radio. W1DIY has 1TV. W1MX worked 340 in the DD Party. Good work by K3OAE. The club has 160 confirmed on c.w. for DXCC.

(Continued on page 134)

C-P COMMUNICATION ANTENNA SYSTEMS

—mean CERTIFIED PERFORMANCE!

BASE STATION STATIONMASTER ADVANCED DESIGN ANTENNA (4X-Omnidirectional Gain)
U.S. PATENT NO. 3,031,668



Cat. No. 200-509 Frequency Range 130-174 MC*

Cat. No. 200-509 Stationmaster Collinear Gain Antenna is designed to meet the ever increasing need for high antenna gain in minimum space and at lowest cost. This antenna, consisting of a number of collinear radiating elements fed inphase and encapsulated in a continuous weatherproof fiberglass housing, meets the above requirements. Low overall weight eliminates the need for extensive erection equipment required by previous antennas offering equal power gain. The input fitting on these antennas is a standard Type N male connector mounted at the end of an 18" flexible terminal extension. Designed for maximum strength with minimum cross-section, Cat. No. 200-509 is capable of withstanding winds in excess of 100 MPH.

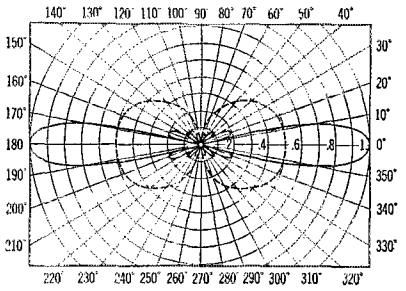
*Exact frequency must be specified

Electrical Specifications:

Nominal input impedance	50 ohms
VSWR	1.5:1
Bandwidth	±0.3%
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
Omnidirectional gain	144-174 Mc 5.8 db 130-144 Mc 5.5 db
Vertical beam width (½ power points)	18°
Lightning protection	Direct ground

Mechanical Specifications:

Radiating element material	Copper
Element housing material	Fiberglass
Element housing tip diameter	⅝"
Element housing butt diameter	1⅞"
Element housing length	19'
Ground plane element length	18"
Support pipe	2⅜" dia. hot-galvanized steel, 22' available for mounting
Rated wind velocity	100 MPH
Lateral thrust at rated wind	45 lbs.
Bending moment 6" below ground plane at rated wind	450 ft. lbs.
Weight	30 lbs.

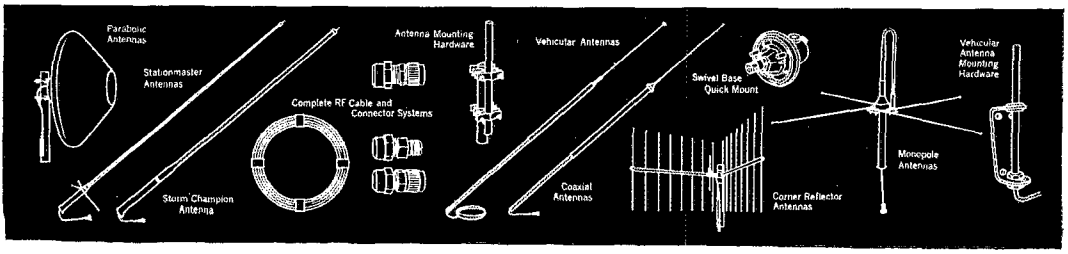


Vertical field strength pattern of Cat. No. 200-509 Stationmaster Antenna. A dipole pattern is shown for reference.

SINCE 1933

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)



K1WJD is the new manager of EAN. The Danvers Amateur Radio Assn. is now an affiliated club. Traffic: (Apr.) W1PEX 1120, K1VGM 554, W1ZLX 525, K1ESG 316, K1YKT 298, W1EMG 294, W1LES 268, W1ZSS 117, K1ZHS 107, K1PNB 99, W1BJE 97, W1DOM 63, W1OFK 50, W1EPE 41, K1ZQU 38, W1AOG 31, K1GKA 29, K1WJD 25, W4TFL/1 24, K1BGK 17, K1LCQ 15, KN1FJM 12, WA1ANA 11, KN1FOM 11, K1CMS 8, W1AUQ 7, K1VOK 7, W1DIY 5, K1OWK 5, W1JDP 4, W1OJM 4, W1MX 2, W1NF 1. (Mar.) K1SMT 202, W1EPE 41, K1WJD 27, W1AUQ 6, K1KMV 1. (Feb.) K1WJD 46.

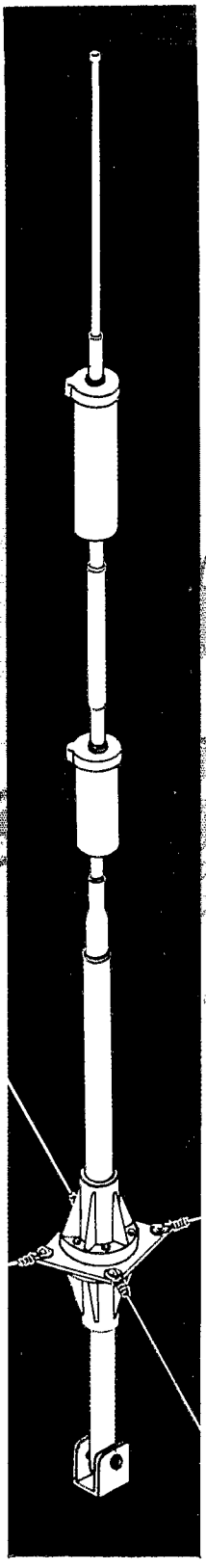
WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: W1BYH/K1APR. C.W. RM: K1IJV. PAM (75 meter): K1RYT. West. Mass. ARRL nets: West. Mass. C.W. Traffic Net, WMN, daily 7:00 P.M. 3560 kc.; Massachusetts Phone Net, daily 5:45 P.M. 3842 kc. s.s.b.-a.m.; Hampden County 10-meter Traffic Net, daily 8:00 P.M. 28.700 kc. W1WCC gave a talk on the ARRL National Traffic System at the Pittsfield Radio Club. In August West. Mass. is losing W1DPY to W4-Land. He will be moving to Johnson City, Tenn., where he will be teaching chemistry at East Tenn. State University. Best of luck to you, Bob. W1ZPB now has an HX-20 s.s.b. rig. K1VHO won honorable mention at the Worcester County Kiwanis Science Fair. K1PZR is with the Signal Corps at Jolon, Calif. W1HDQ, of ARRL, spoke on v.h.f. antennas at the BCARA. W1GKK, W1UUK, W1DGT, W1WF and K1JGW are whacking up some very fine DX totals. W1OBA has a new Heath receiver. K1DPP is on 6-meter s.s.b. As a guest of the Navy K1MEB has been seeing a few of the DX countries he has worked. RM K1IJV reports the following for WMN: 123 messages handled at the rate of .184 per minute. The following eight were the highest in attendance (arranged in order of attendance): K1IJV, W1DVW, W1BVR, K1ZBN, K1SSH, K1LBB, W1DWA and W1AMI. A few of my personal comments recently in this column have aroused the ire of one or two of our members. There is an easy way to avoid this. I am limited to a certain amount of space. When I don't get enough reports, then I shoot off my mouth. Get in those reports and I won't have enough room left for any personal comments. OK? Traffic: W1BVR 136, K1IJV 123, K1SSH 47, K1LBB 43, W1DWA 38, W1WIP 10, W1DVW 6, W1ZPB 3, K1VPN 2.

NEW HAMPSHIRE—SCM, Albert F. Haworth, W1YHI—SEC: W1TNO/W1ALE. PAM: K1APQ. Certificate endorsements: W1ET as OPS, K1ECU as OBS. Appointment: K1SHR as OES. Welcome to K1NMU and K1FMP to the AREC. The Granite State Phone Net meets on 3842 kc. (alt. 3845 kc.) Mon. through Fri. at 2330Z and Sun. at 1430Z. This net is progressing fine under the guidance of K1APQ. The net summer outing will be held in early June. K1SHC, in Lincoln, is looking for contacts in Southern New Hampshire on 2 meters. Welcome to WN1AJV and WN1BFV. W1ET, at Dartmouth College, has been licensed since 1917 as "1YB." After an absence of 23 years W1JB is now on 1810 kc. with 100 watts. W1TA reports a slight fire at the club house with W1RCC and an SWL putting same out with our good N.H. snow. W1ARR graduates this June from U.N.H. and his voice will be heard over WBCN. W1QHS and W1TFS compiled fine scores in the Feb. FMT. W1TFS and W1SWX/1 report a decline in violation reports as OOs. Keep your reports coming in. Certificate winners in last Decembers' Conn. Wireless Assn. N.E. QSO Party were: W1FZ 1st, W1SWX/1 2nd.

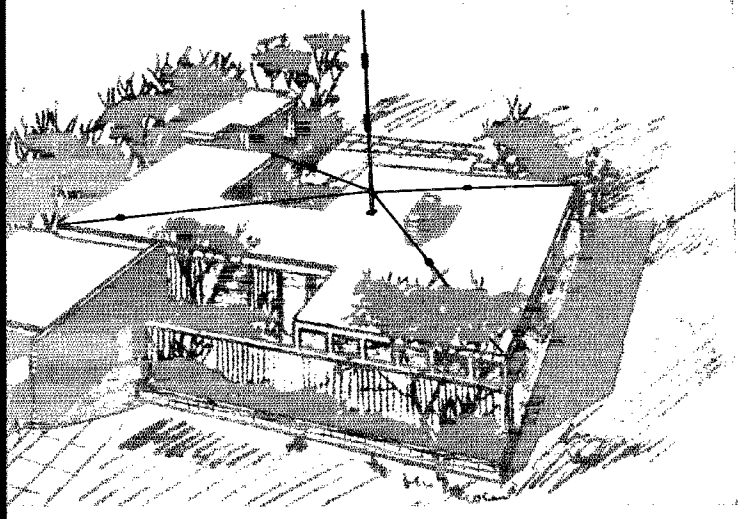
RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE. RM: W1BTV. PAM: W1TXL. New appointments: K1EZN as EC and K1EWL as ORS. RISPN reports 30 sessions, 547 QNI, 74 traffic. The NCRC Club, which meets the 2nd and 4th Mon. of the month for business meetings, announces that it will hold code classes every Mon. at 7 P.M. Visitors are always welcome to attend the classes and membership in the club is not necessary. WN1BLC, a new member, is active on 80- and 40-meter c.w. A prize donated by K1VPK will be given to the next NCRC member to make his General or Tech. Class ticket. A group of members are working to get four stations on the air for Field Day. Congratulations to K1MZS, who was named "Ham of the Year" at the ARRL Convention in Swampscott, Mass. K1LII has been very active in the c.d. Chet is the RO for Pawtucket. WN1BOF has just received his Novice Class ticket. The W1AG Club of Rumford expects to have all its members participating in Field Day activities. Traffic: W1TXL 527, W1BTV 60. WA1BJS 25, K1VYC 11.

VERMONT—SCM, E. Reginald Murray, K1MPN—All nets are operating on summertime schedules: Green Mt. Net on 3855 kc. daily at 2130Z; Vt. Fone Net on 3855 kc. Sun. at 1300Z; VTN on 3520 kc. Tue. and Thurs. at 2300Z. Don't forget International Field Day at Burlington Cliffside Country Club July 25-26. For more details contact Ray Minor, W1SCJ, RFD 1, Box 71, Williston, Vt. W1KJG is restoring a 1915 vintage spark transmitter. Welcome to new Novices WN1s, BLB, BMI,

(*Continued on page 136*)



What's New in Verticals?



Setting the pace in 10, 15, 20 and 40 meters is Mosley's new RV-4 vertical antennas. These outstanding performance giving antennas can now be mounted on any roof as well as on the ground. They operate as a quarter wave vertical antenna on all four bands. The RV-4 features the Mosley slim line Trap-Master traps that have earned user acclaim through daily use in tens of thousands of installations throughout the world. These antennas have automatic band switching for 10 thru 40 meters. The RV-4 antennas are self-supporting and completely factory pre-tuned to maintain low SWR over entire range. The RV-4RK kit for roof mounting includes radial wire mast and hinged mounting. No radials required for ground mounting if a good ground connection can be provided within a few inches of the antenna base. Maximum power rating 750 watts on AM phone, 1000 watts CW and 2000 watts P. E. P. on SSB, input to final amplifier, Uses single 52 ohm coax line. Antenna height 20' 8-5/8" above insulator, with roof mount 25' 2-5/8" Weight of antenna 10 lbs., with roof mount 14½ lbs.

(In request of further information write for literature code # (8)

Mosley Electronics, Inc. 4610 N. Lindbergh Blvd. Bridgeton, Mo. 63044

BNH, BNI, BNJ, BNK, BNL, BNM, BOA, BOB, BRY, BRZ, BSA and BSB. We regret to report W1-HCJ as a Silent Key. (Dick was W1EKU's son) FCARC's new officers: K1RMH pres.; K1WUZ, sec. trustee; W1-WVA, treas. CVARC'S new officers: K1MPN, pres.; W1-NDL, vice-pres.; K1HDB, secy.; K1OXD treas. The Green Mt. Net reported 705 check-ins for Apr. Vt. Fone Net had 105 and VTN had 43 with 18 pieces of traffic handled. Traffic: K1BQB 265, W1WFZ 40, K1UZG 16, K1LLJ 13, K1MPN 10.

NORTHWESTERN DIVISION

IDAHO—SCM, Raymond V. Evans, K7HLR—RM: W7EMT. W7GMC is back on TCC, PAN to CAN, so look for a good traffic report there. K7KBY will be leaving us for Illinois this summer. Frank's work in the section will not soon be forgtten, especially with the GEM Net, the Eagle Rock Radio Club and the W1MU Hamfest. The Magic Valley group has moved to new quarters in the old hospital building and is now sponsoring an Idaho Counties Award. Counties required are: Idaho stations 12, Continental U.S. stations 8 and all others 4. Address all inquiries to Magic Valley Radio Amateurs, Box 1176, Twin Falls. K7OAB is about ready to join The Sideband-ers. Net traffic: GEM Net 62. FARM Net 51. Traffic: W7GMC 97, W7EMT 91, W7DPD 53, K7CXG 24, W7FGM 23, K7HLR 22, W7GGV 17, K7OAB 2.

MONTANA—SCM/SEC Walter R. Marten, W7KUH —Asst. SCM/L.F. PAM: Dr. Marvin Hash, W7YHS. V.H.F. PAM: W7TYN. RM: W7FIS. Endorsements: W7-SEW and K7KME as EC's. Appointments: K7LUH as EC, K7SVR as OO. A Montana Mobile Emergency Corps is being formed. If interested please contact your SCM. Results of the Frequency Measuring Test: W7FIS 3.8, K7-OGF 4.3, W7NPV 1.8 (parts per million). Reports were received from K7PWY, K7EWZ, K7UPH, W7FIS, K7OGF, W7LBK, W7TYN, K7SVR and W7NPV. The following amateur publications were received: *Hi-Q News*, editor K7BYB; *Splatter*, editor W7YHS; *Hellgate Static*, W7-GBH. The 30th Annual Glacier Waterton International Peace Park Hamfest will be held July 18-19 at Apgar (Glacier Park). K7PUH moved to a new QTH. K7EWZ reports summer QRN in evidence with the bands much improved. WN7AGX is a new call in West Yellowstone. New officers of the Gallatin Amateur Radio Club are W7NPV, pres.; K7NIP, vice-pres.; W7ZHA, secy.-treas.; K7RGI, act. mgr.; K7EAK, trustee. K7IQI spent a week in Denver. W7NPV spent a week in Washington, D. C. K7DTW has joined the staff of Montronics. K7ELW is building a d.s.b. exciter. K7JBH was elected president of the National Honor Society (honor high school students). W7SMY has archery as a second hobby. He is also pres. of the Yellowstone Bowman Archery Club. Four stations in Billings are building 4-1000 A amplifiers. K7PKV is building an s.s.b. amplifier using a pair of 4-1000s. New 2-meter stations in Missoula are W7IPB, K7DHW and W7QZJ. Don't forget the W1MU Hamfest at Mac's Inn, Idaho, Aug. 7, 8 and 9. W7BOV is back in the mobile activity. W7WYG has a new s.s.b. mobile. W7FGZ made a trip to the West Coast. Traffic: K7EWZ 266, K7PWY 40, K7OGF 31, K7SVR 28, K7UPH 12. W7FIS 2.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7WKP. RM: W7ZFH. Nets, OSN, 3585 kc. 1830 PDT Mon. through Fri. AREC 3875 kc. 1900 PDT 7 days per week and regular NCS and alternates have been appointed. OSN Apr. sessions 22, attendance 153, high 10, traffic 65, high 15. BRAT awards to W7AJN, W7BVH, W7ZFH, K7IWD, W7JHA, newly-appointed ORS, is active on OSN, RN7 and PAN and is using a Ranger II and an HQ-170. K7DVK purchased some property on top of Mt. Scott, near Portland, and used it for a Field Day site. W7DEM reports three new Novices in Grants Pass, WN7ADT, WN7ADW, WN7ADX and W7ADF, ex-W4UHY. W7DPE is a member of Navy MARS. The regular monthly meeting of the Multnomah County AREC was held at the American Red Cross Blood Donors' Service Building with a tour of facilities and inspection of the proposed AREC station operation headquarters. W7RVN, EC for Multnomah County, is representing the AREC Steering Committee on the Governors Committee for Emergency Communications on a state-wide plan. W7AZD will act as alternate to W7RVN. Well, folks, that's all the news received this month. Traffic: W7DIS 523, K7IWD 277, W7ENU 242, W7JHA 182, W7ZB 119, W7ZFH 88, W7DEM 85, W7AJN 37, W7DPE 31, K7-SHC 13, W7KTG 4, W7MAO 2.

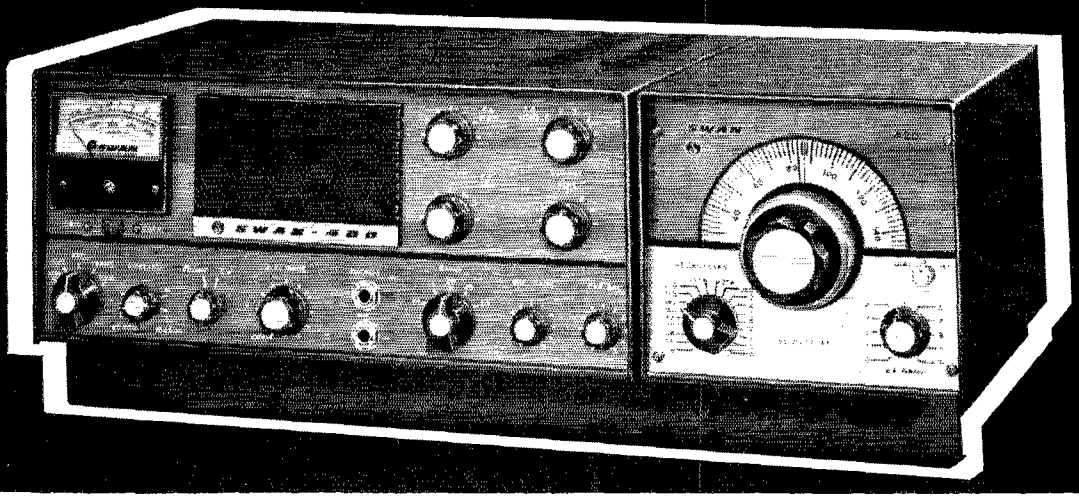
WASHINGTON—SCM, Robert B. Thurston, W7PGY —Asst. SCM/SEC: Everett E. Young, W7HMQ. RM: W7AIB. PAM: W7LFA. Some 350 attended the Annual Skagit Banquet at Bryant, Wash. Apr. 21. Director Roberts, W7CPY, and Vice-Director/SCM Thurston, W7-PGY, were in attendance along with two ex-Directors and one ex-SCM. Director Roberts also held a meeting in Tacoma with members of the Tacoma and Puyallup Clubs in attendance the following Mon. evening. The Bremerton area gang is boasting twelve new s.s.b. stations. K7VVB is waiting for his General Class license.

(*Continued on page 138*)

HERE IT IS! THE SPECTACULAR

NEW SWAN-400 SSB TRANSCEIVER

5 BANDS - 400 WATTS

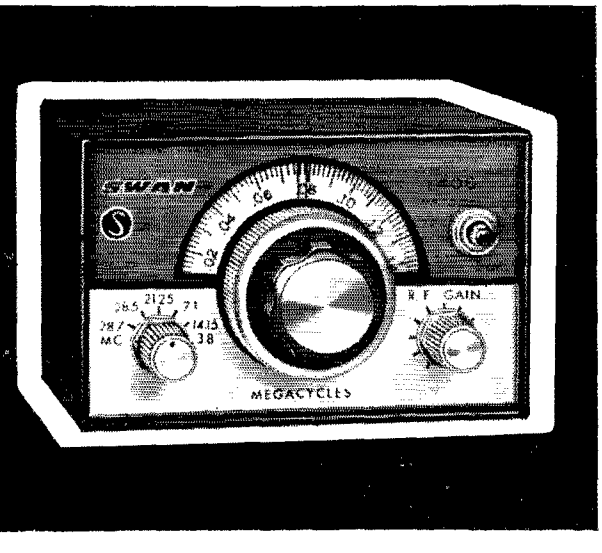


SWAN-400 SINGLE SIDEBAND TRANSCEIVER 400 watts P.E.P. input, 10 through 80 meters. Fixed station, portable, or mobile. SSB, AM, and CW.

$395

SWAN-420 FULL COVERAGE FREQUENCY CONTROL UNIT Highly stable transistorized VFO designed for fixed station operation. 20 ranges 200 kc each. Illustrated above as companion to SWAN-400.

$120



SWAN-406 MINIATURIZED CONTROL UNIT Provides phone band coverage. Designed for mobile installation. May also be used for fixed station. Highly stable transistorized VFO in a compact package.

$75

ACCESSORIES:

- AC POWER SUPPLY, MODEL 117B.....$ 85
- MOBILE POWER SUPPLY, MODEL 512 .....$145
- PLUG-IN VOX UNIT, MODEL VX-1.....$ 35

See your Swan Dealer for complete specifications.

SWAN ELECTRONICS CORP.
Oceanside, California

KØKFA/7 recently moved from Kansas and settled in Puget Sound country. K7VMH is installing a 68-ft. fold-over tower. We understand that the Spokane fellows soon will have a new meeting place, having been extended an invitation by a member of the American Red Cross to utilize a portion of the K. of P. Hall. W7YFO has a new TR-3 in the Buick. K7DED is about ready to fire up on f.s.k. K7PVO completely renovated his DX-60; he is Amateur Extra Class. W7OEB, K7KSF and K7ZRF were all very QRL with traffic from KL7-Land during the earthquake. K7RSM is looking for a good exciter. W7OIH has joined the Rock Hounds. W7AIB is recovering from bad bone bruises suffered while cranking down his tower during a wind storm that came up suddenly. He has been named chairman of the local interference and noise committee. W7AMC had a seige in the hospital but is on the mend now. WSN, 3535 kc., has moved to 0200Z with daylight time now in effect. K7SRI has a HQ-170. W7-UVR lost his beams during the big wind in Richland recently; he has received OO appointment. The Annual Walla Walla Hamfest will be held Sept. 19. You should plan to attend this very excellent get-together. Thirty-five turned out for the potluck party held Apr. 20 in the Walla Walla area. W7ZAW carries the big load in RACES for the Walla Walla gang. The Mount Baker Amateur Radio Club has been increasing its activities and building up membership during the past year. The NSN had 30 sessions, 399 QNIs and 127 QTC for the month. W7VI and his XYL spent three weeks in W6-Land. W7JC and W7AIB renewed their ORS certificates. Bob Murray, owner of the Dog House in Seattle, gave an "Alaska earthquake" testimonial banquet Apr. 10. W7PHO was the M.C. and introduced a number of the old-timers, some with two-letter calls. Traffic: (Apr.) W7DZX 1127, W7BA 1039, W7HMA 706, W7OEB 569, K7-JHA 537, W7APS 335, K7CTP 239, K7VDY 150, W7CZY 120, K7SRI 110, K7JRE 53, W7AMC 27, W7AIB 22, W7-BTB 18, W7EVW 11, W7JEY 3. (Mar.) W7HMA 449.

PACIFIC DIVISION

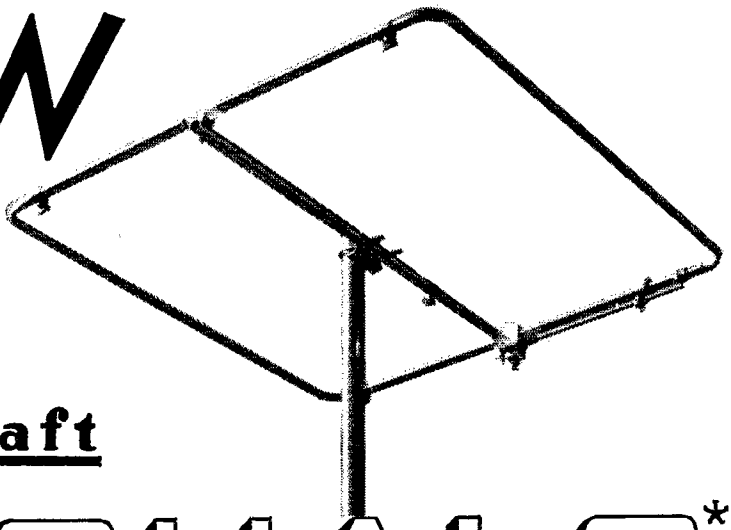
HAWAII—SCM, Lee R. Wical, KH6BZF—All members and ARRL field appointees are reminded to record their ZIP code with Headquarters. KH6LG is our newly-appointed EC for Kauai county. With deepest regret we note the passing of KH6EC, Ira, an avid radio engineer and fellow ham, served in many activities in HARC, CAP and was a fine reserve police officer. KH6FX and KH6AW had a nice eyeball chat recently. KH6FCN, ex-W7FBN, is secretary of our local AFCEA chapter. KH6-ESL and KH6EMA have left us for W4-Land. KH6AO and KH6CVA joined the AFCEA. KH6EWD and his XYL, Helen, went "holo holo" to Maui for the PTA Convention. Maui ARC's secy., KH6EXO, reports the 1964 officers are KH6AUM, pres.; KH6EXR, vice-pres.; KH6CIO, treas. KH6CRV started a crystal-etching class at Camp Smith ARC recently. KH6AFS has been reported over on the Kona side of Hawaii. WH6FJL is looking for some "midwestern states" on the low end of the 21-Mc. Novice band. KH6EWD reports the Poi Net will soon be in full swing again. KH6ATS vacationed on Maui. KH6-ACC is knocking off 40-meter DX with ease. K6QKL - KH6, OES, reports still no evidence that Echo II is doing anything for us here. Keep those reports coming. See page six for my address. Traffic: (Apr.) KH6BZF 6. KH6ATS 5. KH6EWD 1. K6QKL/KH6 1. KH6KS 1. (Mar.) KH6USA 1489.

NEVADA—SCM, Leonard M. Norman, W7PBV—K7NVB intercepted a message from WA4IYQ/MM aboard the USS *Alcoa*, who had found the Yacht *Dubloon* adrift, and passed the information along to the Coast Guard in Florida via W4MKX. K7ZOK is a new OES and has WAS and WAC on 6 meters from his old call, WO-FKY. K7RWN has a new TR-3. W4CJD/7 and K7SFN report FB signals on Nevada's C.W. 3660 kc. Net. WN7-WPQ lost his gear via a lightning strike. Through the efforts of W7RBV, K7UGE is about to get on RTTY. A new OBS is K7UDG. Nevada Centennial Certificate No. 125 was issued to your SCM, W7PBV. The NARA is considering ID badges for its members. W7CTK missed two days work because of handling Alaskan earthquake communications. The following stations handled Alaskan traffic: K7BIM, W7CTK, K7FER, W7OYQ, W7PBV, W7-PC, W7RBV, K7SKP, W7TAO, W7THH, K7TJV, W7TQE, K7UGE, K7VYT, K7YHR, K7YXX. Traffic: K7UGE 380, W4CJD/7 98, W7OYQ 57, W7RBV 42, K7OLQ 8, W7-PBV 4, K7YHR 4, K7YXX 2.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Edward T. Turner, W6NVO. SEC: WA6HVN. V.H.F. PAM: WA6RXB. The Santa Clara Valley Section Two-Meter Net activity is picking up, but still needs many check-ins. NCN section net activity remains high with several S.C.V. appointees active regularly. The new officers of the San Mateo Radio Club are K6ORP, pres., W6FOP, vice-pres.; W6UZA, secy.; W6UQ, treas. W6RSY has curtailed activity to about ½ of his

(*Continued on page 140*)

NEW



Cush Craft

SQUALO*

6-10-11-15-20 or 40 METERS

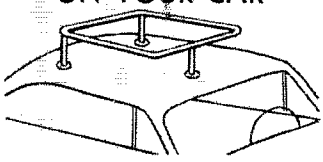
Cush Craft's continuing research produces another first —THE SQUARE HALO. Squalo is a full half wave, horizontally polarized, omnidirectional antenna. Outstanding all around performance is achieved through a 360° pattern with no deep nulls. Full size and compact dimensions provide a low Q for broad band coverage. Direct 52 ohm Reddi Match feed gives an SWR of 1.5-1 or less from 50 to 51 Mc.

The 6 and 11 meter Squalos are packaged complete with rubber suction cups for car top mounting and a horizontal support for mast or tower mounting. The 10-15-20 and 40 meter Squalos are designed for mast or tower mounting where space does not allow for larger antennas. Squalo is ideal for net control, monitoring, or general ham coverage.

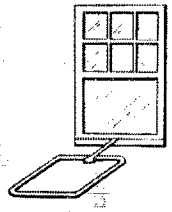
Whether you are a beginner, apartment dweller, or serious DX man the space saver Squalo is for you. You can buy one for each band and build a Squalo Tree!

Model No.	Description	Net Price
ASQ-6	6 meter 30" square	**$12.50**
ASQ-10	10 meter 50" square	**19.50**
CSQ-11	11 meter 50" square	**19.50**
ASQ-15	15 meter 65" square	**23.50**
ASQ-20	20 meter 100" square	**29.50**
ASQ-40	40 meter 192" square	**66.50**

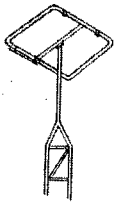
ON YOUR CAR



OUT A WINDOW



ON A MAST



*Pronounced Squaylo

Cush Craft

621 HAYWARD ST.
MANCHESTER N. H.

BUY FROM YOUR DISTRIBUTOR OR WRITE FOR FREE LITERATURE

usual until next fall, but still makes BPL with a high total. W6JXK awaits a BPL medallion and has been in the BPL for a full year now with high totals each month. W6ASH reports weekly skeds with the Oscar Worldwide Net, which includes VK2EO, UW0IK, KL7-DQD, XE1DOM, KH6UK, VK4TY, VR2DK, KG6AAY, W6WX, W1AW, K6GS and WA6JSA. K6DYX is active on RTTY and now working with a group in the Watsonville/Santa Cruz area on 432 Mc. W6PLS is now DXCC and active on several nets. W6DEF was the Field Day chairman for the South County Amateur Radio Assn. WA6UAM has built a new 6-meter rig which he plans to take east next fall when he goes to college. WA6RXB is doing a fine job with SCVSN and also on the Mission City C.D. Net. WA6HVN, SEC, attended a meeting of the Santa Cruz Radio Club and has suggested that the group affiliate with the Santa Cruz Red Cross Chapter, both for AREC work and a meeting place. Hal wishes he had more time for on-the-air activity. W6AUC is active as OO. K6YKG is active on NCN again and working on code speed improvement. W6WX is running bulletins for the Northern California DX Club. W6LFZ reports that the Hollister Emergency Net group was active in Field Day. K6MTX is spending most of his ham radio time on construction projects. The Santa Clara County Amateur Radio Assn. had a special dinner for National Amateur Radio Week which culminated in the club's participation in Field Day from Mt. Hamilton. W6UW also took part in the V.H.F. QSO Party, with K6HCP and WA6FCH making the arrangements. K6HEP is trying to arrange contacts on 1215 Mc. and has taken his General Class exam. Traffic: W6RSY 857, W6JXK 516, W6ASH 456, K6DYX 212, K6GZ 207, W6AIT 158, W6PLS 61, W6YBY 60, W6DEF 57, W6ZRJ 54, WA6UAM 41, WA6RXM 26, WA6HVN 24, W6AUC 17, K6YKG 6, K6LFZ 3, W6WX 3. (Mar.) W6WX 2.

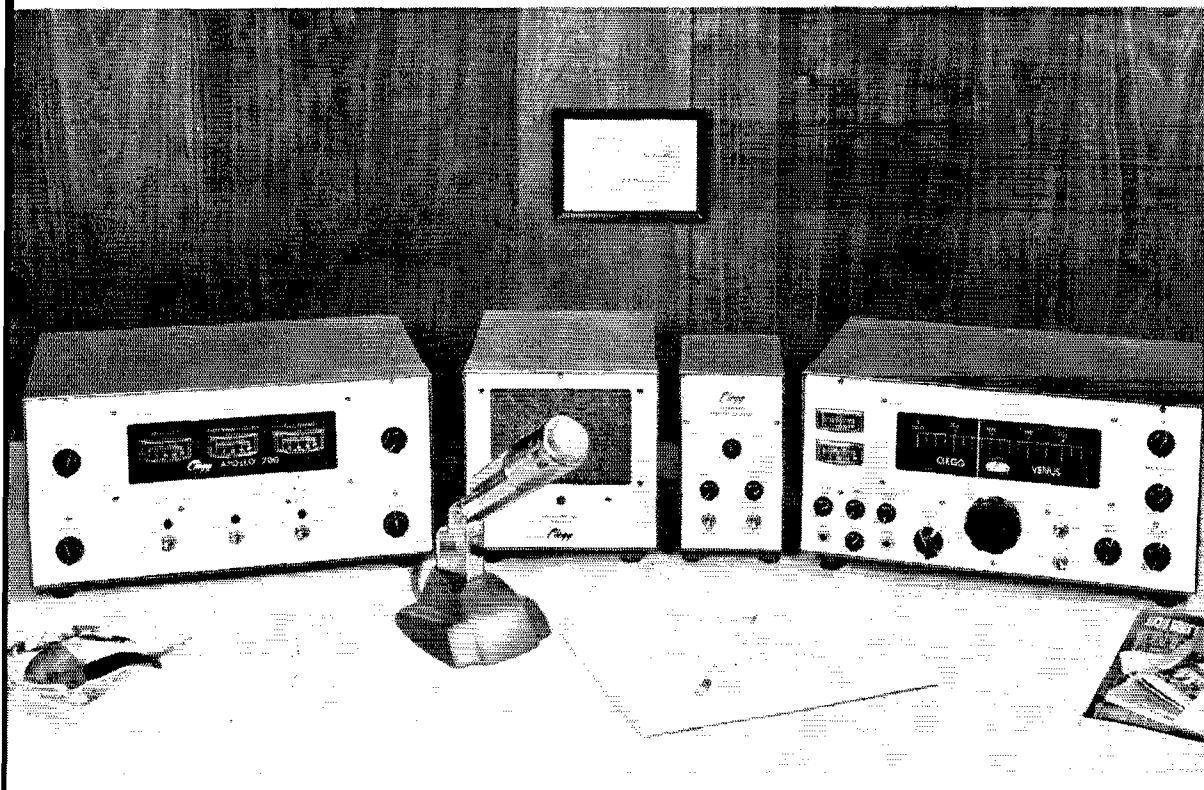
EAST BAY—SCM, Richard Wilson, K6LRN—On Apr. 17 SACEN/6 had a Hidden Transmitter Hunt and Drill. WA6GRO was hidden and was found by W6EZA first, WB6BHC second and WA6GUM third. K6PTN was a visitor. My apologies to the East Bay Radio Club especially on being omitted from the April listing of clubs. It is very much alive and kicking and meets the 2nd Fri. of each month at the Electronics Lab in the El Cerrito High School, Ashbury and Eureka Sts. About 40 hams and families attended the Mobile Breakfast at Pleasanton April 26. At the transmitter hunt held after breakfast WA6KLL was hidden and found first by WB6CBA. K6JHV has an SW-240. WA6PKF is EBRC EC and FD chairman. WA6ZPJ has homebrewed an all-band transceiver. WA6UQM picked up 17 new countries in the DX test for a total of 32. WA6MJP is QRL school work. WA6VAT is OBS on 145.665 Mc. at 0200Z. W6AR is active from San Lorenzo with a 2-A and a DX-60. The LARK toured the Oakland Airport control tower on Apr. 2. K6LRN, WA6ANE, WA6KLL, W6TYM, WB6JGA, WN6GUY, W6KG, KL7DTB/6, W6ICR, W6GIP, W6UGO, W6ZVV, W6LGW, W6EY and W6ZF were among those representing East Bay section radio clubs at the Director's meeting in Oakland Apr. 4. There are openings for all appointments. We especially need OOs and ORSs in Napa and Lake counties. If there is enough interest we could possibly start a slow-speed net this fall. Contact me or WB6JGA for further details. WB6JGA visited the MDARC and gave an excellent talk on the ARPSC and the NTS. K6GK attended the Pan-American Congress and also the convention at Guyamas May 28. K6TFT will be on RATT and hopes to start a 2-Meter RATT Net/-MARS. WA6NOV has his antenna up 45 feet now. New on 6 meters in the Napa area is WB6DEH and W6SJA is new on 2. W6LGW and W6RYC and their families spent Easter week on the Mojave Desert. K6IMV, W6LKE, WA6DKG and WA6QAZ assisted on an abbreviated trail ride Apr. 11. K6JZR is QNI two MARS Nets and NCN. WA6YAL, WB6AUF, WA6ZPJ, WA6WNG, WB6APK, WA6ZTY, K6ZRY and WA6PKF were active during the Alaskan emergency from W6CUS for the Red Cross at Berkeley. The station was set up at the QTH of WA6YAL and handled 952 pieces of traffic in six days of operation. All are members of the EBRC. Traffic: W6CUS 942, WB6JGA 516, K6GK 110, K6TFT 37, K6JZR 14, WA6-FBS 8, K6LRN 6.

SAN FRANCISCO—SCM, C. Arthur Messineo, W6-UDL; K6CWP—SEC: W6KZF, W6YKS, an old faithful from Fortuna, is now ORS. K6TZS and W6CYV have moved from So. Calif. to Eureka. Reports on the Crescent City and Alaska disaster still keep coming in and are being sent to Hq. WA6WPO is having a ball with his new Ranger-Courier combo and WN6FUD with his DX-60 is doing FB on 80. W6CYV, a DXCCer, is now in McKinleyville. Listen to W6SG on Sunday A.M. The San Francisco Radio Club was fortunate in getting W4-BPD as a speaker at its May meeting. WA6QXV will be on again from a new QTH. WB6GVI has been getting in quite a bit of DX lately. Our SEC's quote of the month: The Alaskan disaster demonstrated a decided lack of training in message-handling. Learn

(Continued on page 142)

SIX METER SIDEBAND . . . with POWER

Clegg



YOU HAVE HEARD THE VENUS—the cleanest six meter sideband signal on the air—and now a new dimension is added . . . *POWER*. With APOLLO 700, the new Clegg six meter linear with integral power supply, seven hundred—plus watts PEP input makes that VENUS signal a real standout. Top that off with the Clegg SS BOOSTER—the latest Squires-Sanders development in outstanding amateur communications gear—and you have the hottest six meter sideband rig imaginable!

The VENUS, APOLLO, SS BOOSTER and the 416 VENUS AC POWER SUPPLY/SPEAKER are matching units—in performance *and* in styling. These are just a few of the "plus" features that result from years of successful Clegg experience in the design of VHF equipment:

VENUS: Standard Frequency Range, 49,975 to 50,475 KC; **Receive:** Nuvistorized front end for maximum sensitivity; 9 MC crystal lattice filter in both receive and transmit mode; Receiver offset tuning ± 1.5 KC; Peak noise limiter for AM adjustable threshold limiting SSB/CW; 10 KC per knob revolution tuning ratio; Slow AVC release especially designed for 6 M SSB; **Transmit:** 85 watts PEP input—all modes (AM, SSB and CW); 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 100 cycles/hour after warm-up; Broad band circuits throughout provide maximum simplicity and ease of tune-up. Physical dimensions are just right for fixed installation or mobile—15″ wide x 7″ high x 10½″ deep—21 lbs. Available now.

APOLLO 700: Six meter linear amplifier—Power input 700 watts PEP with 10 watts of drive; Final tubes type 8236; Integral power supply; Three illuminated meters—Grid Current, Screen Current or RF output, and Plate Current; Instant Exciter/Linear selection when used with VENUS. Cabinet identical in size to VENUS. Available in July.

SS BOOSTER: An unusual new Squires-Sanders development—details forthcoming.

VENUS 416 AC POWER SUPPLY: Attractively styled power supply/speaker combination to power the VENUS. Available now.

AMATEUR NET PRICES: VENUS, $495; 416 AC SUPPLY, $110; APOLLO and SS BOOSTER to be announced.

Keep in touch with your distributor or write for further detail.

Squires-Sanders, Inc.

475 WATCHUNG AVENUE, WATCHUNG, N.J. • 755-0222

proper message form and remember if you are not having your landscape rearranged by a flood or earthquake or your house isn't on fire, the best thing to do in an emergency is Shut Up and Listen. End quote. Does anyone listen on 10 lately? Why not use that ideal band for those local ragchews and help relieve some 40- and 80-meter QRM. The QCWA, No. Calif. Chapter, held its Annual Picnic at Adobe Creek Lodge, Los Altos, June 14. The s.s.b. and c.w. nets on Sun. mornings show an ever increasing number of QCWA check-ins .Traffic reports continue to be slow in coming in. Wish you fellows would mail them in a little earlier so that they could be listed and we could show how much traffic is really handled by this section. WA6IVN now has an RME-6900 receiver and likes it. His dad, WA6IVM, will return from his trip to Japan accompanied by JA1DCY, who will enter the Utah State College. Mother Margaret Reilly, a cloistered nun at Women's College, was aided by our ARRL, WA6IVM and VE7BBB in her appeal for help in regaining her WA6BAO call. She is a grand lady, just 70 years young, and formerly of W9-Land. Traffic: W6YKS 279, K6SAA 13, W6UDL 10, WB6GVI 7, WA6IVM 7, K6ALI 4.

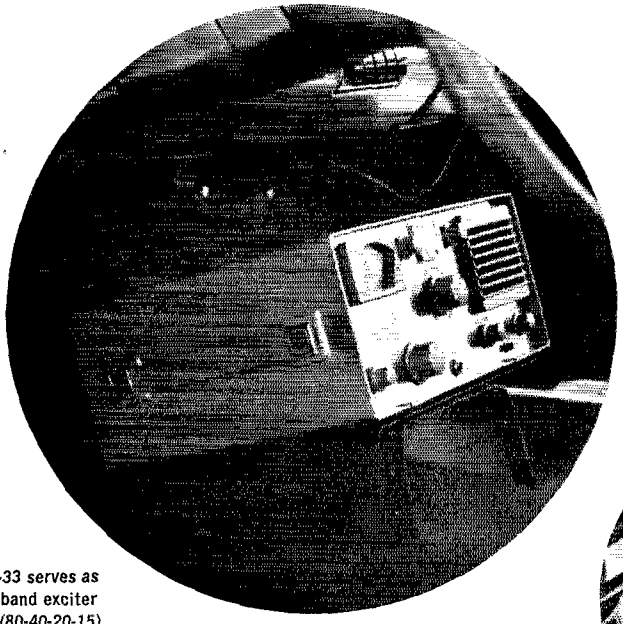
SACRAMENTO VALLEY—SCM, George R. Hudson. W6BTY—Asst. SCM/SEC: Mary Ann Eastman, WA6HYU. W6ESZ, McClellan Amateur Radio Society prexy and chairman of the Pacific Division ARRL Convention to be held in Sacramento at the Hotel El Dorado Sept. 25-26-27 extends a cordial invitation to all to attend. WB6BHJ has formed the Amateur Radio License Club at Mira Loma High School and is instructing in code and theory. The Yolo Amateur Radio Club, via WA6YKR, reports that WB6GGH has been appointed net mgr. for YARC on 2 meters; WA6IUM is building a 3-400 linear; WA6BLN has an SCR-522 on 2 meters; WA6KJQ is building an all-mode all-band rig; WA6BXW is building an s.s.b. rig; WB6EAG is proud of his new "console installation" using an HT-37 w/warrior linear and an HQ-180 and high tower and beam; WA6EHC is using a homebrew 4-400 linear on the low bands; W6CQA is converting Shawnee six to Pawnee two and WA6VAY is sporting new SX-115, HT-32B and HT-33A linear. WA6YKR has 2 and 6 transverters on the air along with the new S/Line. WA6SFD has been appointed Area Coordinator (Sacto.) Navy MARS with WA6YKR assisting. WB6GGH and WA6MMO installed a new 2er and 6er in Curly's car for his vacation trip to the Portland, Ore. area. The Sacto ARC (downtown club), W6AK toured KCRA radio and TV studios as part of a recent meeting. A "big" vote of thanks is accorded K6HHD and W6GDO for their past six year's devotion as NCS for the Sacramento Valley 2-Meter C.D. Net. The new NCS of the Sacto. Valley C.D. Net is W6RSZ. K6IKV reminds all that the Sacto ARC 2-Meter Net meets Tue. at 9 P.M. (PDT). WA6KFN, of the Sacto. ARC, is to be complimented on the fine work he has done in turning out a crew of efficient operators through his code and theory classes. W6IJK, Sacramento Aerojet ARC 2-10-meter nets can be found Tue. 145.000 Mc. 7.30 P.M. and 29.000 Mc. at 8.30 P.M. Jeff Kingston, Sacto Valley's newest OBS and OO would like to hear from Lake Tahoe area hams interested in forming a club. W6WLI still is trying for DX with RTTY. WB6CIN of the new Oroville ARC, handled 4 pieces of emergency traffic on 40-meter c.w. from KL7DTK. W6WGO says he is on MTN at 1900 on 3854 kc. W6RHC, the Golden Empire Amateur Radio Society C.D. Net meets on 1920 kc. Mon. at 8 P.M. and has 3 new members. WN6BPY, L. F. Stewart and Warren Connell. W6SYX provided emergency communications for skin divers who were searching the Sacramento River. W6TKE is building a kw. linear with 4 each 811s. K6BMU has put the rig on 1920 kc. and K6PRR has been instrumental in establishing a 6- and 2-meter c.d. net complete with base stations, mobiles and repeaters in Plumas County. W6VKL, of El Monte, is now living in Paradise. The GEARS provided mobiles, monitors, etc., for the Tach Watchers Club trials at Vina, Calif., on 1920 kc. Traffic: W6WGO 94, WB6BHJ 46, WB6CIN 8, W6IJK 4.

SAN JOAQUIN VALLEY—SCM, Ralph Sarovan, W6JPU—K6GZN is EC for San Joaquin County. K6CPQ and K6RBB were heard handling many messages during the Alaskan earthquake. WA6FBL has automatic equipment for code practice sessions and is on 50.346 Mc. Anyone interested in learning the code, contact Len. The Delta ARC is thinking of putting up a high-frequency repeater station. The Delta ARC meets the 3rd Fri. of every month at the Junior Museum, 1305 Occidental Ave., Stockton. WA6ILA built a 6-meter superhet for mobile use. The Delta Area Traffic Net meets every Thurs. at 8:30 P.M. with K6MGV as NCS. WB6DNI has an SBE33. WA6TZJ is heard on 75-meter s.s.b. WB6FKA is on 75-meter s.s.b. W6JPS has a 75-A4 receiver. W6ADB has a new 52-ft. power pole up with a 2-meter beam. W6ARE reports that the V.H.F. Net meets Sun. at 10 A.M. on 145.62 Mc. and welcomes stations to check in with on Sun. W6JXY painted the Fresno Amateur Radio

(*Continued on page 144*)

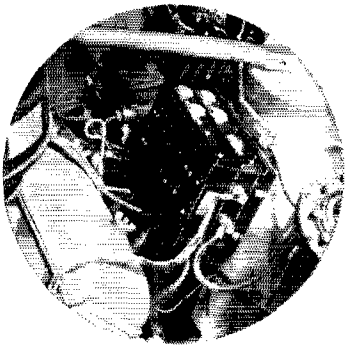
1000 WATTS..WITH WHEELS

The mobile SSB kilowatt . . . once rare indeed, special and costly . . . becomes easy to achieve, and economical too using only standard SBE units. This is **advanced** equipment, sophisticated, in which transistors and diodes replace vacuum tubes in all low-level applications including the outstanding receiver. Current drain is reduced . . . **substantially.** Equipment size is scaled down materially. And these exclusive SBE transistorized designs reduce selling price by eliminating duplicate parts and wiring through the use of bi-lateral circuits that operate both during transmit and receive. Using these big-value items—SB-33 for the exciter and SB1-LA for the linear, a KW (p.e.p. input) fits handily into the family car . . . and space-wise, the family will never know the difference! See below how W6JPM did it.

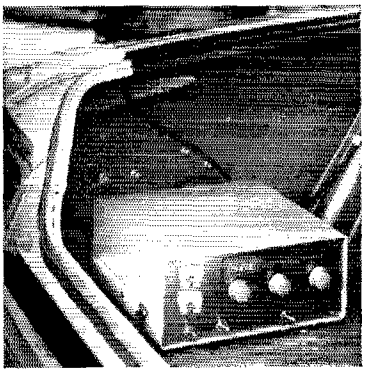


SB-33 serves as 4-band exciter (80-40-20-15) Note how little space it occupies

Band-spanner "top-sider" antenna with one of the new "gallon" coils, tops off this powerhouse on wheels.



Power supplies, SB2-DCP for SB-33 and SB-3DCP for SB1-LA are tucked into engine compartment.



The SB1-LA 4-band linear occupies modest space in a seldom-used corner of the rear trunk.

SB-33 . . . . . 389.50

SB1-LA 279.50

Please send SBE full-line catalog describing all units used in the mobile KW.

SBE

SIDEBAND ENGINEERS

317 Roebling Rd., So. San Francisco, Calif.

RAYTHEON

Export sales:
Raytheon Company, International Sales & Service, Lexington 73, Mass. U.S.A.

NAME

NUMBER STREET

CITY ZONE STATE

Club's 22-ft. trailer. It is loaded with 2-, 6-, 20-, 40- and 80-meter rigs and is in operation. W6CUA has been appointed OBS. W6NCG is getting settled in a new QTH and is back on 2-meter f.m. K6PPI is having problems in his mobile rig; fuses won't stay in. W6OWL is heard on 2-meter f.m. K6SEV is building a converter for mobile work. Don't forget that the Fresno Amateur Radio Club meets the 2nd Fri. of each month in the PG&E Building. Traffic: W6ADB 188, WA6VPN 38, W6ARE 12.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RM: WA4FJM. PAM: W4AJT. V.H.F. PAM: K4MHS. The Mecklenburg ARS recently elected new officers as follows: W4FHI, pres.; W4OTW, vice-pres.; K4KFR, secy.; K4SFI, treas. W4RWL has returned to NCN after a stint in the Army plus wedding bells, and says he is surprised and impressed by the way NCN operates now as opposed to 1950-'54. WA4FFW says Alamance County has a real fine AREC program with active nets on both h.f. and v.h.f. Congratulations to WA4ICU on being inducted into the National Junior Honor Society. K4MPE says his DXCC score with 75 watts is now 200/191. WA4ANH is now located in his new QTH with all antennas up. W4BAW, net mgr. of CCEN, spent several weeks in the hospital. We are real proud of our newest NTS net, NCSSBN. It is an up-and-coming group of netters and what the members lack in age and experience is compensated for in their eagerness and desire for public service. Net traffic: NCN (E) 347, NCN (L) 100, CCEN 84, THEN 63. Traffic: (Apr.) W4LWZ 257, WA4PDS 174, W4EVN 135, W4IRE 112, WA4ICU 97, K4YYJ 91, WA4FJM 81, WA4EIS 80, K4CDZ 75, WA4ANH 55, W4BNU 50, WA4KDZ 45, W4FDV 34, K4EO 29, W4BAW 24, W4RWL 12, W4MUP 11, WA4LWE 10, WA4JCS 9, K4MPE 8, K4ODX 7, K4QDO 7, W4AJT 2, WA4EYA 2. (Mar.) W4COJ 21, W4MUP 18, K4ODX 11.

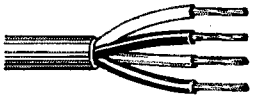
SOUTH CAROLINA—SCM, Lee F. Worthington, K4HDX. SEC: W4BCZ. RM: K4LND. Nets: C.W., 0000Z and 0300Z, 3795 kc.; A.M., 0000Z, 3930 kc.; S.S.B., 0000Z, 3915 kc. The Blue Ridge ARC is to be congratulated on its fine hamfest held May 3 in Greenville. Over 450 were in attendance despite bad weather that morning. The S.S.B. Net held its meeting in Greenville on May 2, during which K4LNJ was elected as the new net manager. New appointments: WA4LPX, as ORS; W4PNZ, as EC Florence County; K4SMP, as EC Pickens County. W4JA has just completed a new compact 100-watt c.w. transmitter for 80,40,20 and 15 meters. Hope to see it in *QST*, Gil. W4UEV had the honor of presenting the Merit Award for the best monthly article in *QST* to W4JA for his "Black Box" article. Again, congratulations, Gil. W4FFH is the new net mgr. of the S.C. AREC Net. *Bulletin*: W4PED, Charlie Wright, has been elected SCM for South Carolina as of June 27, 1964! April net traffic: C.W. 138, S.S.B. 127. Traffic: K4LND 185, WA4PFQ 105, WA4JHD 50, WA4LPV 26, WA4LPX 20, K4OCU 20, W4NTO 10, W4JA 7.

VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM and SEC: H. J. Hopkins, W4SHJ. RMs: K4MXF, WA4EUL, W4SHJ, W4QDY. PAMs: W4JMA, W4DKP. Each month brings reports of increased activity by Va. Co. hunters; W4OWE reports on an Expedition to Page Co. (15 QSOs); K4SDS says "we have put 6 rare counties on the air and more are scheduled;" K4SDS received ODA—all c.w.! K4MYO received the USA-CA Award; W4JUJ snagged 2 new counties and worked in both the c.w. and phone CD Parties. Va. Section Area 4 really is active with assistance to the Polio Op. A nice report was received from Claire Bardon, W4TVT (the XYL of W4RHC Area 4 Coordinator) pertaining to Operation Sugar Club; W4ZMT reports 10 hours in this event; W6GGR/4 furnished communications for 2 clinics (of 29 total) by mobile on 29.05 Mc.; W4JXD aided in Operation Crew Races on the Potomac River; K4NOV worked fixed 6-meter ARPSC in Fairfax Co. He operates 10 and plans 2 meters soon. Ethel, K4LMB, provided mobile communications to 3 schools during sugar cube—also is having fun with a new TR-3 at the home QTH. W4BGP now is operating F1 (RTTY) crystal-controlled on 3618 kc. and XYL WA4BVE is busy with the jr. operator and fixin' up a new QTH.

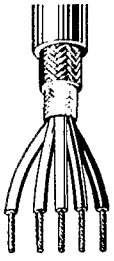
(Continued on page 146)

Belden Wire and Cable for every ham application

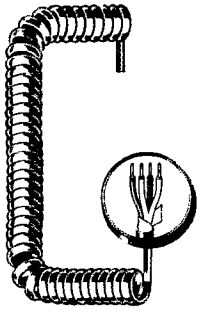
service rated—quality controlled easy-to-use packaged lengths



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.

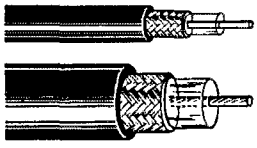


Power Supply Cables. Provide dependable service as power supply cords, interconnecting cables on electronic equipment, remote control circuits, special press-to-talk microphone circuits, and other ham applications. Designed for long service life with excellent mechanical and electrical characteristics, and uniform quality. Special jacket offers maximum resistance to abrasion and ozone.

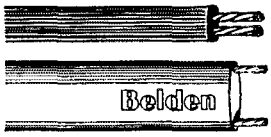


Coiled Microphone Cable. Provides low impedance for mobile microphone applications. Black neoprene jacket remains flexible at low temperatures. Available with or without shielded conductors.

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.

Belden
WIREMAKER FOR INDUSTRY
SINCE 1902 – CHICAGO

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

The LARC had Division Director Anderson as a guest speaker at its April meeting—4th year in a row. W4DLA reports earning his 2nd 55-w.p.m. certificate (CWA). K4PXY missed out somewhat by his stay in the hospital; reports a Utica 650 on 6 meters and an NCX-3 in the car. WA4EUL likes the job of managing the VSN and getting off to a good start. WA4FCS still is having modulator trouble. W4MXU is working on a new shack. W4RHA hopes to spend more time on the air if health at home improves. Ye ole SCM yearns for more on-the-air time. Two stations made the BPL—W4DLA and K4SDS. Traffic: W4DLA 505, W4DVT 367, WA4EUL 298, K4SDS 201, W4RHA 165, W4JMA 151, W4SHJ 132, WA4FCS 118, K4FSS 115, W4MXU 109, W4TE 105, W4DKP 95, W4OKN 95, WA4KTZ 83, K4KDJ 74, W4NLC 74, WA4FSC 72, W4ZMT 63, WA4GWD 58, W4BZE 57, WA4JRY 42, K4PXY 40, WA4KVR 36, W4WO 35, K4ISM 27, W4OWE 27, W4QDY 27, K4KNP 25, W4JUJ 20, K4LMB 19, W4BGP 18, W6GGR/4 17, W4JXD 17, W4LK 17, WA4SHD 17, K4NOV 15, WA4HQW 14, W4MK 12, WA4BVE 10, K4IIP 8, WA4IVM 8, W4ZAU 6, K4MYO 5, W4OWV 5, K4BAV 3, K4YZT 3, W4KX 2.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA. PAM: K8EPI. RM: K8HID. Net operations are on 3570, 3890, 3903 and 3905 kc. Congratulations to the KERA Amateur Radio Club of Ravenswood on becoming affiliated with ARRL. Present officers are K8RXZ, pres.; WA8AUW and WA8BTL, vice-pres.; WA8CTO, secy.-treas. The Club station call is WA8CKE. The Northern Panhandle ARC is working on direction-finders for transmitter hunts as a club project. WA8CRW reports for the S.S.B. Net, 21 sessions, 390 stations, 9 messages handled. WA8DGE and WA8FIC continue to show the "ole timers" how to handle traffic. K8TPF reports the PON held 21 sessions, 257 stations, 178 messages. W8IRN is very active with ARPSC work in Kanawha Valley. K8EPI reports for WVN phone, 22 sessions, 514 stations, 71 messages. K8QYG received Worked All Counties WVA (WACWV) certificate No. 40. The MARA and KRC are planning a joint QSO Party. See next month's *QST* for details. WA8BUM has a new HQ-180 receiver. W8DUV, W8DUW and K8EEJ are active in RTTY work in Huntington. W8DIE and W8DFC renewed their ORS appointments. My sincere thanks to all for their help in making the Sixth Annual ARRL State Convention a success. Traffic: WA8DGE 263, WA8FIC 194, K8TPF 120, K8VIP 26, K8CHW 25, W8HZA 21, K8EPI 20, W8CKX 17, K8ELH 17, W8JM 16, WA8HPQ 13, W8DUV 10, WA8CRW 9, W8IRN 4, K8DYB 2.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crompton, KØTTB—The Colorado HNN had the third largest number of check-ins during April that it ever has had. We are real proud of the regular check-ins and the way they are sticking through these spring months. Ordinarily the check-ins drop off during April. However, we do know that the left-over traffic from the Alaska quake and the Wichita Falls tornado helped to keep up the flow of traffic and the interest in the net. WØGWK lost his mother during April. Our condolences, Ray. The HNN is getting more representation from neighboring states lately. We are now represented by several regular check-ins from Wyoming, Nebraska, Utah and Montana. The following stations checked in 90% or more of the April sessions: WØBES, WØCBI, WØCYG, WØEYX, WØGNK, KØKJN, WØLYV, WØYQ. Thanks for excellent cooperation, gang. We are sorry that WØHJL is not feeling well. We understand her illness is quite serious. Our hopes for a quick recovery, Kayla. We would like to see all the members of the High Noon Net at the Moon Valley Hamfest June 5, 6, 7. Contact KØKUP. Net traffic: Columbine Net 358, HNN 268. Traffic: KØZSQ 195, WØHXB 161, KØDCW 125, WØSIN 38, WØCBI 14, KØSPR 5.

UTAH—SCM, Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson, W7OCX. SEC: W7WKF. Volunteers are needed at the Utah State Library, Division for the Blind, to read *QST* and other technical publications on tape. This is an extremely worthy project and we need your help. W7LQE has installed a ten-element 2-meter beam. K7TEO is now on s.s.b. with a Marauder and loaned his DX-60 and v.f.o. to WA7AID. Traffic on BUN has held up despite poor band conditions. Much of the credit on BUN should go to WAØAMA, K7QGW and others for their help in relaying traffic. W7POU kept 34 skeds in April with stations looking for Utah. K7RAJ took part in the Feb. FMT. I regret to say that I must resign as Utah SCM to accept a teaching position in Maryland. Nominations for a new SCM must be on file at ARRL Headquarters before July 15. Traffic: W7LQE 281, W7OCX 64, W7VTJ 63, W7QWH 16, K7TEO 8.

(*Continued on page 148*)

GONSET **SIDEWINDER**
TRANSCEIVER **Model 900A**

SOLID STATE "SCOOP" FROM GONSET!

FIRST AND ONLY TRANSISTORIZED SSB-AM-CW TRANSCEIVER FOR MOBILE, PORTABLE AND FIXED COMMUNICATIONS

The totally new Gonset Model 900A *Sidewinder* is the first and only transistorized SSB-AM-CW transceiver (except mixer, driver, final stages in transmitter) to provide complete coverage of the 2 meter amateur band in 4 segments 1 MC wide. Yet it's so compact it fits quickly under the dash of the newest cars! Transistor design makes possible a primary power requirement in the receiver of less than ½ amp! Separate power supply accessories snap-fasten jiffy-quick to back of transceiver, or may be used for remote installation. Here's the trouble-free, solid state transceiver with power to spare for any fixed, portable or mobile application!

For complete information, visit your Gonset Distributor, or write Dept. QS-7.

CHECK THESE HIGH-PERFORMANCE SPECIFICATIONS:

TRANSMITTER: Transistorized (except for mixer, driver, final states) • **Frequency Range:** 144-148 MC • **Power Input:** 20 watts PEP SSB, 6 watts AM, 20 watts CW • **Spurious Suppression:** —50 db • **Carrier Suppression:** —50 db on SSB • **Unwanted Sideband Suppression:** —40 db • **Stages:** 3 stage MIC Amplifier; 15 MC Mixer • **Diodes:** 2 Balanced Modulator; Meter Rectifier • **Tubes:** 6EA8 Doubler, Mixer; 12BY7A Driver; 6360 Power Amplifier

RECEIVER: All-transistorized • **Frequency Stability:** Highly stable; utilizes same VFO as transmitter • **Sensitivity:** ½ microvolts or *better for 10 db* $\frac{S}{N}$ • **Selectivity:** *Lattice crystal filter for both* receiver and transmitter • **Audio Output:** 3.0 watts • **Spurious Suppression:** —50 db or better • **Image Rejection:** —50 db (receiver and transmitter utilize double conversion) • **Stages:** RF; Mixer; Doubler; 9 MC Mixer; 2 9 MC IF; SSB, AM, CW Detector; Audio Driver; Push-Pull Audio Output • **Diodes:** AM Detector; AGC Detector; RF Gain Control

TRANSCEIVER: 9 MC BFO; 15 MC IF; High Frequency Crystal Oscillator; VFO; VFO Regulator; AGC; 9 MC IF • **Dimensions:** 8⅞" W., 4⅞" H., 7⅜" D. • **Wt.:** 10 lbs.-8 oz. • POWER SUPPLY: **Dimensions:** (AC or DC) 8⅞" W., 4⅞" H., 5¹⁵⁄₁₆" D. • **Wt.:** 13 lbs.-8 oz.

PRICE: TRANSCEIVER: $399.50 Amateur Net; POWER SUPPLY: AC—$67.75 Amateur Net • DC—$79.50 Amateur Net

ALTEC LANSING CORPORATION

GONSET, INC.

ALTEC LANSING CORPORATION
LTV *A Subsidiary of Ling-Temco-Vought, Inc.*
1515 S. MANCHESTER AVENUE, ANAHEIM, CALIFORNIA

NEW MEXICO—SCM, Newell Frank Greene, K5IQL—Asst. SCM: Kenneth D. Mills, W5WZK. SEC: K5QIN, K5RWB, star OO, finds harmonies in his own family! His wife, K5KSP, presented him with a 7¼-lb daughter, Gail. Our RM, W5ZHN, has been in the hospital. W5MVP has been appointed as an OO. Ken Mills has consented to take the job as Asst. SCM for Albuquerque. Duke City members may find it convenient to pass information to the SCM via Ken. W5LWR, ex-W7LWR, is now on s.s.b. Walt says this took fifteen years, but he made it. W5ROH has been appointed EC for Artesia. W5QKA assembled an electronic organ kit and reports it intercepts shortwave signals in a big way. We still are looking for an active PAM for v.h.f. Don't forget the Annual Picnic at Clouderoft Aug. 16 and the Rocky Mountain Division Convention at Estes Park in July. Traffic: (Apr.) W5CRF 121, WA5DUH 24, K5HTS 9. (Mar.) W5ZHN 51.

WYOMING—Acting SCM, Wayne M. Moore, W7CQL—RM and ORS: K7QYG. OBS: K7TAQ. Nets: Pony Express, Sun. at 0800 on 3920 kc.; YO, Mon.-Wed.-Fri. at 1830 on 3610 kc.; AREC, Mon. through Sat. at 1230 on 3920 kc. The first 6-meter opening for Wyoming was observed this spring on May 5 and the boys are awaiting further v.h.f. openings and activities. K7YPT is the new EC for Goshen County. The Casper Amateur Radio Club enjoyed the ARRL film "Radio Waves" the first part of May. Another reminder: The annual Wyoming Hamfest will be held in Cheyenne Aug. 22 and 23. Direct any hamfest inquiries to K7-NQX, Box 52, Cheyenne. Fortunately I heard of no beams or antennas blown down during the severe wind storm the latter part of April. Traffic: K7IAY 69, W7DXV 52, K7VTM 26, K7ITH 21, K7SLM 12, K7-LOH 11, K7OVD 8, K7AHO 6, W7AEC 5, W7BKI 4, K7MAT 4, K7OWT 4, W7YWE 2, K7IKO 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—SEC: W4NML. RM: WA4EXA. PAMs: K4BTO, K4NSU and K4WHW. WA4GLX is the new AENT net mgr. K4BTO won the citizenship award at the Birmingham Hamfest. WA4KNH is on s.s.b. K4HAL is the new AENJ mgr. K4FZQ and K4OIN won prizes at the Montgomery Hamfest; W4FBX and K4KQH won prizes at Birmingham. The Tuscaloosa Club's bulletin is called *Shack Yak*. New equipment: W4YRM, a 2 meter rig; K4AYF and K4WHW, 6ers; K4UVF a TR-3; K4NXC, a 99er; WA4CIE an NCX-3; WA4OGQ an ATI and an HE61 v.f.o.; W4UZZ an HT-37. April net reports (times in GMT):

Net	*Freq.*	*Time*	*Days*	*Sessions*	*Avg. Tfc.*	*Avg. QNI*
AENB	3575	0100	Daily	31	5.7	9.7
AEND	3725	2200	Mon.-Sat.	23	1.3	7.4
AENM	3965	0030	Daily	30	3.8	54.
AENO	50.55	0115	Tue.-Thurs.-Sat.	10	2.1	95.
AENP	3955	1230	Mon.-Sat.	26	3	16.
AENP	3955	2400	Daily	36	2	24.6
AENR	50.55	0115	Wed.-Fri.	9	1	28.
AENT	3970	2230	Daily	29	1.14	9.1

The Huntsville Club won the SCM award, K4CFD the RM trophy and K4WWN the PAM trophy. Traffic: (Apr.) WA4AVM 303, WA4EXA 195, W4NML 166, K4-WOP 95, K4AOZ 82, K4WHW 82, K4BSK 45, K4NUW 34, W4YNG 32, K4KJD 29, K4NSU 17, WA4EXB 15, WA4HFE 11, K4BTO 10, WA4IGV 9, W4YRM 9, W4-CIU 7, K4JDA 7, K4GXS 6, K4ANB 5, K4FZQ 5, K4FQF 4, W4KCQ 4, WA4MGI 4, WA4HGN 3, WA4-OGQ 3, K4RIL 2, WA4CWI 1, WA4FWP 1. (Mar.) WA4OGQ 6, K4WSS 3, W4NET 1.

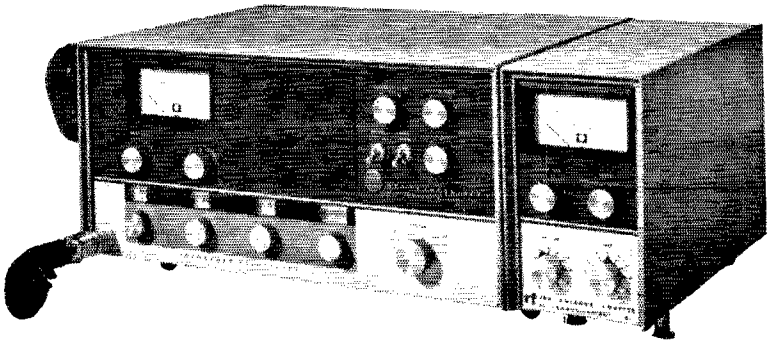
EASTERN FLORIDA—SCM, Guernsey Curran, W4GJI—SEC: W4IYT A.M. PAM: W4SDR. S.S.B. PAM: W4OGX. C.W. RM: K4KDN. RTTY RM: W4-RWM. V.H.F. PAM: WA4AZZ. Hasn't it been exciting with that fine amateur convention taking place at Orlando and seeing all those old-timers and new guys you had never met face to face before? You've got to hand it to W4RRG for running a fine event and that added affair to top off Saturday night was a terrific success. Orlando can pride itself on the best organized hamfest year by year in the state. W4BKC reports that over 100 local amateurs handled the Sabin Oral Vaccine communications from 40 dispensing points on SOS Apr. 12 and the Jaycee outfit was so pleased it asked for a repeat on June 7. It was nice to have a long chat with our Southeastern Div. Vice-Director at Orlando. He attended the April meeting of Directors at Hartford and came back with some very cogent ideas. From Miami he states that the Museum of Historical Association of South Florida is to have an exhibit of ancient amateur gear tied in with the Fiftieth Anniversary of the American Radio Relay League. Remember, it is ARRL who says SARs by the 6th at the latest, so please get them

(*Continued on page 150*)

SSB COMMUNICATIONS

Announcing

A NEW **MULTI-CHANNEL** SSB TRANSCEIVER FOR **FULL MILITARY APPLICATIONS**



The R F Communications Model RF-301 is a Multi-Channel SSB Transceiver for severe military environment. For use in base stations, transportable systems, and in open vehicles and boats. This attractively styled package can withstand wind, sand and driving rain because of its unique splash proof construction.

DIGITAL TUNING—2 to 14.999 Mc in 1 Kilocycle increments using transistorized synthesizer.

VFO CAPABILITY—Continuous tuning available on both receive and transmit with 100 cycle resolution.

POWER OUTPUT—100 Watts, p.e.p. **and** 100 Watts average.

POWER SUPPLY—115/230 volts, 50/60 cycle built-in. Space available on chassis **inside** cabinet for 12 or 24 volt D.C. supply.

MODES—USB, LSB, AM, and CW.

TRANSISTORIZED—All circuits transistorized with exception of P.A. and Receiver RF Amp.

COMPANION ANTENNA COUPLER—To match 50 ohm transceiver output to whip or long wire antenna. Built in VSWR Meter.

SIZE—Measures 17"W x 7¾"H x 14"D and weighs approximately 48 pounds. Coupler adds 4¾" to width.

FOR VEHICULAR MOUNTING—Integral shock-mount and dust filter available.

STABILITY—3 parts in 10^7, -40 to $+65°$ C.

PRICE—The RF-301 is priced surprisingly low—about half the cost of other transceivers with similar characteristics.

Write or call for details.

rf **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

in on time. I should like to thank all the guys who took the pains to come up and shake hands at Orlando. Many I haven't worked since the a.m. days years ago and others were entirely new to me and I enjoyed it thoroughly. Of course there were a lot of those side-banders who were kind enough to recognize me. Watch out for those RTTY boys. May your tubes run Cool! Traffic (Apr.) WA4BMC 413, K4RDN 394, K4BY 265, WA4IJH 225, W4TUB 181, K4SJH 172, W4IEI 155, WA4LHK 136, W4DFU 132, W4URX 132, WA4RSQ 125, W4MIN 115, W4AKB 111, WA4LBM 108, W4BKC 93, W4SDR 88, WA4FYV 84, WA4GDS 73, W4IXJ 69, W4VWL 69, WA4GBM 67, W4YJM 61, K4LCF 58, W4SGH 48, W4GJI 47, W4LUV 43, W4OGX 43, W4QAY 35, W4IE 31, K4NCN 29, WA4COR 28, WA4QBD 28, K4DAX 27, K4ENW 26, W4IYT 26, K4ILB 25, W4GUJ 23, WA4NBE 21, W4TJM 16, W4EHW 14, W4FP 13, K4EBE 12, WA4AYD 10, W4GWE 7, WA4IYG 7, K4MTP 6, K4VEJ 5, W4LVV 4, K4ODS 3. (Mar.) W4SGH 486, WA4IXI 94, W4EHW 35, WA4IYG 25, W4LVV 5, WA4FZD 3. (Feb.) W4URX 1438.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. RM: W4BVE. Tallahassee: W4ACB, one of West Florida's earliest hams, became a Silent Key. He was a former SCM and SEC. K4BXO and K4YPI are associated with a new industry located here, specializing in the manufacture of ham gear. Marianna: WA4DED was host at a recent dinner meeting of Jackson County hams. Also present were WA4JRT, WA4SIB, K4UNT and others. Cross City: W8HKU/4 has been operating on 40-meter c.w. and s.s.b. —the only active ham in Dixie County. However, W4SIU promises to be on soon from Old Town. Perry: W4ZWY had antenna trouble, but will be back on WFPN soon. Another rare county which may be heard from soon is Hamilton. W4WCU bought a 160-acre farm on the Suwannee River near Jasper. Panama City: The County 2-Meter Net was alerted during the Alaska Disaster by EC K4GVY. WA4FIJ set a new Florida record for 432-Mc. operation—302 miles. W4ZJB is prexy of the PCARC. WA4NRP has a new monitor scope. W8IHW/4 is now operating from Lynn Haven. Fort Walton: Two-meter mobiles provided rides to the polls during the election. Taking part were WA4BOZ, WA4FFU, WA4HWX and W4UXW. Pensacola: K4SMB arranged for WFPN to handle CAP traffic to K4NMZ in Milton. K4VWE in Defuniak and W4RKH in Fort Walton. Traffic: (Apr.) K4VFY 517, WA4ECY 233, W4BVE 181, K4SMB 87, WA4FIJ 51, K4BDF 13, WA4ABP 7, W4ZGS 3. (Mar.) K4BDF 55, W4ZWD 13.

GEORGIA—SCM, Howard L. Schonher, W4RZL—SEC: K4MDC, RM: W4DDY. PAMs: W4FYH, K4PKK, WA4EHT. The AREC adds WA4ARG with emergency power. K1KSH/4 is active on 160 and 2 meters. Sparks will be QRD Pakistan soon. WA4MOC is a new addition to GSN. W4VFR and WA4FIV add signals to 2. K1YVI/4 is blowing 811s. K5GBS/4 is back from VK-Land. The 6-Meter AREC Net meets Sat. at 0045 GMT on 50.550 Mc. K4WLJ is ANC. The 15-Meter AREC Net meets Thurs. at 0100 GMT on 21.3 Mc. WA4CWU is NC; WA4FUN and WA4IJC are ANCs. WA4MDS is traffic agent to the Ga. S.S.B. Net. WA4JTC is TA to GSN and WA4JOB is TA to GCEN. W4WKP is organizing a Novice net for the AREC. Fulton/DeKalb AREC furnished the state c.d. extra operators for the Sabin Oral. On 75-meter s.s.b. are WA4ENC, W4WUZ and WA4MDS and on 2-meter f.m. are WA4LWZ, WA4CWU, K4FIV and K4PKK. W4FWH and K4KLD are experimenting on 432 Mc. WA4CEL is looking for a WAS certificate. K4AHA is back with a big signal. W4HEG is a new Hunter bandit. WA4JSU has an FB signal with a new Swan 240 mobile. K4NGI lost everything in a fire. W4SLP is mobile again. K4TZC moved to Florida. WA4MPD is going on 420-Mc. f.m. WA4PSA reports vertical polarization on 6 is no good. WA4EHT will be portable from Bluffton, S.C., during June, July and August. WA4MPD is experimenting from Atlanta to Canton on 420 Mc. (Apr.) K1KSH/4 227, W4NSO 174, W4DDY 164, K4BAI/4 100, W4RZL 76, K4MCL 31, WA4LLI 21, WA4BVD 19, W4MLA 19, WA4EHT 12, WA4PSA 8, WA4DQQ 4, K4FUE 3. (Mar.) W4DDY 273, K1KSH/4 145, WA4LLI 29, K4MCL 26, W4HYW 12.

CANAL ZONE—SCM, Thomas B. DeMeis, KZ5TD—KZ5JT has returned and is back on the air. KZ5BT reported that the latest group of trainees soon will be ready for their exams. KZ5BT reported wonderful cooperation by KZ5CO, KZ5DX and several others in helping teach the new group. Ex-KZ5UN is reported well on the way to complete recovery from his stroke reported earlier. KZ5EJ relayed one 10-meter voice contact from WA5FDM. The message was conveyed to an aircraft 18,000 feet high en route from Lima, Peru, to the Canal Zone. The CZARA and Crossroads ARC enjoyed a pleasant boat trip through Gaillard Cut for the April meeting. A committee was formed for working out plans to have some kind of amateur activity in August

(*Continued on page 152*)

12 NEW AMATEUR BEAMS

from

FINCO®

ALL GOLD CORODIZED

ALL GAMMA MATCHED

3 New combination 6 & 2 meter beams
5 New 6 meter beams
3 New 2 meter beams
1 New 1¼ meter beam

SEND FOR NEW TECHNICAL INFORMATION CATALOG #20-226

THE FINNEY COMPANY
34 West Interstate • Bedford, Ohio

in commemoration of the 50th anniversary of the Canal Zone. Details will be forwarded shortly. KZ5DX is now QRT and returning to the U.S. and soon will be operating from Georgia. Ex-KZ5WZ now is operating from Tampa, Fla., using WA4QPR. KZ5RV and KZ5YR will be enjoying a vacation and will be touring stateside. Army MARS is active on the 40-meter net Sun. but plans for starting a c.w. net fell through because of lack of interest and activity. KZ5IM is the new MARS director.

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, John A. McKowen, W6FNE—Asst. SCM: Richard H. Ingham, WA6DJB. SEC: K6YCX. Asst. SEC: W1KUX/6, RMs: W6BHG, W6QAE. PAMs: K6PZM, WA6TWS, W6ORS. Traffic for April was 8811 for the section. Eight BPL awards went to K6BPC, WB6BBO, W6GYH, K6MDD, WA6WTK, W6WPF, WA6TAW and WA6GJR. It seems that more of the Alaskan traffic was reported for March than i originally suspected, as the number of reporting stations are about equal and about 2000 points less. We all regret the passing of WB6BEK. WA6USU is back on the nets after an auto accident. An observation by K6YCX/SEC is that the most helpful amateurs during the Alaskan disaster were members of an organized net. A lot of stations tried to provide freelance aid and frequencies were rather jammed at times. The experience gained from net participation is invaluable during such trying operations. The SoCal V.H.F. Club ran a mobileade to Calico, Calif., and from the reports of this successful venture it looks like a monthly project or outing will result. WA6TGH is prepared to blast DX now on 15 meters with the new three-element array. W6AM reports the highest total west of New York in the DX Test on s.s.b. with HL9KN as operator. K6SIX is busy overhauling the rig. We have received several comments from people in appreciation of the *Section News Letter*. If you are not receiving a copy drop me a Form 1 card and I will put you on the mailing list. Form is can be obtained from most net managers or drop me a line for a starting supply. W6FB reports the S.W. Division Convention plans progressing well. Remember Sept. 11, 12 and 13 at Palm Springs and the Traffic Breakfast on Sun., the 13th, at 9:30. New officers of the United Radio Amateurs of L. A. Harbor are W6TH, pres.; W6TFS, vice-pres.; K6PRN, secy. W6ORS's antennas were wiped out by a wind storm. K6YCX has the new final ready for high-power operation on 2 meters for the AREC Net Sun. mornings. My continued thanks to the net managers and secretaries who take the time to report net activities for the paper. Support AREC/NTS. You can be active in either of these ARPSC functions by contacting either K6YCX/SEC or checking into a section net. The Southern Calif. Net meets daily at 0300Z on 3600 kc. and the Southern Calif. Six Net meets daily at 0200 or 1900Z on 50.40 Mc. Traffic: (Apr.) K6BPC 4013, WB6BBO 1283, W6GYH 662, K6MDD 656, WA6WTK 550, W6WPF 542, K6IWV 373, WB6GZY 262, WA6USU 244, WA6TAW 168, W6QAE 155, WA6GJR 131, WB6EUU 94, WB6RBH 85, WA6ZRM 81, K6PZM 72, WB6IEK 66, WA6YEA 66, W6BHG 54, WA6-WIZ 53, WB6GXI 34, W6NKR 34, W6FB 32, K2PHF/6 22, WA6KVA 20, W6ZJB 20, WA6KAW 19, W6SRE 16, W6USY 14, K6YCX 14, W6LVQ 12, WB6BZX 11, WB6-GZN 10, WA6CKR 7, WA6CAX 6, K6FIL 6, W6PCP 6, W6VOZ 6, WA6DJB 4, WA6ZID 4, WA6CXB 2, WB6-FPQ 1. K6SIX 1. (Mar.) WB6BBO 1234.

ARIZONA—SCM, Floyd C. Colvar, W7FKK. SEC: K7NIY. PAM: W7OIF. RM: K7TNW. Appointments: W5MCE/7 as OES. Presently a few areas are open for Official Bulletin Station appointment. Let your desires be known. K7PXJ is doing a fine job as editor of the *W7IO Newsletter*, which is the club paper of the Arizona Amateur Radio Club. Congratulations to W7-VWF on receiving his DXCC award and to K7SWX on receiving his WAS award. K7PLO is busy mastering his new keyer. W7VKO is very active on RTTY. K7RUR, pres. of the Arizona Chapter of QCWA, reports a membership of 37. The Phoenix V.H.F. Radio Club moved into its new home at the new Red Cross building located at 1510 East Flower St. Meetings are held the 1st and 3rd Wed. of each month at 0300 GMT. The V.H.F. C.W. Net meets Mon. at 0200 GMT on 50.340 Mc. with K7UJV as NCS. The Arizona Amateur Radio Club has a new antenna installation for 40 and 80, thanks to the efforts of K7RFG, 7TXS, 7UOP, 7RGG and 7JJT. The Annual Amateur Picnic was held in Casa Grande. The softball game was won by Phoenix 26 to 12. Once again, please make an effort to get your reports in immediately after the first of the month. All news will be welcome and is needed to keep this column informative and up to date. Traffic: K7NHL 87, W7CAF 40, W7FKK 31, K7RUR 4.

SAN DIEGO—SCM, Don Stansifer, W6LRU—The Red Cross cooperated with the Newport Club during

(Continued on page 154)

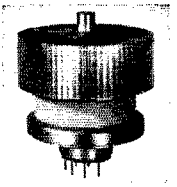
PATTERN FOR PERFORMANCE

Here is a straightforward approach to the problem of preventing electrons from returning to the screen region of a transmitting tube. When channeled into beams like those below, electrons reach the anode, where they do their useful work. Penta's exclusive, patented vane-type suppressor grid does the trick.

The characteristics of Penta tubes employing this electrode geometry approach those of the theoretically perfect beam tube. Plate current is practically independent of plate voltage. Kinks and wiggles are absent. Plate voltage can swing well below screen voltage without appreciable loss of current.

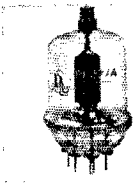
The result is outstanding linearity, efficiency, stability. For example, Penta's PL-8295A—the ceramic version of the famous PL-8295/172—delivers 1000 watts of Class AB_1 useful output at only 2000 plate volts . . . more than 1500 watts at maximum Class AB_1 ratings. Introduced in 1955, Penta tubes with vane-type suppressor grids are in important equipment the world over, and their use in high-quality linear amplifiers is growing daily.

You, too, can enjoy the advantages of this years-ahead design by specifying the PL-177A, PL-175A, PL-8295/172, or PL-8295A, for 100-watt to 1.5-kilowatt power output applications. Detailed, factual data sheets are available for the asking. Ask also for your copy of Penta's latest Summary Catalogue, which describes all Penta products, with prices.



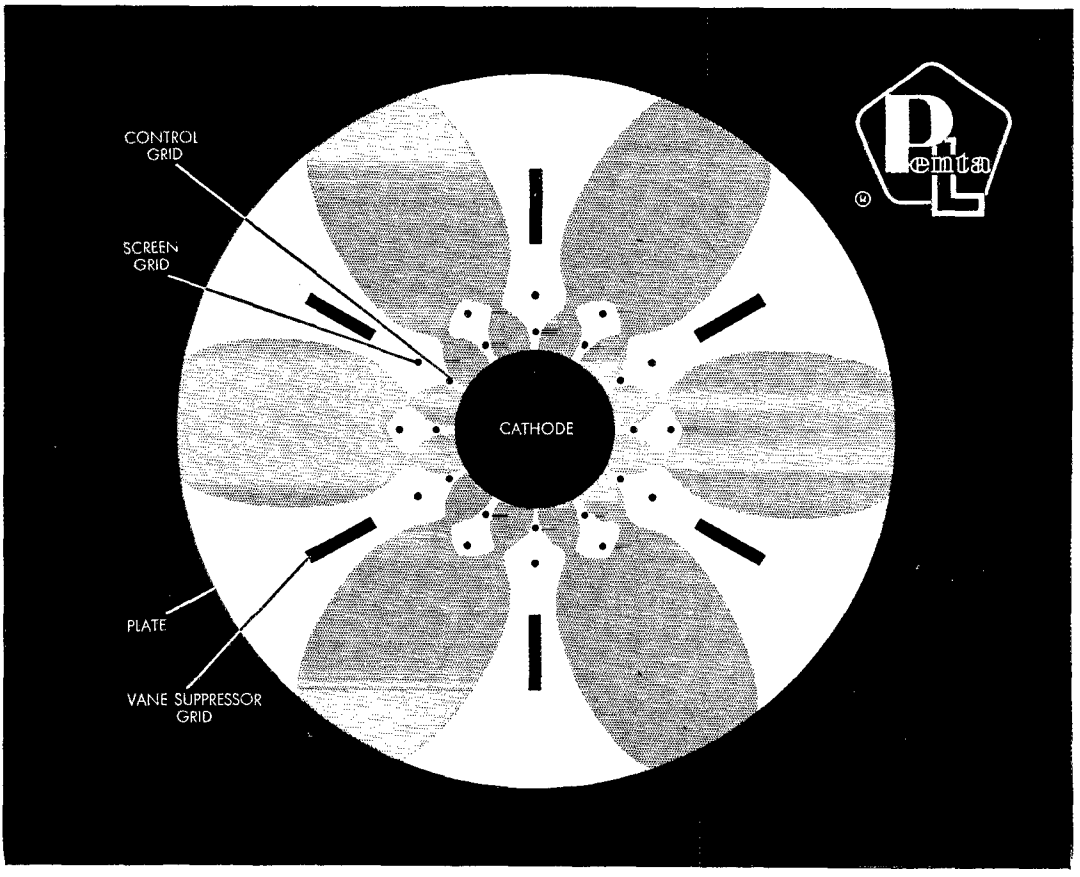
PL-8295A 1000W beam ceramic pentode. High-output Class AB_1 linear amplifier.

PL-175A 400W beam pentode. Popular Class AB_1 linear amplifier.



PL-177A 75W beam pentode. To 175mc. Highly efficient at plate voltages as low as 600v.

PENTA LABORATORIES, INC. 312 North Nopal Street, Santa Barbara, California
Export: Frazar and Hansen, San Francisco 11, Calif.



Field day and served from their mobile canteen, giving the Red Cross a practice drill as well as the radio club. W6DEY is the chairman of the new Orange County Council and WA6WVJ is secy.-treas. Five clubs sent in delegates to the meeting in May. Your SCM enjoyed a good meeting with the Newport Club in May. The San Diego DX Club hosted W4BPD, well-known round-the-world DXer, in late May when he visited the area. K6ENX, well-known DXer, is over 200 countries on s.s.b. now. The Field Day committee for W6NWG, the Palomar Club, was W6HLB. A San Diego visitor for three months, who is attending the DX Club meetings, visiting with other area clubs and enjoying California hospitality, is PAØLZ, who returns to Holland in August. The new call for K4AKP/6, ORS and traffic man, is WB6JUH. K6UTO made BPL for the first time. It is rumored that Orange County has an active DX club now. The SCM would like news from the group for this column. As you read this Field Day, 1964, will be history; at your next club meeting start making active plans for Field Day next year. Don't make the same mistakes two years in a row. San Diego area amateurs are reminded that the Asst. SCM is W6EWU, who speaks for me when I'm not in the area. Have fun this summer, and keep reports coming in with news for this column. Traffic: (Apr.) W6IAB 4771, K6BPI 3155, W6YDK 2226, W6EOT 902, WB6JUH 891, WA6BRG 634, K6UTO 528, WA6ROF 190, K6IME 83, W6DGM 35, WA6ZWR 30, W6WRJ 27. (Mar.) W6IAD 8230, W6YDK 2902.

SANTA BARBARA—SCM, William C. Shelton, K6AAK—SEC: WA6OKN. RM: W7WST/6. The RM has a new HX-10 and made BPL again. The SEC has a Porcupine for his mobile antenna. W6AB, the LERA club station, is NC for the 2-meter net for the north section and has a dozen or more check-ins. The new frequency will be 146.25 Mc. and the net meets at 1900 local time. W6KCD has a new SB-33 and linear. K6ARK has returned from Japan and plans to retire from the Navy and settle in Oxnard. W6CQO is on RTTY and has built the tunnel dipper. The Poinsettia Emergency Net meets Sat. at 2030 on 146.7 Mc. The Point Mugu Net meets on M-W-F at 1915 on 146.88 Mc. WA6OJM applied for ORS appointment and is now located at Dunn School. He and W6GSG have started the Dunn School Amateur Radio Club in Santa Ynez. A G-76 and a TA-33 beam on a windmill tower starts the signals out. Traffic: W6CQO 52, K6AAK 24.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: K5AEX. PAM: W5BOO. RM: W5LR. The Alaskan disaster gave the amateurs another opportunity to prove their worth by rendering a public service. It also proved the need for more training in handling traffic in emergency situations. The few stations in Alaska were hampered by unthinking amateurs trying to pass traffic into the disaster area. The same situation existed when a cyclone hit the Wichita Falls area. In spite of the errors made, many people were grateful for the efforts in handling welfare traffic. The Palestine ARC held its Annual Dogwood Hamfest Apr. 12 with 90 hams and their XYLs in attendance. The Panhandle ARC, with the cooperation of the V.H.F. Pioneers, held a very FB hamfest May 2 and 3 with 315 registering and more than 50 attending but not registering. About 150 attended the meeting Saturday night and heard several good speakers. Mr. Brooks, Phillips Pet. Co. engineer, gave an interesting talk on the organization of radiotelegraph for the oil companies, and how hams played an important part in the organization of their communications plans. Mr. Howard, FCC engineer-in-charge of the Dalls office, talked on self-regulation, TVI and consideration for the rights of others. Other speakers were W5UYQ, WA5IXQ, K5TRY, WA5EMP and W5BNG. W5DYW and WA5IMP are s.s.b. mobile with new HW-12s. W5BFK has a new Swan-400. Traffic: W5DTA 626, WA5DQP 252.

OKLAHOMA—SCM, Bill F. Lund, K5KTW—Asst. SCM: Cecil Andrews, W5MFX. SEC: K5DLP. W5FWZ was selected to receive the Oklahoma SCM Award as the Outstanding Amateur for 1963. We are sorry to see W5EUL transfer from Oklahoma City to Atlantic City. Hank was president of the Aeronautical Center Amateur Radio Club and EC for Oklahoma County. W5UZX assumed the office of pres. and George Lagaly vice-pres. The official total for W5PAA during the Alaskan earthquake emergency was 16 official, 10 semi-official FAA messages and 2940 non-official welfare messages during the emergency. W5EHC will be delegate of the ACARC to the National ARRL Convention. W5EMB has a new HX-500. W5TKC has a new Galaxy 300 which he will set up at Altus AFB. WN5JGR is knocking off DX with a Globe Chief and Drake 2B station. WA5APW is a new General Class licensee in Oklahoma City. K5KOF is on

(*Continued on page 156*)

CHICAGO AREA HAMS

Make Amateur Electronic Supply Your

COLLINS HEADQUARTERS

"DOC", W9HJS and this **OPERATING COLLINS DISPLAY** are waiting for you at our **CHICAGO STORE.** Stop in for **FREE** Demonstration.

Send Mail Orders and Inquiries to our Milwaukee Headquarters

AMATEUR ELECTRONIC SUPPLY
3832 West Lisbon Avenue
Milwaukee, Wisconsin 53208
Ph (414) WE-3-3263

CHICAGO STORE HOURS

Mon., Wed., Thurs.: Noon to 9 p.m.
Tues. and Fri.: Noon to 5:30 p.m.
Saturdays: 10 a.m. to 4 p.m.

AMATEUR ELECTRONIC SUPPLY

6450 Milwaukee Ave., Chicago, Ill. 60631 • Phone RO-3-1030

the air in Dewey. K5WVS has a new NCX-3 and K5JTG has a new Drake TR-3. It looks like the Bartlesville group is going s.s.b. K5TEX and K5TEY are the proud grandparents of a new granddaughter born in Kingsville, Tex. K5RJI has returned to Tulsa. WA5DBM won the membership contest and was awarded a D-104 mike. Traffic: W5PPE 362, WA5CPX 353, K5TEY 133, K5KTW 100, K5DLP 71, W5DRZ 49, W5FEC 40, K5SWL 40, W5MFX 36, K5CAY 24, K5OCX 23, W5UYQ 22, K5LZF 15, W5ENC 7, K5MTC 7, K5YAQ 7, K5CBA 5, K5BAT 2.

SOUTHERN TEXAS—SCM, Roy K. Eggleston, W5QEM—SEC: W5AIR. PAM: W5ZPD. Congratulations and best wishes to W5TEL and his new bride, Betty. She is the daughter of W5MSA and his XYL. The Corpus Christi Amateur Radio Club furnished communications for the assemblying and during the Buccaneer Days Parade. The members did their usual FB job, under the direction of K5WQF. W5QKF has just returned from Newington and the Board Meeting. K5RVF has a new beam and 37-ft. crank-up tower. All you fellows who think you have to have a full gallon to get out should talk to WA5HHD and find out what he is doing with his 18 watts home brew. Now is the time for all amateurs to get out the old emergency gear and see that it is working. The hurricane season will soon be on us. Tornadoes are playing around over Texas and the amateurs did a good job on the ones in Wichita Falls and Temple. W5ONG and W5RUM and the other hams in Victoria have an emergency setup that other towns would do well to copy. They also had a nice write-up in the *Corpus Christi Paper*, something that the hams of Corpus Christi find almost impossible to do. Sorry to learn that K5LQJ is leaving Crystal City, as he was the only link we had there, but glad that he is only going as far as Pleasanton. Traffic: (Apr.) W5GDH 525, K5HZR 147, K5TRY 43, K5IQJ 8, K5RVF 1. (Mar.) W5AIR 73.

CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCM: A.E.W. Street, VE1EK. New appointment: VE1YU as EC. Our deepest sympathy to the relatives and friends of VE1BC, who has joined the ranks of Silent Keys. The Goose Bay QSO Party winner was VE1MW/VO2 with runners-up VO2DP and VO2RS. The VO2NA Trophy was awarded to VO2DP. WAG (Worked All Goose) Award mailings have been delayed because of the northern posting of VO2NA but all remaining applications will be processed shortly. VE1GC's XYL is now licensed as VE1ANX. Newfoundland amateurs are using 3.785 Mc. as net, mobile and calling frequency. Congratulations to VE1MX on his score in the SS Contest, also on his Master's degree from UNB. Newly-elected officers of SONRA are VO1FQ, pres.; VO1FX, vice-pres.; VO1BR, secy.; VO1BU, treas. VE1AHR has transferred to Ottawa. VE1AIP has been operating aboard the *Bonaventure*. VE1PQ visited G-Land. VE1TO is putting out a fine 50-Mc. signal from Chester. VO2BA is transferring to the VE3 district as an instructor. Another ham family, VO1BT with XYL VO1AM and jr. operator VO1DR. Traffic: VE1OM 15, VE1DB 11, VE1AEB 5.

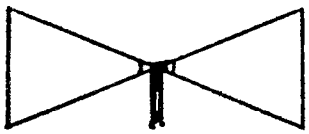
ONTARIO—SCM, Richard W. Roberts, VE3NG—The London group held a successful radio section of a hobby show in that city recently. The club has a new call, VE3LON. VE3BHH is on 2 meters. VE3BKO soon will be a W1 in New Hampshire. VE3BTI has good DX on 20-meter s.s.b. The Scarboro ARC held an FB banquet recently. VE3EZI is to be congratulated on her score in the YL/OM Contest, over 33,000 points. The Scarboro ARC also was active in a local hobby show. The Ontario DX Assn. puts out a real bulletin for DX men. VE3AZA, after 28 years operating, got his WAC. Congrats. OM members of the Ottawa area assisted in locating two young boys who were lost in the ski area in March. Ski patrols with ham operators were instrumental in locating the pair. Without those hams who assisted in the Alaskan quake many friends and relatives would have been left without news of their loved ones. VE3ARF, who operates at Lake Mazinaw during the summer, had two SCMs visit him this month. VE2DR and VE3NG were both visitors to his camp within two hours of each other. Other visitors were VE3DZA, VE2AUU and of course ARF's XYL. VE3DVM, VE3AQM will be located in Smiths Falls. The Sarnia Group has a 10-meter net at 1 P.M. Sun. on 29 Mc. The London gang has had to change the date of the ARRL Ontario Convention to Oct. 2 and 3 because of hotel commitments. Our Director, VE3CJ, was a Delegate to Mexico for a Conference and also, with Canadian Counsel VE3RX, attended the ARRL Board Meeting. The Willowdale Boy Scounts, under Scoutmaster VE3DRF, held radio exhibition in Nobleton recently. Much interest was shown by the many visitors. VE3DVE is a new ORS.

(*Continued on page 158*)

BULLS EYE BUYS AT ARROW

HAND-PICKED FOR HAMS BY HAMS

"WONDER BAR" 10 METER ANTENNA

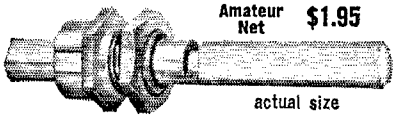


As featured in Nov. 1956 QST. Complete with B & W 3013 Miniductor. Only 8 ft. long for 10 meters.
Amateur net $7.85

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 ⅜" hole. High torque, low back lash, smooth and permanent movement, coaxial spindles, ¼" shaft dia.

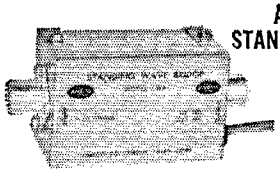
Model 4111/RV
Amateur Net $1.95



actual size

AMECO MODEL BIU BRIDGE INDICATOR UNIT

Model BIU, when used with the Ameco SWB or other make of bridge, will accurately read SWR, percentage power and percentage voltage (3 scales). Contains a sensitive 100 microampere 2⅛" D'Arsonval meter. Unique switching circuit provides for reading either one of 2 bridges. Charcoal grey cabinet with satin copper panel, 2¾"x5"x3". Wired and tested. **$15.95**



AMECO MODEL SWB STANDING WAVE BRIDGE

High quality bridge accurately reads SWR's from 1.8 to 225 mc. (including ham, CB and commercial bands). Can handle up to 1 KW. Uses inductive coupling and can be left in the line continuously without insertion loss. Contains two SO-239 VHF connectors. Satin copper case, 1⅝" x 2¼" x 4½". Wired and tested. **$9.95**

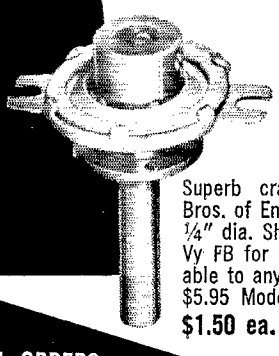
PRECISION BALL DRIVE DIAL

Another superb product of Jackson Bros. of England. 4" dia. dial with 6:1 ball drive ratio. Fits standard ¼" shaft. For that velvet touch...
Amateur net $3.95

FAMOUS JENSEN 8" P.M. SPEAKER

Model C-855 professional series, dual cone, ceramic-magnet, 12 watt handling capacity. Ideal for remote ham and hi fi use. Shipping weight, 4 lbs.

$7.29 ea.



PRECISION PLANETARY-VERNIER for exceptionally fine tuning

Superb craftsmanship by Jackson Bros. of England. Ball bearing drive, ¼" dia. Shaft 1⅛" 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

Shown approximately actual size

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 ¾" w. x ¾" d. New and fully shielded.

Amateur net $1.39.
3 for $3.49.
10 for $10.75.

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 — MYrtle 4-6822

65 Cortlandt St., N.Y. 7, N.Y. • 525 Jericho Tpke., Mineola, N.Y. • 225 Main St., Norwalk, Conn.
212 — Digby 9-4730 516 — Pioneer 2-2290 203 — Victor 7-5889

VE3ESH is in Kingston. Traffic: VE3CYR 166, VE3NG 103, VE3DPO 87, VE3AWE 70, VE3DRF 68, VE3FGV 51, VE3EHL 48, VE3AML 47, VE3BUR 47, VE3ETM 47, VE3BTV 42, VE3CLK 34, VE3BLZ 30, VE3DUU 27, VE3EBC 25, VE3AKQ 23, VE3BII 21, VE3DU 21, VE3BZT 20, VE3WW 18, VE3EZY 14, VE3FEH 10, VE3TT 6, VE3VD 4, VE3DVE 2.

QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. SCM: Michel St. Hilaire, VE2BEZ. Having been elected SCM for another term I wish to thank you sincerely for your faith in me. A trip to Thetford Mines allowed us to meet VE2AYA and XYL VE2AYB, a charming couple. VE2AEM expects to transfer to a base in Germany in early 1965. *Don't forget the annual RAQI Convention at St. Gabriel d Brandon, Aug. 14, 15 and 16.* VE2AGQ is back on the traffic nets again after a stiff year at college. VE2OR promises to beat last year's salmon record. Our hats are off to the executives of the MARC for an excellent season. VE2SH has been selected to represent Canada at the V.H.F. Convention during the ARRL National Convention in N.Y.C. in August. VE2AUU is alternate. During a trip to Ontario with VE2AUU (excellent mobile equipment) we had the pleasure of meeting VE3ARF, VE3BZT, VE3CNT and others. VE2BMS reports the Laurentian Camp Traffic Net will start in July. VE2EC writes that ham activity in the St. Maurice Valley is bolstered by many newcomers. VE2BEZ reports: The North River Radio Society had a lot of success at its last meeting; many VE2 and VE3 amateurs were present. VE2BDZ déménagé a Drummondville. VE2ALH est silencieux, causé par son émetteur. VE2AN vient d'obtenir son certificat en téléphonie. VE2BKE redevenu actif sur 2 mètres. VE2JC ne tiendras pas de "Field Day" cette année. VE2BEZ a eu du trouble avec son émetteur mais tout est redevenu normal. Traffic VE2DR 134, VE2ALH 70, VE2BMS 60, VE2OJ 45, VE2JJ 40, VE2EC 37, VE2AUU 22, VE2AAH 18, VE2CP 12, VE2BRT 11, VE2BG 10, VE2HV 10, VE2BBH 5, VE2ABT 2.

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FS. PAM: VE6PV. RM: VE6AEN. ECs: VE6FK, VE6SS, VE6ABS, VE6AJY, VE6AFJ, VE6PZ. OPSs: VE6CA, VE6PV, VE6HM, VE6SS, VE6BA. OOs: VE6HM, VE6NX, VE6PL. OBSs: VE6HM, VE6AKV. ORS: VE6BR. OESs: VE6DB, VE6HO, VE6AKV, VE6AJY, VE6MC. The boys are trying their best to supply you with news of interest through a provincial paper, so why don't you support them with your reports and bucks. They need your help to make a success of it, so fellows dig and don't leave it all to Wally. I would like a few more reports myself. Did you send yours in? Our PAM reports that APN went on summer sked May 4. Our SEC reports that all AREC groups are doing fine. Don't forget the Annual Provincial AREC Picnic. Check your local group for time and place; date Aug. 2. Don't forget the International Hamfest to be held the third week end of July in Montana this year. Activities on 2 and 6 meters are improving with more of the boys operating on these bands. Traffic: VE6HM 251, VE6CA 16, VE6TG 15, VE6SU 7, VE6ABS 5, VE6SS 5, VE6UH 5, VE6FK 3, VE6ADS 2, VE6HS 2, VE6PV 2, VE6PZ 2.

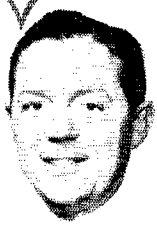
BRITISH COLUMBIA—SCM, H. E. Savage, VE7-FB—The O.K. Valley International Annual Hamfest 1964 will be held at Conconully State Park, 18 miles west of Omak, July 25 and 26. There will be lots of goodies as usual to keep you all busy and happy. VE7AAF, president of the Victoria Short Wave Club and a participant in many other activities, has resigned as Route Manager for B.C. to put all his efforts into job promotion study. All our thanks to Brent for his fine work as RM over the past several years and we regret to lose him. However, he will continue as ORS and OPS. Our new Route Manager is VE7AGF, Dave, who has a big job to do and hope we have the same support for him. The Penticton High School Club station VE7BOR held a demonstration of amateur radio during the school open house with good interest taken by the public. The Nanaimo Club still is producing amateurs. VE7BDR and VE7BPP. The club participated in the May 24 Parade. VE7AJK has been busy on 40-meter c.w. and working DX. VE7AC is in the new ham shack but too busy in the orchard to put the rig on. News from here is very scarce. Must be all are hiding their activities. Traffic: VE7AJK 317, VE7KZ 156, VE7BHH 43, VE7AC 14, VE7BBB 3.

MANITOBA—SCM, William H. Horner, VE4HW—Greetings to all Manitoba operators in this my first report. Thanks for your support and your help is solicited in keeping our section active. The increase in 75-meter mobiles necessitated adoption of 3770 kc. as a meeting frequency. A total of 283 "call letter" license plates have now been processed. No further applications can be accepted until 1965. A change in the ARLM "Worked All Winnipeg" award requires the same number Winnipeg contacts but now these do not have to be

(Continued on page 160)

"Call us for reliable, PERSONAL SERVICE"

Bob Henry
WØARA
Butler, Mo.

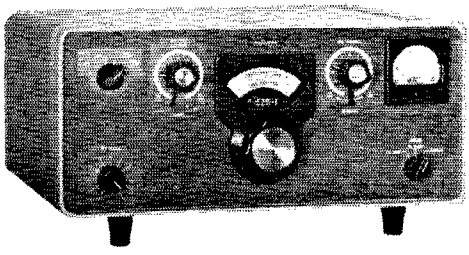


Ted Henry
W6UOU
Los Angeles, Calif.

Walt Henry
W6NRV
Anaheim, Calif.

COLLINS

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

62S-1 VHF Adapter	$ 895.00
75S-3B Receiver	620.00
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	1,795.00

Write, phone or visit either store today!

Inquiries and orders from military men and others outside USA wanted.

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.

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. PRospect 2-9200

"World's Largest Distributors of Short Wave Receivers"

ARLM members. VE4RE has resigned as WARA pres. VE4DQ received well-deserved publicity in the Brandon *Sun* for keeping a Brandon family in touch with a mother and young daughter hospitalized in Boston, Mass. QSL Manager VE4OX is back from a California holiday with a good tan—likewise VE4VJ and VE4VK. The WARA code and theory clas for sightless persons is doing nicely under the direction of VE4NS and VE4FB. VE4CZ, VE4HI and VE4HB have been named ECs and VE4OL, our SEC, is setting up an active emergency and public service organization. Our Fargo Hamfest delegation did well. VE4MW placed first in the 75-meter hunt. VE4CF took second as average ham. VE4TH, VE4BS, VE4UK, VE4CS, VE4CO, VE4EW and VE4UP also participated. Write P.O. Box 475, Winnipeg, for information on the Mid-Continent Hamfest Sept. 5 and 6 at Winnipeg. Traffic: VE4QD 22, VE4JY 18, VE4SE 7, VE4AN 4, VE4EG 4, VE4JA 3, VE4QJ 3, VE4IW 2, VE4SD 2, VE4SH 2, VE4SW 2, VE4MK 1.

SASKATCHEWAN—SCM, Mel Mills, VE5QC—The ARRL meeting at the hamfest brought in many new AREC members and SEC VE5CU and the EC are very happy with the progress of the AREC. New calls in this area: Ralph VE5QR, Ed VE5VF, Bill VE5NT, Jim and Marg Friesen got their calls, VE5VF, Rudy VE5IZ, Nick VE5IV, and Bert VE5QZ. VE5IL is finally settled in the new QTH: VE5OP is using a new beam and as QSL Mgr. reminds all VE5 amateurs to get their stamps and self-addressed envelopes in to him *now!* You will get DXCC quicker. VE5JV really is getting out with that quad. VE5QC has a new ten-acre antenna farm. No DDT is allowed! Traffic: VE5HP 62, VE5LM 43, VE5BO 31, VE5CM 13, VE5HQ 11, VE5YR 4.

Technical Correspondence

(Continued from page 60)

contacts were limited to JAs, UAØs, HL/HMs and KG6s. Now with the fall months upon us, the trans-equatorial propagation is starting to pick up. Recent catches are ZS2OM, ZS6AAY, 9Q5AB, 6L1WF and UA4FAZ. Working into the Philippines (1000 miles) is almost a lead-pipe cinch several times a week, with 5/9 signals both ways, sometimes for two or three hours at a time.

The setup here isn't anything special; a home-brew transmitter tuning at 80 watts input, two AR-88 receivers and a ten-meter ground plane. One receiver has a low-noise front end using cascode 6CW4s, which is a big help.

For those that want armchair copy around the clock, ten is definitely not the band at this stage of the sunspot cycle, but for those willing to dig down to the noise level and have a bit of patience and persistence, ten is an interesting and rewarding band. But it doesn't do any good to just listen. You have to let people know you're on — a good, healthy CQ every fifteen minutes or so produces results.

In closing, I just want to say that ten isn't dead; it just suffers from underpopulation. — *Al Edwards, KR6TAB (EX-KG6AJL), U. S. Army Ord. Grp., APO 48, San Francisco, Calif.*

The Alaska Story

(Continued from page 53)

ROY TNW UNR VYY WVN, *K5s* ARF/6 AZO CAT CAY CBA CRK DDA DZV EUL FEO FEU GJQ HXL HXT IMF JOU KEI KRM KTW KXK LZA ODH OHQ PFF RKM TRY UMH UZK WLK WZT YXD, *WA5s* BFB DFF DFR DTP DZW EMS FNC, *W6s* ACP ACT AHG AIT AOR AVQ BLU BOZ CAL CBA CQO CRM CUB CUS CXO DG DRP ECE ELQ EOT EQZ ERM GFY GUQ GYH HJK HKB HSV IAB IAH IBW ICG IRF JDN JXK KBH KBT KCQ KIK KPC KSY KYN LNC LRT LUZ LVG LWB MFW MKE NGN NPV NSC NSR NSW OFL OII ONY ORB OT OYJ PSA QCE RDB

(Continued on page 162)

TREMENDOUS SAVINGS ON LIKE-NEW EQUIPMENT

for the SWL, Newcomer, or Extra-Class Amateur

- Two-Week Trial
- 90-Day Guarantee
- Trades Accepted
- Plenty of Free Parking

Whether you are a shortwave listener, a potential ham, a UHF enthusiast, or possess one of those rare two-letter calls, Trigger Electronics is where you will get the cleanest, most dependable, like-new equipment at sensational savings for such gear. And it performs as brilliantly as it looks!

SEND FOR FREE PRICE LIST

Whether you want to buy a key, a code practice set, or a top-quality receiver or transmitter, Trigger has the gear and is ready to get you started out right. Send stamped self-addressed envelope for free price list.

51J3	$399
75A4	399
75A3	239
800 Cycle Filter	29
75S3	489
32S1	399
312B4	139
KWM1 & NB	339
AC Supply	69
KWM1 Spkr	17
KWM2	775
DC Supply	99
CC2 Case	49
32V3	239
KWS1 Control Spkr	39
200V	547
DRAKE 2A	174
SX111	169
SX100	179
SX117	279
SX117 LF Tuner	19
SX110	99
S40	44
SX43	79
S107	57
S108	79
S120	49
SX105 152-173MC	49
SR150 DC Supply	67
SR150 Mobile Tray	19
FPM200	1400
HT32	299
HT37	279
HT40	49
INVADER 2000	647
VALIANT	199
RANGER	137
RANGER II	239
ADVENTURER	29
CHALLENGER	69
6N2 Conv	44
6N2 XMTR	99
6N2 LINEAR	329
COURIER Amp	147
THUNDERBOLT	299
HQ100AC	139
HQ105TR	107
HQ110	127
HQ180C	299
NC300	$187
NC155	129
NC190	147
NCX3 DC Supply	79
GLOBE CHIEF Dlx	39
WRL 755A VFO	27
G76	199
G76 Xtal Call	14
G76 DC Supply	69
G76 AC Supply	79
GC 105 2 Meter	179
III 6 Meter	149
IV 6 Meter	199
G50	249
SUPER 6 Conv	24
SUPER 12 Conv	39
G66B	72
G66B 3 Way Supply	29
G77A & 3 Way	139
CLEGG 99ER	89
INTERCEPTOR	329
POLYCOM 62B	299
DX100B	144
DX60	57
DX40	44
DX35	39
GR91	37
AR3	22
MR1 Receiver	64
MT1 Transmitter	47
HG10 VFO	34
AC1 Antenna Tuner	17
HD11 Q Mult	15
QF1 Q Mult	9
HEATH Signal Tracer	17
V7A VTVM	24
HEATH 6ER	39
LAFAYETTE HE35	37
KNIGHT R100	57
B&W 5100	119
P&H 6-150	159
PALCO 65 XMTR	49
PMR7	67
AMECO 86W XMTR	47
AMECO AC Supply	19
EICO 723	34
DB23	34
NOVATECH AIRCRAFT	49
WATERMAN S11A Scope	47

another important TRIGGER service: WE BUY USED HAM GEAR FOR CA$H

PROMPT SERVICE / PROMPT CASH!

TRIGGER Attn: W9JVJ (ABC1234)
7361 North Avenue
River Forest, Illinois Amount
(suburban Chicago) Enclosed

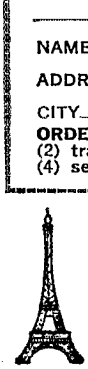
RUSH THE FOLLOWING:

NAME_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

ORDER BLANK TO: (1) send for free price list, (2) trade ur present gear, (3) order equipment, (4) sell ur gear for cash.



FOREIGN INQUIRIES INVITED

(A small deposit will hold the unit of your choice on Lay-Away)

STORE HOURS

Weekdays ..... 1:00-8:00 P.M.
Saturdays ..... 9:00-3:00 P.M.
Or by Appointment After Hours

TELEPHONES

From Outside Chicago.....PR 1-8616
Chicago Area Only.....TU 9-6429
Business phones with QTH Extensions

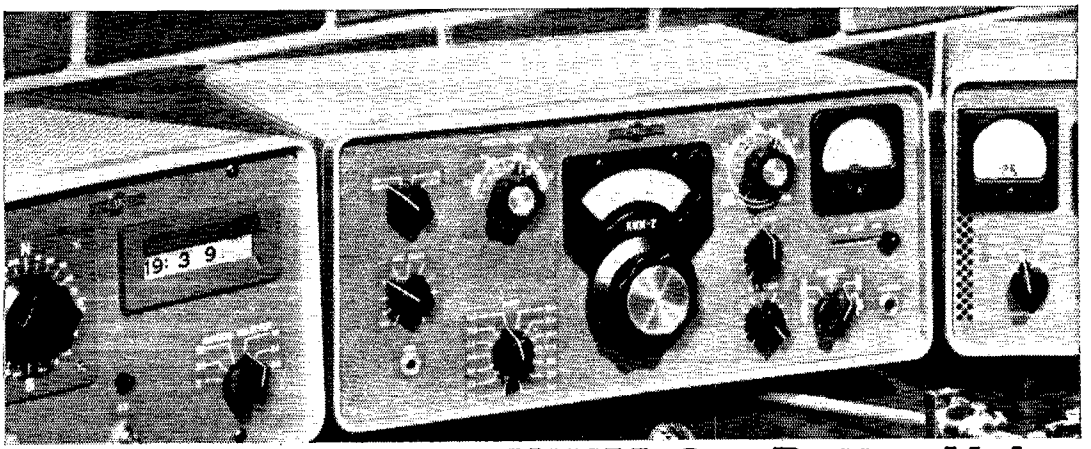
TRIGGER *Electronics*

7361 NORTH AVENUE • RIVER FOREST, ILLINOIS

RHP RST/7 RSY RTF RYU UDL URA UW VLZ WLX WPF WWJ YBV YDK YKS ZNF ZRJ ZRR, *K6s* AJM AW BBF BKC CBZ DUU DVD DXD EOD FAE FDU GGS GRK GZ HAE HON IME IQY JJC JSN KT KVN LFH LRL MDD MIM MFJ MWK NAR OBL OJJ OPA PHQ PQH PZM QAG QVN RBP RIP RQT RTI UMI UUT VVT WEF WNE ZRY ZYR ZYZ, *W1&6s* ABX AJJ AJT AYP BAO BJB BRG CJA CLI CYQ DBB DFT DNI DNT DZM EMM EYY FCH GPB GRG IVM JGA JRD JYA KCY KHK KMI KPK LAG LHW LVA LYL MDJ MOC MPR MVO NKJ OSB PTA PUX QET QOB ROI/KG6 RXM RZB SFM SKT SSC TAD TBY TNZ TYR UJB UJX UUO UVW VTX VWI WDD WFQ WMG WNG WTK WTX YCY YIN ZCO ZHP ZHQ ZPJ ZTY, *WB6s* APK AUF BBH BBO BOX DSL FAG FBJ FHL/Ø FLY GXI HDO JUH, *W7s* ADH AS AVK BAN BDR BGU BIM BPC BX CTK CXH DED ENU EQU FER GCK GIB HCJ HQG IH IWD JWJ KOY MDP MRZ MVC NKK NQI OYQ PAU/Ø PBL PBV PC PGS PWA QES QEU QYA TMF TPC TQE UGX UMT UNT UTL VE VNM VVI VWI WHB WIL WST/6 WTA WWR YZN ZCE ZEL ZHE ZHZ, *K7s* AST BIM CPT DFV DOH DYY EKF FDP FSU GFZ GRS HLR IEY JPI KBY KSF LRV/6 LUC LYK MFS MHL NDY NLG NTK OPB ORN OSM PFV PNC PRW PUR QKE QVB QYG REZ ROE ROZ RYT SKP TAO TET TJL TJV TPM UDG UEB UGE UHN VEM VYT WBC WHB WNE YAY YGW YHR YXX ZYC, *W8s* DAE DDG ERD FYO FYR GJK HZA IGI IIP ILC ILO JEY LEX LLT LT MGA NJW NWR RWG TZZ VYE WQV ZTS, *K8s* AMU AVG BPC BUR DDG EHF ENY GCS GET GHJ HKB JZZ KTB MMZ PMW RZA TKA UBK VPW WXO WQV, *W1Bs* AJG AJW AWH CKY EFK GAH GYT KYO, *W9s* AFT AOW ATK BTI BTQ BYJ/6 CSC CUW DHW DIM DOQ DSY DWH DYG DZB EEO ESM ETE FCV FSX/KH6 GDW GIQ GM GPI HED HFN HKD HTH IBU IUK JNU JXV KKM KQD KZD LCD LCE LOO NAG OHJ PST QCQ SSL SUF TQ UNE USR UXD VDM VWJ VZR VZZ WPC WZK YIP ZAD ZPV, *K9s* AKF AMD AXL AXS BSC BTE BTG CAN CMX CYZ ENC FLX FZD GBN GSK HYZ IBB IEI ILJ IOG IVG KLM KSU KUK KZB LEN PSU PSX QNV QYW QYY RCP RUK UBC UIY UKH YMZ YXK YZI ZNL ZPP ZYS, *W1Øs* AJF AOL BHX CCP CKQ DGV DWZ WAT, *WØs* AJL ALA AOG APG BBX BOR CZ DXA EMM EXX EZE FRU ITX JAW LGG LNZ MTP NVV OAQ OHJ OLC ONJ OUI RCS RFU RGT SEH TGU TPZ VBK VFE VQY, *KØs* AEK AGW AYO BAT BCX DKM DNK EDD EFL EV EVC FNC FRW GHK GIC HEX HGH IFJ JDD JQV JTQ MWD OWG PHZ UDZ UTL YOR ZFW, *W1Øs* AAR ASO BGX CAM DEN EDD EZD FCO FLA FSW, KB6EPN, KC6CG, *KG6s* AKR IF, *KH6s* ATS ECT ESC EZJ DEH FHE FOQ, KX6DA, ZL4ML, *VE3s* DKR EAM, VE5TK, *VE6s* BT DY OT PZ WG WK, *VE7s* AGF AKB AKD BAH BBB BHH BKA MT OM, *VE8s* AC MA. QST

Strays

The Braille Institute, 741 North Vermont Ave., Los Angeles, Calif., is looking for volunteer instructors to help K6VVM with a licensing class for blind would-be hams. Write him at the above address, or phone him at NO 3-1111 during working hours.



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!

HARRISON "Ham Headquarters, USA"

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 *Bil 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: 139-20 Hillside Avenue, Jamaica • RE 9-4101]

17th V.H.F. SS

(Continued from page 87)

WA4NWI 648- 27- 2-A
K4BEI 598- 23- 3-A
W4PEX 572- 26- 1-A
WA4GNG 550- 25- 1-A
WA4KMA 480- 20- 2-A
W4LSQ 338- 13- 3-AB
K4ROP 286- 13- 1-A
W4BFM 264- 12- 1-A
K4UVF 176- 8- 1-A
K4GRO 132- 6- 1-A
W4FQQ/4 (W4FQQ, WA4KTD) 840- 35- 2-A

Eastern Florida

K4YSN 770- 35- 1-A
K4NTD 648- 27- 2-BD

Western Florida

WA4FIJ 1014- 39- 3-AR
WA4FJF 132- 6- 1-AB
K4MAC 110- 5- 1-B

Georgia

W4YZE 374- 17- 1-B
WA4MKZ (K4SLX, W4WKP, WA4MKZ) 2134- 97- 1-AB

SOUTHWESTERN DIVISION

Los Angeles

WA6SLF 3770-145- 3-B
WA6WIZ 1638- 63- 3-A
K6STI 1296- 54- 2-B
WA6OPI 884- 34- 3-AB
WA6TAW 648- 27- 2-A
WA6GAG/6 (WA6s AJT GAG, WB6BYL) 13,160-470- 4-AB
W6ULL/6 (4 oprs.) 8512-305- 4-AB
K6BPC (4 oprs.) 3328-128- 3-AB

Arizona

K7YSE 1452- 66- 1-A
K7ZDG 1386 63- 1—

San Diego

W6CZK 4096-128- 6-AB
WA6LVS 1716- 72- 3-B
K6MDG/6 (4 oprs.) 4758-183- 3-AB
WB61MW/6 (WA6WPG, WB6s CFC FCR) 1820- 70- 3-A

Santa Barbara

WA6UPX 528- 24- 1-B
W6NLO (K6QPV, W6NLO, WB6BAL) 2548- 91- 4-AB
W6UFJ/6 (4 oprs.) 2430- 81- 5-AB
W6OUL/6 (4 oprs.) 984- 41- 2-B

WEST GULF DIVISION

Northern Texas

WA5EYO 2832-118- 2-A
K5MLD 2424-101- 2-A
K5IVB 2112- 88- 2-A
K5CMC 2040- 85- 2-A
WA5HKD 1760- 80- 1-A
K5ZKS 1386- 63- 1-A
WA5DCH 704- 32- 1-AB

Oklahoma

K5YEM 1848- 84- 1-AB
WA5DWK 1287- 59- 1-AB
W5LOW 1144- 52- 1-ABD
W5HUJ 1100- 50- 1-AB
K5EZG 1056- 48- 1-AB
K5OCX 814- 37- 1-A
K9MVJ/5 792- 36- 1-AB
WA5EYV 748- 34- 1-AB
W5FMX 682- 31- 1-AB
W5WAX/5 572- 26- 1-AB
WA5BPK 484- 22- 1-A
W5EUL 484- 22- 1-AB
WN5HWH* 418- 19- 1-B
W5HXL 418- 19- 1-A
WN5ICN 418- 19- 1-B
W5MPF 418- 19- 1-AB
WN5HTL 374- 17- 1-B
W5VRV 352- 16- 1-B
K5PBE 264- 12- 1-AB
W5EHC 220- 10- 1—
WA5BPI 198- 9- 1-A
K5AWD 176- 9- 1-A
W5JKK 154- 7- 1-A
W5UYQ 132- 6- 1-AB

Southern Texas

WA5AUA 336- 14- 2-A

CANADIAN DIVISION

Ontario

VE3CIL 5208-186- 4-B
VE3ESE 4380-146- 5-AB
VE3CVX/3 2784-116- 2-B
VE3DUU 2664-111- 2-B
VE3CXK 2212- 79- 4-B
VE3TT 1920- 80- 2-B
VE3EZC 1898- 73- 3-B
VE3BYU 1690- 65- 3-B
VE3BBC 1272- 53- 2-B
VE3CLT 1224- 51- 2-B
VE3CWR 1224- 51- 2-B
VE3DWQ 1224- 51- 2—
VE3AST 1200- 50- 2-B
VE3CKB 1092- 39- 4-AB
VE3DFA 1080- 45- 2-B
VE3BBO 912- 38- 2-B
VE3FCF 768- 32- 2-B
VE3EWW 744- 31- 2-B
VE3AAH 720- 30- 2-B
VE3FOE 720- 30- 2-B
VE3EBP 676- 26- 3-B
VE3BBC/3 648- 27- 2-B
VE3FJS 644- 23- 4-AB
VE3AEZ 572- 26- 1-B
VE3ETM 552- 23- 2-B
VE3EZI/3 552- 23- 2-B
VE3BBO/3 504- 21- 2—
VE3AL/3 440- 20- 1-B
VE3DTV 440- 20- 1-B
VE3FAP 432- 18- 2—
VE3EWU/3 374- 17- 1-B
VE3ASZ 330- 15- 1-B
VE3EOD 330- 15- 1-B
VE3FAQ 330- 15- 1—
VE3EZC/3 286- 13- 1-B
VE3EZI/3 242- 11- 1-B
VE3EBY 240- 10- 2-B
VE3EWU 220- 10- 1-B
VE3FLY 220- 10- 1-B
VE3DTU 198- 9- 1-B
VE3EIJ 176- 8- 1-B
VE3DAY 132- 6- 1-B
VE3BOU 88- 4- 1-B
VE3CUW 44- 2- 1-B

Quebec

VE2ALE 1148- 41- 4-B
VE2AQA 1036- 37- 4-AB

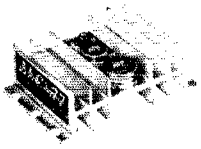
* [1] W3HFY, opr. [2] K3HJA, opr. [3] W3BN, opr. [4] K3SPS, opr. [5] WA2OAA, opr. [6]K9EEC, opr. [7] W8OCK, opr. [8] K8OLB, opr. [9] WA2KZV, opr. [10] Hq. Staff, not eligible for award. [11] W1QIS, opr. [12] K1RYE, opr. [13] K1FTG, opr.

by hams... for hams... Harvey is reliability

Harvey

VALUES OF THE MONTH

TRANSISTOR IGNITION BY AUTOMOTIVE ELECTRONICS —



Complete, factory wired, AEC 77 system for installation in all 6- or 12-volt vehicles with negative ground.

Increases power up to 10% . . . assures fast starts at low end . . . full power at high rpm . . . up to 20% more mpg . . . increases spark plug life 3 to 5 times over normal . . . insures 75,000 mile point life . . . gives instant starting in sub-zero weather . . . eliminates frequent tune-ups . . . simple 20 minute installation by anyone . . . cures ignition problems . . . MOBILE RADIO IGNITION INTERFERENCE REDUCED.

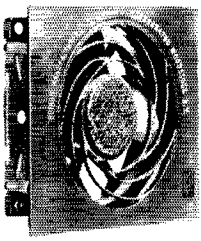
In conventional ignition systems, high voltage at the spark plugs falls off over 50% as engine speeds increase. The result is a weak spark causing incomplete combustion, loss of power, fouled plugs and poor gas mileage. The rugged AEC 77 electronic ignition increases and maintains maximum high voltage output at the spark plugs with no high voltage fall-off at any speed.

Says World Champion Racing Driver Phil Hill, "Rarely does a device come along that improves power, performance, and economy at the same time. My congratulations to AEC 77".

Every AEC unit uses high quality components such as Delco high voltage 15 ampere transistors and Motorola 50 watt zener diodes. Every AEC ignition coil is wound with Formvar insulated wire, oil impregnated and hermetically sealed for maximum insulation and cooling.

Complete AEC 77, factory wired, with 400:1 coil ratio, 6/12 volts **$39.95**

Please add 75¢ for postage and handling.
25% deposit on COD's.



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**

BRAND NEW SOUND-POWERED HANDSETS WITH WESTERN ELECTRIC UNITS —

Operation up to 5 miles over a simple, two-wire line. No batteries or other external power required. Just the thing for tuning up that beam. Use anywhere a telephone or any other two-way communication set-up is needed. It's portable and flexible.

Per pair less wire **$24.95**

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.

UNI-CARD

103 West 43 St., New York 36, N. Y. (212) JUdson 2-1500

Happenings of the Month

(Continued from page 93)

The specific assignment of the committee for the past year was to consider a program of club recognition through awards for group participation in such ARRL sponsored activities as Field Day, Sweepstakes, and similar contests. The committee does not subordinate such a program to an insignificant level, but in light of developments during the past year, it feels that there are other aspects of a public relations program which are of a greater urgency at this time and should be considered by the Board. The committee does recommend, however, that each Director evaluate an award program in his own division to best serve the needs of club recognition and to submit his determinations to the Public Relations Committee before the close of the year 1964.

After a thorough and conscientious study of the many comments of the membership relating to the current policies and proposals of the League, this committee concludes that attention should be focused on a three-fold public relations program designed to (1) best serve the interests of the League at the domestic and international levels, (2) concentrate upon ARRL members and non-members alike in stressing the principles of the amateur service and (3) inform the general public of the purposes and accomplishments of amateur radio in the past, present and future.

To elaborate further on such a program, the committee feels it is imperative that the League maintain the closest possible liaison with our own governmental and regulatory agencies on the domestic level and to provide the maximum possible support and financial assistance to the IARU on an international level.

The committee recommends an ARRL field corps to bring about a closer relationship between the League as a representative organization and the amateurs and their clubs that comprise the membership. Composed of prominent radio amateurs and augmented by the headquarters staff personnel, the field corps could schedule meetings throughout the United States and Canada for the purpose of maintaining an active liaison with the amateur body, and even of greater importance, with such non-amateur organizations as Kiwanis, Rotary, Lions Club, etc., as well as school science clubs at the community level for the specific purpose of increasing the stature of the League and the amateur service in the public interest, convenience and necessity.

The committee is of the opinion that dissemination of information to the general public could be improved to obtain the necessary contacts with the news media of the press, radio, and television. Every avenue of publicity should be exploited.

Respectfully submitted:

CARL L. SMITH, W0BWJ
ROEMER O. BEST, W5QKP
PUBLIC RELATIONS COMMITTEE

May 1, 1964

(Continued on page 168)

Visit the Nation's Capital on your way!

The capital of the United States, one of the most beautiful and impressive of the world's centers of government—offers the final bit of spice to make your trip to the World's Fair complete. Plan to include a visit to Washington, D. C. in your itinerary. **(Don't miss the big Hallicrafters display at Uncle George's in suburban Wheaton, Md.!)** You'll be delighted by Washington's fascinating embassies **(be sure to visit Ham Headquarters . . . Uncle George's in Wheaton, where else?)** . . . see the white tiger at the zoo, the flood lit Capitol at night. Better yet—just stop at Uncle George's and we'll tell you where to go and what to see. **(You can be sure we'll say a few kind words about our Hallicrafters display!)**

Uncle George's Ham Shack

11324 Fern St.
Wheaton, Maryland
949-2262

NOW IN OUR TENTH YEAR OF SERVICE TO HAMS

Minutes of Executive Committee Meeting April 30, 1964

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Headquarters office of the League in Newington, Connecticut, at 10:47 A.M. April 30, 1964. Present: President 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 Huntoon; Vice President F. E. Handy; and Treasurer David H. Houghton. Also present were General Counsel R. M. Booth, Jr., and a number of visiting directors and vice-directors of the League.

On motion of Mr. Eaton, unanimously VOTED to approve the holding of an Oregon State Convention in Klamath Falls on May 23–24, 1964, and a Florida State Convention in Miami on January 23–24, 1965.

The Secretary presented an offer from Lloyd Colvin, W6KG, to make the League the beneficiary of a $100,000 life insurance policy, the eventual proceeds to be used for monetary awards to deserving radio amateurs, to be known as the "Colvin Award". On motion of Mr. Kahn, unanimously VOTED to accept the offer, subject to execution of an appropriate formal agreement, and to extend sincere thanks to Mr. Colvin on behalf of the League.

On motion of Mr. Denniston, unanimously VOTED to approve the League's proportionate share, $332, of printing costs of briefs in the FCC application fee litigation in the Seventh Circuit Court of Chicago.

On motion of Mr. Compton, affiliation was unanimously GRANTED to the following societies:

Alhambra Amateur Radio Club
Alhambra, California
Cathedral Amateur Radio Club (H. S.)
Springfield, Mass.
The Elberton Amateur Radio Society
Elberton, Georgia
The Hills Amateur Radio Society
Rochester, Michigan
Hopewell Amateur Radio Club..Hopewell, Virginia
Las Vegas Radio Amateur Club, Inc.
Las Vegas, Nevada
Marion VHF HiBanders, Inc.....Galion, Ohio
Messick Amateur Radio Klub (H. S.)
Memphis, Tennessee
Minuteman Radio Club.....Whiteman AFB, Mo.
Shoreline Amateur Radio Club..Essex, Connecticut
Souhegan Amateur Radio Association.....
Milford, New Hampshire
Syosset High School Radio Club
Syosset, New York
Tulare County Amateur Radio Club
Lindsay, California
Air Capitol Amateur Radio Assn, Inc.
Wichita, Kansas
Norfolk Radio Club.....Norfolk, Nebraska
The Pilot Knob Amateur Radio Club
Leavenworth, Kansas

(Continued on page 170)

RECONDITIONED EQUIPMENT

★ 10 Day Free Trial (Lose only Shipping Charges) ★ 30 Day Guarantee ★ Full Credit Within 6 Months on Higher Priced New Equipment ★ Pay as Little as 10% Down and Take up to 3 Years to Pay the Balance Order Direct from this Ad!

AMECO	
AC-1 Xmtr	$15
CB-6 Conv	17
CN-144 Conv	29
CN-50 Conv	29
PS-1 AC Sup	7
PV-50 Preamp	9
TX-86 Xmtr	69

B & W	
5100 Xmtr	$119
51SB SSB Gen	119
51SB-B Gen	109
L-1000A Lin	149
370 SSB Slicer	24
650 SWR	24

CENTRAL ELECT.	
10A Exciter	$59
20A Exciter	125
QT-1 Anti-trip	9
BC-458 VFO	24
BC-458/10M	39
100V Xmtr	450
200V Xmtr	595
600L Lin	219

CLEGG	
99'er Xcvr	$99
Thor VI w/AC	275
Zeus Xmtr	425
Interceptor	325

COLLINS	
75A-1 Rec	$169
75A-2 Rec	225
75A-4 Rec	375
75S-1 Rec	325
75S-2/blanker	399
75S-3 Rec	475
32V-2 Xmtr	175
32V-3 Xmtr	249
32S-1 Xmtr	450
30S-1 Lin	995
KWM-1 Xcvr	275
399B-1 Adapt	39
KWM-1 Console	59
MP-1 Mob Sup	125
516E-1 12vDC	109
516F-1 AC Sup	75
PM-2 Sup	95
CC-2 Case	50
DL-1 Load	35
189A-2	35
312B-3 Spkr	19
312B-5 PTO	249
351D-1 Mount	39
351D-2 Mount	79

DRAKE	
1A Rec	$119
2A Rec	179
2AQ Combo	24
2B Rec	209
2BQ Combo	29
2BS Spkr	12
2AC Calib	12

EICO	
147A Tracer	$19
315 RF Gen	29
324 RF Gen	24
460 Scope	49
720 Xmtr	49
722 VFO	34
723 Xmtr	34
730 Mod	39
944 Tester	14

ELDICO	
SSB-100F	$325
SSB-1000F	225

ELMAC	
A-54 Xmtr	$29
A-54H Xmtr	34
AF-67 Xmtr	49
AF-68 Xmtr	99
PS 2V AC Sup	29
PMR-6 Rec	34
PMR-6A Rec	39
PMR-7 Rec	64
PMR-8 Rec	89
PSA-500 AC Sup	19
PSR-612 DC Sup	19
PSR-6 DC Sup	9
PSR-12 DC Sup	9
M-1050 DC	29
M-1070 AC/DC	39

GELOSO	
209 Rec	$149

GLOBE	
65A Xmtr	$29
65B Xmtr	34
680 Xmtr	44
680A Xmtr	49
LA-1 Lin	69
Scout Deluxe	75
90 Xmtr	29
90A Xmtr	34
Chief Deluxe	39
Champ 350	225
DSB-100 Xmtr	49
755A VFO	39

GONSET	
Comm III 2M	$169
Comm III 6M	149
GC-105	199
Comm IV 2M	269
Comm IV 6M	249
6M Lin (II)	89
G-50 Xcvr	225
G-63 Rec	119
G-66 Rec	59
G-66B Rec	69
3-way Sup	24
Thin-pak	19
G-76 Xcvr	175
G-76 AC Sup	69
G-76 DC Sup	59
G-77 Xmtr	99
G-77A Xmtr	119
GSB-100 Xmtr	225
Super 12	34
6M 12v Conv	29

HALLICRAFTERS	
SX-25 Rec	$49
SX-28 Rec	89
HT-32 Xmtr	319
HT-32A Xmtr	349
HT-33A Lin	375
HT-33B Lin	595
SR-34AC	199
SR-34 AC/DC	225
HT-37 Xmtr	299
HT-40 Xmtr	49
S-40B Rec	59
SX-42 Rec	119
SP-44 Scope	49
S-53A Rec	49
SX-62 Rec	179
SX-62A Rec	275
SX-71 Rec	89
SX-73 Rec	349
S-76 Rec	69
S-85 Rec	69
SX-99 Rec	79
SX-100 Rec	149
SX-101 Rec	159
SX-101 Mk III	175
SX-101 Mk IIIA	199

HALLICRAFTERS	
SX-101A Rec	$219
S-106 Rec	29
S-107 Rec	59
S-108 Rec	79
SX-110 Rec	89
SX-111 Rec	149
SX-117 Rec	269
HA-10 Tuner	19
S-118 Rec	69
S-120 Rec	44
SX-122 Rec	225
SX-140 Rec	69
SR-150 Xcvr	495
P-150AC Sup	75
P-150DC Sup	79
MR-150 Rack	19
FPM-200 /AC	1250
HA-5 VFO	54

HAMMARLUND	
HC-10 Adapt	$59
HQ-100 Rec	99
HQ-100C Rec	109
HQ-110 Rec	119
HQ-110C Rec	129
HQ-110A Rec	159
HQ-110AC Rec	169
HQ-120 Rec	59
HQ-129X Rec	89
HQ-129X Spkr	9
HQ-140X Rec	114
HQ-145C Rec	149
HQ-145XC Rec	169
HQ-150 Rec	139
HQ-160 Rec	189
HQ-170 Rec	199
HQ-170C Rec	209
HQ-180 Rec	275
HQ-180C Rec	289
SP-600 Rec	275
SP-600 JX-17	495
HX-50 Xmtr	289
HX-500 Xmtr	325

HEATH	
HW-10 Xcvr	$169
HX-11 Xmtr	29
HX-20 Xmtr	149
MR-1 Rec	59
MT-1 Xmtr	44
MP-1 DC Sup	29
DX-20 Xmtr	24
DX-35 Xmtr	39
DX-40 Xmtr	44
DX-100 Xmtr	99
DX-100B Xmtr	149
TX-1 Xmtr	159
SB-10 Adapt	69
HX-10 Xmtr	275
HA-10 Lin	175
RX-1 Rec	149
HG-10 VFO	29
VF-1 VFO	17
Two'er	39
Six'er	34
Ten'er	29
UT-1 AC Sup	19
HP-20 AC Sup	29
HP-23 AC Sup	39
QF-1 Q-Mult	4
HD-11 Q-Mult	9
DF-3 Dir Finder	39

HUNTER	
Bandit 2000A	$425

JOHNSON	
Adventurer	$29
Navigator	79
Viking I	69
Viking II	89

JOHNSON	
122 VFO	$29
Ranger I	125
Ranger II	225
Valiant I	199
Valiant II	299
500 (4-250A)	395
500 (4-400A)	475
Pacemaker	149
Invader 2000	725
Courier Lin	139
Thunderbolt	325
6N2 Conv	39
6N2 Xmtr	99
Mob Xmtr	25
Mob VFO	15

KNIGHT	
R-55 Rec	$39
R-100 Rec	59
R-100A Rec	75
T-50 Xmtr	29
T-60 Xmtr	39
T-150 Xmtr	75
V-44 VFO	17

LAFAYETTE	
HE-10 Rec	$49
HE-35A Xcvr	49
HE-45 Xcvr	75
HE-50 Xcvr	69
KT-390 Xmtr	49

LAKESHORE	
Sig Splitter	$19
P-400-GG Lin	99
Bandhopper	49
Phasemaster II	119

MORROW	
5-BR (AS-IS)	$25
FTR (IF) (AS-IS)	20
MBR-5 Rec	49
MB-6 Rec	59
MB-560 Xmtr	49

MORROW	
RVP-250 Sup	$9
RVP-600 DC Sup	29

MOSLEY	
CM-1 Rec	$119
CMS-1 Spkr	9

NATIONAL	
SW-54 Rec	$25
NC-57 Rec	49
NC-66 Rec	49
RDF-66 D.F.	9
NC-88 Rec	59
NC-98 Rec	75
NC-98 Spkr	9
NC-109 Rec	89
NC-125 Rec	75
NC-155 Rec	119
NC-173 Rec	75
NC-183 Rec	119
NC-183D Rec	149
NC-188 Rec	69
NC-190 Rec	149
NC-270 Rec	149
NC-300 Rec	169
NC-300 C6	29
NC-300 C2	29
NC-303 Rec	269
HRO-50T Rec	125
HRO-60 Rec	225
NCX-3 Xcvr	269
NCXA Sup	79
NCXD Sup	69

POLYTRONICS	
62B Xcvr	$249
PC-6B AC/DC	249

PRECISION	
E-200 Sig Gen	$39

R M E	
HF Conv	$25
DB-23 Preamp	29
45 Rec/Spkr	59
VHF-152A Conv	34
4300 Rec	89
4302 Spkr	9
4350 Rec	109
6900 Rec	175

S.B.E.	
SB-33 Xcvr	$299
SB1-LA Lin	199
DC Sup	39

SWAN	
SW-120 Xcvr	$149
SW-140 Xcvr	149
SW-175 Xcvr	175

TAPETONE	
XC-50 Conv	$29
TC-220G	25

TECRAFT	
PTR-2 AC Sup	$34
CC 50 Conv	24
CC5-144 Conv	24

TMC	
GPR-90 Rec	$275
GPR-90 Spkr	19

UTICA	
650Xcvr/VFO	$125

WRL	
SB-175 Xmtr	$49
Galaxie 300	225
PSA-300 Sup	75

ACT NOW!

VISIT! our branch stores in ORLANDO, Fla. and CHICAGO, Ill.

AMATEUR ELECTRONIC SUPPLY

3832 West Lisbon Avenue
Milwaukee, Wis. 53208
Ph. (414) WE 3-3262.

Ship Me: _____

_____

_____

State Second & Third Choice (If Any)

I enclose $_____, and will pay balance (if any):

☐ COD ☐ 1 Year ☐ 2 Years ☐ 3 Years

NOTE: CASH ORDERS SHIPPED PREPAID! (In USA)

NAME _____

ADDRESS _____

CITY _____

STATE _____

☐ **Send Latest Reconditioned Equipment Bulletin**

Ridgefield Park High School Amateur Radio Club
Ridgefield Park, N. J.
Sparta School Amateur Radio Club (H.S.)
Sparta, N. J.
Cook County Ham Club . . . . Arlington Heights, Ill.
Danvers Amateur Radio Association
Peobody, Massachusett
Hillsdale Amateur Radio Club . . Hillsdale, Michigan
Elkhart High School Amateur Radio Club
Elkhart, Indiana
Kera Amateur Radio Club . . . Ravenswood, W. Va.
Wayne State University Radio Club
Detroit, Michigan

At this point the Committee extensively reviewed plans for the modernization and refurbishing of W1AW. On motion of Mr. Eaton, unanimously VOTED that the Communications Manager is authorized to proceed with a renovation of the Maxim Memorial Station, W1AW, generally in accordance with plans he has presented, and that the General Manager is authorized to pay from the Building Fund the costs of such renovation not to exceed $20,000.

On motion of Mr. Eaton, unanimously VOTED to accept a change of date in the Ontario Province Convention to October 2-3, 1964.

There being no further business, the Committee adjourned at 12:45 P.M.

JOHN HUNTOON, *Secretary*

The World Above 50 Mc.

(Continued from page 108)

the mid western states to look out for him at or about 50.5 Mc.

Our regular reporter from Nevada, K7ICW notes only one E_s opening during April, on the 16th. "Stations were coming in fairly well from Oklahoma, Texas, Missouri, Iowa and Arkansas. Heard lots of s.s.b. but no *EE* or *E* backscatter noted. On April 18 heard lots of ionoscatter with K7CAZ in Seattle, being the only one positively identified. Out in Oregon K7GWE sez: "Still no openings on 50 Mc. but expect them soon." Imagine you've had a number of them by now, Randy. Good luck! In Michigan W8MBH reports 50 Mc. open to Pennsylvania, New York and Ohio on April 24, and one 2, K2LOK, heard on the 28th. K8VEX reports good ground wave into Wisconsin on April 26 and an aurora on the 30th. Ivan has been very busy lately erecting a 70-ft. wooden tower and — "I am putting in a ground system. I have got a 1000 feet of #12 wire that I am putting about six inches in the ground, with ground rods at the end of each radial." (Such ambition!) QST

COMPARE

WRL OFFERS YOU THE FINEST HAM EQUIPMENT ON THE MARKET AT PRICES YOU CAN AFFORD!!

TOP TRADE-IN ALLOWANCE ON YOUR PRESENT GEAR FOR NEW OR USED EQUIPMENT

OVER 1200 PIECES OF RECONDITIONED UNITS AT BEST PRICES AND 4-WAY GUARANTEE

SEND FOR **FREE** "BLUE BOOK" LISTING ON RECONDITIONED EQUIPMENT

SEE WRL FOR ALL YOUR AMATEUR NEEDS

FREE NEW 1964 WRL HAM CATALOG

WORLD RADIO LABORATORIES
3415 WEST BROADWAY
COUNCIL BLUFFS, IOWA 51504

The House the Hams Built

NOW! ORDER YOUR GALAXY TRANSCEIVERS FROM WRL!

GALAXY III

80-40-20 METERS

ONLY...$349.95

NO DOWN PAYMENT . . . . . ONLY $17.00 MONTHLY ON WRL CHARG-A-PLAN

GALAXY V

80-40-20-15-10 METERS

ONLY...$469.95

NO DOWN PAYMENT . . . . . ONLY $21.00 MONTHLY ON WRL CHARG-A-PLAN

GALAXY OF FEATURES (III & V)
BOTH MODELS—THE BEST IN MOBILE & FIXED STATION OPERATION.

Handsome styling—functional design. Brushed aluminum panel with 4-color etchings. Flat black knobs and perforated steel cabinet with hinged top.

- 300 WATTS SSB/CW INPUT conservatively rated
- FULL COVERAGE ALL BANDS
- BEST FILTER AVAILABLE exceptional 2.1 KC filter stays 60 db down—with 1.8:1 shape factor
- MOST COMPACT 300-WATT TRANSCEIVERS—size, 6" x 10¼" x 11¼". Weighs only 13 lbs.
- SELECTABLE USB OR LSB with illuminated indicators
- ALC CIRCUIT BOOSTS TALK POWER

TWO-WEEK FREE TRIAL*

WRL **WORLD RADIO LABORATORIES**
3415 WEST BROADWAY
COUNCIL BLUFFS, IOWA

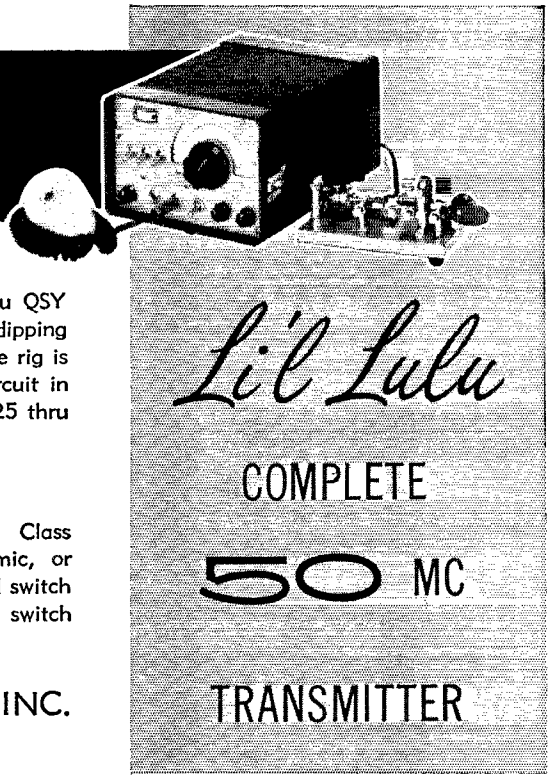
☐ Enter order on attached sheet. ☐ Send Galaxy III & V brochure. * ☐ Send trial terms. ☐ Quote trade allowance on attached sheet. ☐ Send FREE "Blue Book" sheets, ☐ Send FREE WRL Ham Catalog.

Name_____ Call_____

Address_____

City_____ State_____

One Control tunes this rig . . . from VFO thru final



Li'l Lulu

COMPLETE 50 MC TRANSMITTER

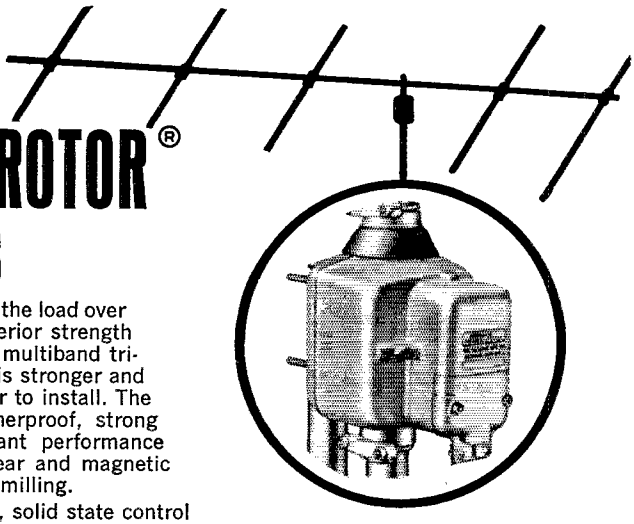
Special gang-tuned circuits in Li'l Lulu let you QSY instantly — there's no buffer tuning and final dipping needed when the frequency is changed. And the rig is really TVI proof! By keeping the VFO grid circuit in the 25 mc range, TVI is eliminated. Price: $225 thru your dealer.

Check these features:

- 117 vac, 12 vdc integral power supply
- Class A high level modulation
- Carbon, dynamic, or crystal mic input
- Push-to-talk, or use panel switch
- Built-in cw keying filter
- VFO spotting switch
- VFO control
- 12DQ7 final.

WHIPPANY LABORATORIES, INC.
1275 Bloomfield Ave., West Caldwell, N. J.

NEW ALLIANCE TENNA-ROTOR®
for Ham Installations



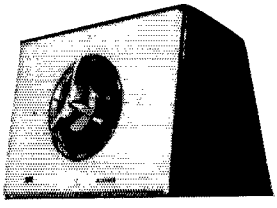
The patented-rigid-offset design distributes the load over a greater area and gives the rotator a superior strength to weight ratio. Ideal for use with amateur multiband tri-bander type antennas.* This compact unit is stronger and lighter, therefore making it safer and easier to install. The Rotator unit is fully enclosed in a weatherproof, strong ribbed die-cast zinc housing. An important performance feature is the combination of the worm gear and magnetic brake, which has a high resistance to windmilling.

The completely transistorized Model C-225, solid state control features a patented phase-sensing electronic bridge circuit. All you do is turn the knob and the antenna will automatically sync to that direction.

If you can lift and mount your antenna on the Tenna-rotor, it will support it, hold it, and turn it.

**Recommended mounting one foot maximum above the rotator.*

For complete details write: **Listed & CSA Approved**



Model C-225

The **ALLIANCE** Manufacturing Company, Inc.
(Subsidiary of Consolidated Electronics Industries Corp.) **ALLIANCE, OHIO**

BARRY ELECTRONICS

Collins R-388/URR Receiver (.5 to 30.5 Mcs). Sometimes known as 51J3. 110 VAC/60 CPS. Good F.B. clean condition Xtal filter. **$550.00.**

Collins R389/URR Low Freq. Receiver. 110 VAC. Cabinet model in Mint condition. 15 KCS through 1500 KCS. With motor drive and Digital Freq. dial. **$850.00** with book.

R-383/CRD-2A Receiver. 14 tubes. Very sensitive, very good condition. (.54 to 32 Mcs.) 110 VAC. Similar in appearance to famous AR-88 Receiver. **$115.00** with book.

AN/URM-35 (SG-56) Signal Generator. 4.5 to 8.00 KMC. **$275.00** with book.

Grundig Hi-Quality TV Camera in original mfgrs' cartons. Tested, working. With first quality 6198 Vidicon. For Ham TV or operates directly into any standard TV receiver for CCTV. 115 VAC @ 60 CPS. **$295.00.**

BC-221 Freq. Meters: Excellent condition. Original calibration books. Lab-tested okay. 125 to 20,000 KCS. **$89.00.**

BC221 AK Freq. Meter with internal modulation. 125 to 20,000 KCS. **$110.00.** (With orig. calibration book . . . Lab-Tested O.K.).

BC221 AC Freq. Meter with built-in AC Power Supply. **$125.00,** with orig. calibration book.

TS-175U Freq. Meter with internal modulation. Looks like BC221, but freq. range is 85 to 1,000 Mcs. **$150.00.**

Same as above with 115 VAC built-in power supply. **$175.00.**

RME6900 SSB/CW/AM Receiver with Matching Speaker. Brand-new sealed factory cartons. **$250.00** for the combination.

CDR "Ham-M" Rotor. $110.00. New Factory-Sealed Carton . . . Complete.

Write or Call for Special Prices on the following NEW HAM Gear in stock: **HQ-110AC, HQ-170A, HX-50, HXL-1 Linear Amplifier, National NCX-3 Transceiver** with AC and DC Power Supplies, **Viking Ranger II (Wired). Clegg Zeus VHF Transmitter. Clegg VHF Interceptor Receiver, Hammarlund HK-1B Electronic Keyer. Ameco TX-86, 90 Watt (6 thru 80) Transmitter, Drake 2B Receiver, Drake 2B-Q Spkr/Q Multiplier. National NC-400.**

When visiting the Fair in New York (Flushing), please visit us too! 30,000 square feet of choice merchandise. Most diversified tube stock in the world.

Call or Write for Sale Price on Following Equipment in Excellent to like-new condition:

Collins 75S-3A ("Mint"), **Collins KWM-2, Gonset G-66, Prepro (10 to 160) Transmitter, LM Freq. Meters.**

ARC-5 Transmitters (new) 7 to 9.1 Mcs. **$12.50.**

Choke 5.5 Henries @ 900 Ma. 3 KV RMS Test. **$13.00.**

10 KW. High-Power DPDT Antenna Relay. Brand new/orig. box with book. Mycalex insulation. (Cost over **$300.00** ea.). **$25.00.**

Johnson Dual Section Variable Capacitor: 31 to 151 Mmf. Type 150 DD70. Orig. boxed. Johnson cat. #153-511. (Reg. **$19.95**). On sale **$12.50.**

Don Bosco "Mosquito". Pen type, signal injector. With pocket clip. This unit injects an IF, RF Signal. Transistorized signal injector. Ideal for servicing transistor radios, etc. Requires 1½ volt penlight battery. Brand new/Boxed. Regular **$9.95.** On sale **$7.95.** W/sheet.

Illumitronic Air Dux: Model PI-195-I @ **$7.35** net; Model PI-195-2 @ **$15.50** net. Brand new boxed with full instruction sheet.

Alliance K-22 Tenna Rotor @ $19.75.

Alliance T-20 Tenna Rotor @ $24.03.

U-1 Alliance Tenna Rotor @ $28.78.

Klixon 15 Amp., Circuit-Breaker (115 VAC) **35¢.**

COME IN AND BROWSE. MONDAY TO FRIDAY—Thousands of items that we cannot list in an ad. MON. TO FRI. 9 to 6. SATURDAYS 10 to 2 PM. (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. Orders under **$5,** add **50¢** to cover Service Charge.

BARRY ELECTRONICS DEPT. Q-7
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. **50c service charge for orders under $5.00.**

☐ Send for New 64 page greensheet catalogue No. 12
☐ Send information.....
☐ I have available for trade-in the following.....

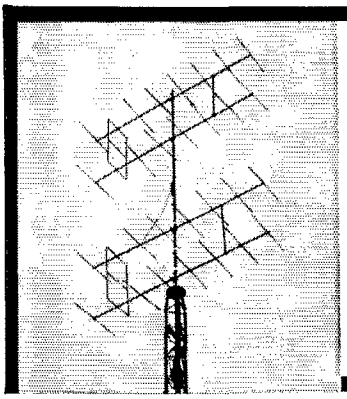
.....

Name.....Title

Company.....

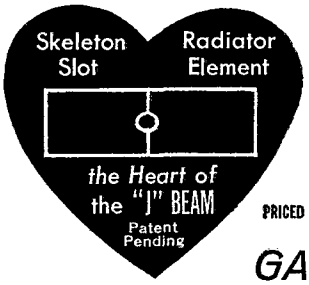
Address.....

City.....State.....



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

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 noncommercial 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 (5), 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 checking-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.

BIG "D" Hamboree, August 15, 1964. Goodies, family fun, swimming pool nearby. Make plans now! Pre-registration ($2.00) closes August 1. Write Ed Youngblood, Dallas Amateur Radio Club, Box 30532, Dallas, Texas.

PEORIA Hamfest September 20, Exposition Gardens, Peoria Area Amateur Radio Club, Registration $1.00 until Sept. 11. Write Ferrel Lytle, W9DHE, 419 Stonegate Rd., Peoria, Ill.

HAMFESTER Radio Club Hamfest August 9, 1964. Write for full details. Hamfester Radio Club, K9LOK, 5434, So. Bishop St., Chicago, Illinois 60609.

ANNOUNCING! The 30th Annual Hamfester Radio Club Hamfest and Picnic, Sunday, August 9, 1964, Santa Fe Park 91st and Wolf Road, Willow Springs, Illinois, near Chicago. For complete information and maps write John Chass, K9LOK, 5434 South Bishop St., Chicago, Ill. 60609.

AMATEUR Paradise Vacation: Livingstone Lodge and log cabins, Mascoma Lake, Enfield, New Hampshire. Couples, families, 100 acres, swimming, fishing, boats, sports, Dartmouth golf course, tennis. Hot showers. Fire places. 35th year. Light housekeeping. Couples, $50 per week, children half. Literature. A1 O. Livingstone. W2QPN.

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 Eimas, subject to our test. Maritime International Co., 199 Front St., Hempstead, N.Y.

TOROIDS: 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 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan. Tel NOrmandy 8-8262.

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 suitble for framing. It's a Wow! Brigman, W4IEN, Box 257, Norcross, Georgia 30071.

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, W2KUW, 308 Hickory, Arlington, N.J.

QSLS?? WPES?? Personalized made-to-order one-day service! Largest variety samples 25¢ DeLuxe 35¢ (refunded). Sakkers, W8DED, Box 218, Holland, Mich.

C. FRITZ QSLS. Bringing hams greater returns over a quarter-century! Samples 25¢ deductible. Box 1684, Scottsdale, Ariz. (formerly Joliet, Ill.).

QSLS. Twenty exclusive designs in 3 colors. Rush $3.85 for 100 or $6.90 for 200 and get surprise of your life. 5 days' service. Satisfaction guaranteed. Constantine Press, Blandensburg, Md.

QSL, SWL, cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elm, Hamilton, Ohio.

QSLS: samples 25¢ (refundable). Schuch, W6CMN, Wildcat Press, 6707 Beck Ave., North Hollywood, Calif.

QSLS "Brownie" W3CII, 3111 Lehigh, Allentown, Penna. Catalog with samples. 25¢.

QSLS-SMS. Samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio 14107.

QSLS. See our new "Eye-Binder" cards. Extra high visibility. Samples 25¢. Dick, W8VXK, 1996 N. M-18, Gladwin, Mich.

DELUXE QLS. Petty, W2HAZ, Box 27, Trenton, N.J. Samples, 10¢.

SPECIALISTS. Distinctive Samples 15¢. DRJ Studios, 2114 N. Lavergne Ave., Chicago 39, Ill. 60639.

QSLS-SWLS, 100 2-color glossy, $3.00; QSO file cards, $1.00 per 100. Samples, 10¢. Rusprint, Box 7575, Kansas City 16, Mo 64116.

CREATIVE QSL Cards. Free, new catalog and samples. Personal attention given. Wilkins Creative Printing, P.O. Box 787-I, Atascadero, Calif. 93422.

QSLS. Distinctive samples dime. Volpress, Box 133, Farmingdale, N.Y.

ZIP Code rubber stamp, call, name, address with ink pad, $1.00. K4ISA, E. Perry, Box 8080, Allendale, Fla.

DON'T Buy QSLS until you see my free samples. Bolles, W5OWC, Box 9363, Austin, Texas.

QSLS, SWLS, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QLS, SWLs, XYL-OMs (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing: eye-catching, comic, sedate, fatabulous. DX-attracting, prototypal, snazy, unparagoned cards (Wow!), Rogers, KØAAB, 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, Mo. 63118.

QSLS 3-color glossy. 100, $5.50. Rutgers Vari-Typing Service. Free samples Thomas St., Riegle Ridge, N.J.

QSLS. Kromekote 2 & 3 colors, attractive, distinctive, different. Free ball point pen with order. Sample 15¢. Agents for Call-D-Cal decals. K2VOB Press, 31 Argyle Terrace, Irvington, N.J.

QSLS $2.50 per 100. Free samples and catalog. Garth, Box 51Q, Jutland, N.J.

QSLS. All kinds, free samples. W7IIZ Press, Box 183, Springfield, Ore.

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 60639.

1½" Call QSLS $2.40/100, $2.90 (2 sides). Samples. Gariepy, 2624 Kroemer, Ft. Wayne, Ind.

RUBBER Stamps. 3-line. $1.00. Andrew Travis, 2002 West 8th, Austin, Texas 78703.

AT Last! Something new in QSL cards! All original designs. Send 10¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

PICTURE QSL Cards of your shack, etc. Made from your photograph. 1000, $14.50. Also unusual non-picture designs. Samples 20¢. Raum's, 415A Fifth St., Philadelphia, Penna. 19140

QSLS, SWLS. 3-colors, 100 $2.00. Samples dime. Bob Garra, Very reasonable. Samples 10¢ refunded. Joe Harms, Mystery Hill, No. Salem, N.H.

QSLS, $1.90. Dime. Filmcrafters, Box 304, Martins Ferry, Ohio.

QSL. Stamp and call bring samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLS. Samples. Dime, Printer, Corwith, Iowa.

QSLS: Distinctive, economical. Free samples. QSO file cards 200-$1.50. R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

QSLS, 100 for $3.00. 28 new drawings. Samples 10¢. Brigham, Colson St., No. Billerica, Mass.

QSLS: $2.50/100. New catalogue, samples 10¢. Longbrook, Box 393-W, Quakertown, N.J. 08868.

HUNDRED QSLS: $1.00. Samples, dime. Meininger, Jesup, Iowa.

QSLS. Samples 10¢. K. Kidd's, RD 1, Box 254, Telford, Penna.

ATTRACTIVE QSLS: Guaranteed largest variety of individual samples (25¢ deductible). Paul Levin, K2MTT, 1460 Carroll St., Brooklyn, N.Y. 11213.

MUST Sell: 75A-4-500A, Globe King, Johnnie Brines, K4GGM, 16 Barbrick St., Concord, North Carolina.

SELL, swap or buy ancient radio sets and parts, magazines. Laverty, 118 N. Wycombe, Landsdowne, Penna.

BARGAINS! Ham's Trading Paper. Next 10 issues, $1.00. Free sample. The Ham Trader, Box 153C, Franklin Square, N.Y.

HICO 720 xmtr, 730 mod, and Knight R-100 for sale. All professionally wired; can be shipped or mailed, $180 or make an offer. K8QA, 255 N. Graton, Romney, W. Va. 26757.

BOOST Reception: 3.5-30 megacycle SK-20 Preselector kit, $18.98. Boost modulation. AAA1-1 clipper-filter kit, $10.99. Reduce noise, NJ-7 Noisejector, IF, wired. $4.89. Postpaid! Literature free. Holstrom Associates, Box 8640-T, Sacramento, Calif. 95822.

FOR Sale: Plate transformers, 3600-0-3600 VAC @ 1000 Ma., with dual 110V and 220V primaries, $35; 4-100A filament transformers 7.5 VCT @ 21 amps, $17. Peter W. Dahl, KØBIT, 5331 Oaklawn Ave., Minneapolis, Minnesota 55424.

COLLINS OWNERS! Work A.M. wired kit, $5.00! No soldering! Holes! Chassis removal! Switch In-Out! (State model)! KWM-2 Independent Receive Control. $15.00. Kit Kraft, B-763, Harlan, Ky.

KWS-1 wanted. Prefer late model. W6WZD, 98 Fairview Ave., Atherton, Calif.

SELL: Link 120-watt FM base station. Fine for six meters, $60.00; KWM-2, PM-2, MM-1 Bandspanner, $1050.00. In excint condx, never mobile. F.o.b. Dallas, Melton Goodwin, W5EEY, 11421 Fernald Ave., Dallas, Texas 75218.

WRONG Frequency? Change crystal frequency with this crystal etching kit, supplies everything needed, $1.00; deluxe model, $2.00. Guaranteed Ham Kits. Box 175, Cranford, N.J.

SELL: NC-300 receiver w/100 Kc calibrator, in perf. condx. Used vy little: $235.00. Manual is included. Can ship express collect or will deliver within reasonable distance. K3HGX, P.O. Box 8873, Philadelphia, Penna. 19117.

COLLINS KWS-1, 75A4 and SX-101 station for sale. The equipment is in A-1 operating condx and appearance is excint with no signs of wear. This station has been used approximately 100 hours and has not been altered in any way. Serial numbers are as follows: KWS-1, 759; 75A4, 3139; receiver has three filters 800, 2,100 and 6,000 cycles. Please make offer. W9IBA, 1146 Long Valley Road, Glenview, Ill. Phone: Park 4-5505.

TUBES, Diodes, transistors wanted. High cash prices paid. Astral Electronics, Box 636, Elizabeth, N.J. Tel: 354-3141.

HAMMARLUND SP-600FX receiver, first class condx. Will ship. $450. W5HOA, Bill Weeks, 850 E. Madrid Rd., Las Cruces, N.M.

MOHAWK with 360° vernier dial for sale: $250. John Hawkes, VE3CIX, 703 Second St. E., Cornwall, Ont., Canada.

COLLINS S/Line 32S-1, 75S-2 noise blanker, c.w. filter. Make offer. W5HXW, 1234 Glen Cove, Richardson, Texas.

EXCITER Power supplies, triple output, 600V, 240V, 150V reg. rack mounting. $67.50. Contact Dick Tims, K6ZFS, 2239 Farringdon Ave., Pomona, Calif.

WANTED: Pay premium prices for a Collins VFO 70E-14 and old callbooks 1930 and back. W5WB, 702B N. Fillmore St., Amarillo, Texas.

200-V perfect. $595. W3DJW, 6904 City Ave., Philly, Penna.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts; 617-598-2530 for the gear u want at the price u want to pay.

SELL Or trade: New Wollensak #1980 stereo tape-recorder. Cost $379; Fisher #800 AM-FM stereo tuner/amplifier. K7EPD, 4250 E. Palo Verde Dr., Phoenix 18, Arizona. 947-1518.

HAM TV Equipment bought, sold, traded. Al Denson, W1BYX Rockville, Conn.

TOROID RTTY Kit; Mark-Space discriminator and bandpass filters. Includes 4-88 Mry 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 capactrs. $1.00 each. 5/$4.00, 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.

CRYSTALS: Free Bargain List. Nat Stinnette, W4AYV, Umatilla, Fla. 32784

WANTED: Parts, sets, as is GRC-9, BC-610, GRC-27, Autodyne. 236 Park Avenue, Bethpage, L.I., N.Y.

HAM Discount House. Write us for lowest prices on Ham Equipment. Factory sealed cartons. Specify equipment wanted H D H Sales Co., 170 Lockwood Ave., Stamford, Conn.

TUBE Specials: 811A, $2.50; 812A, $2.75; 866A, $1.45; 6146-6883, 3 for $5.00, etc. All new. Free list. Lou-Tronics, Inc., 74 Willoughby St., Brooklyn, N.Y. 11201.

RTTY Gear for sale. Write for list. 88 or 44 Mhy Toroids five for $1.75 postpaid. Elliott Buchanan, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

304TL tubes wanted. Also other xmttg 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! Mobileers Heavy-duty Leece-Neville 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.

WANTED: For personal collection: QSTs March and May 1916 W1CUT, 18 Mohawk Dr., Unionville, Conn.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J. Tel: GArfield Area code 201-471-2020.

CASH For callbooks. Old callbooks prior to 1925 or after 1931 wanted. W8EF, 795 Lake Shore, Grosse Pointe, Mich. 48236.

SELL: KWS-1, $650.00. In excellent condition. Dave De Armond, W6MSD, 3024 Seminary, Oakland, Calif.

SELL: HT-37, perfect condx: $250. George Gromm, WA2OGT, 1622 President St., Brooklyn, N.Y. Tel: PResident 3-8038.

FOR Sale: SX-117, HA-10 tuner and speaker. Like new. $290.00 takes all. F.o.b. Indpls. Floyd Ritter, 7221 E. 17th St., Indpls, Indiana 46219.

WANTED: 500 cycle filter (mechanical) for 75A-4. Sell rotary inductor 1 KW and turns counter-quality govt. surplus pullout. 5 kv var. cap., $20. R. Lumachi, 73 Bay 26th St., Brklyn 14, N.Y.

SELLING Out; GSB-100, $225; HQ-170C, $200, both for $400. Heath VHF-1 $135; HB 10-6-2 rcvr, $50, both $160. Other items, write for list. F.o.b. Bob, 626. 26th St., Cairo, Ill.

RTTY Regenerative repeater, like new, TT-63/A, $35.00. Technical manuals, cleaning out large assortment of manuals. What do you need? Frank Ashby, Box 3716, Modesto, Calif.

GONSET G-76 with AC and DC power supplies, mobile mount, Turner 350C mike, extra relay contacts for PTT, travel suitcase, $250 plus shppg. Mosley TM-5 80-10 meter automatic band-switching mobile antenna with ball socket and spring mount, $50. Dave Shores, WAØBVV, 7506 Byron, Clayton, Mo.

GLOBE Chief 90-A transmitter. $45. Included in price are three never used Novice band xtals. Mike Jones, 1340 Westover Rd., Ft. Wayne, Ind.

CHEYENNE w/AC supply, mike, key, filter, $140. RME4350A, calibrator, speaker, conelrad, in exc. condx, $150. K9OWM, 54 Crescent, Wilmette, Ill.

KWM-2 with AC pwr. supply. Four months' new. $750. Pick-up deal only. W2BIQ. Area code 914 LE 3-2762. Nicholas Lefor, RD #1, New Canaan, Conn.

SALE: NCX-3, NLXA, D-104 PTT mike, 3 months old, Package deal: $350. Sam Yates, 4212 Duke St., Portsmouth, Va. Phone 393-4800

SALE: 1923 Colin Kennedy regenerative receiver with 2-stage amplifier, 1923 four tube Radiola III-A, 3-tube sodion Conn. telephone receiver, all in perf. condx w/tubes, 2 pair original Baldwin phones. Maike Make offer. Photos on request. Andres, 5790 S.W. 114 Terrace, Miami, Fla.

SELL: HX-10 SSB transmitter. 8 months old, in perf. condx, factory checked and calibrated, $300. Will ship. WA2YNS. J. J. Perry, WA2YNS, 424 Elmhurst Rd., Utica, N.Y. Tel: 315-7245374.

NEW: 4CX250B, $20; 4X150A, $10, never used, fresh date, K2BYB, 14 Cody St., Fords, N.J.

HARVEY-WELLS T-90 es Elmac pwr. supply. In gud condx, mobile or base. 90-watts, VFO, plate modulation, push-to-talk, ant. relays, $90 cash or $100 with trade on a Viking II. Write WN2KLZ. 1309 Hurt St., Utica, N.Y.

HEATH 80-mtr. SSB transceiver, HP-23 AC supply, and GH-12 mike, $150. K5RVV, 4575 Highland Road, Baton Rouge, La.

QSTS 1931 thru 1963 in binders, from estate of W4HO. Best offer. Mrs. Sidney Williams, North, Virginia.

WANTED: Thordarson plate transformers T-19P60, T-19P61, T-19P65. Advise price. W8ACP, 960 W. Milton, Alliance, Ohio.

VALIANT I, perfect, $175. Drake 2B, all xtals and calibrator, $180. Sten Gould, WA2MRO, 460 Forest Ave., Paramus, N.J.

SELL: Lampkin 105B and PPM, SX-71 with speaker and calibrator Comco 2-way sets. No trades. R. H. Pilant, 2926 W. 24th. Joplin, Mo.

WANTED: KWM-1 and Collins AC power supply. Must be clean and in excint wkg. condx. B. Sharpe, W9JKC, 634 Vernon St., Glencoe, Ill.

MUST Dispose: 82 copies Proceedings of the IRE, 3 vols., complete, 1926 to 1952. Real bargain for lot. Write for list. Mrs. Miriam Y. Knapp, W1ZIM, 191 Beechwood Rd., West Hartford 7, Conn. Tel: 521-2055.

COLLINS R-390, Globe Champ, 3-el, 20-mtr. Telrex, all manuals, DB23A, 7 ft. cabinet rack containing 838 Mod. and power, also 2000 V, 500 Ma. supply, extra 2000 V, 300 Ma. supply, Johnson T-R switch. Misc. parts, meters, tubes 150-Ts, 4-125A's, 806's, 833A's, 872A's, etc. Going trailer. W9KPN, 1925 N. Drexel Ave., Indpls, Ind. 46218.

NC-300. $175; Globe Scout 680A (80 to 6 mtr) phone, c.w., $75 Globe LA1 linear (80 to 6 mtr) 300 watt PEP, $75; Lafayette HE-61 VFO 6 mtrs., $12; Heath DX-20 80 to 10 C.W., $32. Master 40 hand-addressing machine and supplies, dandy for ham radio club secretaries! $35. All unscratched, perf. condx. K3IBQ, 608 Maple, Southampton Penna.

HEATH Twoer, $35; Tecraft 2-meter converter, $40; Alliance antenna rotor and control box, $15; Hallicrafters S-40A receiver, .55-17 Mc., $50; Hy-Gain 10-element 2-meter beam, $15; Heath AR-3 receiver, $10. WB2CVZ, 57 Livingston St., Rhinebeck, N.Y.

INVADER 200, in excint condx, less than 15 hours honest time. $425. WA5DXP, 1911 Metairie Ave., Apt. B, Metairie, La. 70020.

KWM-2, #917, S16F2 supply. In mint condx, never mobile, $850.00. Will consider 75A4 partial trade. Cannot ship, sry. W8LKH, 22040 Emery Rd., Cleveland, Ohio.

BC221T w/book and reg. P.S., $50; BC 348, AC, $50; Heath OL-1 monitor 'scope, $25; Instructograph xtra tapes, $30; Drake 1000 low-pass, $10; Heath GD-1B grid dip, $15; Vibroplex Deluxe w/case, $17.50; Paco B-10 Bat. Elim. and charger, $37.50; Eico $147 Sig. Tracer, $17. All manuals. Cert. chk or m.o. F.o.b. WA6YTR, 3489 Payne Ave., San Jose, Calif.

RTTY Filters. Octal mount, tuned 2125/2975 cps., $5.95 pair. Collins S/Line, $6.95. Zack, WA6JGI, 3232 Selby Ave., Los Angeles, Calif. 90034.

FOR Sale: Drake 2A $165; GSB-100, $185; Globe Scout Deluxe $85; RME 4300, $95 or best offer. WA6EPO, 19200 Itasca Street, Northridge, Calif.

FACTORY Wired DX-100B, factory aligned SB-10, wired for use together, HQ-110C, every piece perfect, all for $410. KØMRQ, 944 E. Normal, Springfield, Mo.

CONVERTED A54H, gud, $30. Knight sweep osc., new, $40. Richard L. Walker, 21 Adam Rush Rd., Peekskill, N.Y. 10566.

WILL Trade for Sideband station, stamp dealers stock, cost $950 wholesale, 80% U.S. R Sheppard, 153 Huffman, Doylestown, Ohio.

COLLINS 75A3 in A-1 shape with manual to first check for $260. W3BBV, 1357 Hill St., York, Penna. 17405.

THUNDERBOLT 2000W, $295; Gonset 500W, $75, both P.E.P., linears, factory wired, L/N. Viking II, $100, Johnson VFO, $30, both for $125. Cosh W2DTD, 29 Charles St., Merrick, N.Y.

GOING Tran-receive SSB station for sale: HT-37, $350; S101A, $250; HT-41, $300. Late Serial numbers, original cartons, manuals. Excellent condition. Will ship guaranteed. WA4FEI, 311 West View Street, Harrisonburg, Va.

75A4 with three filters, slow speed dial recent realignment, perf. condx, $425.00. B&W 5100 with 51SB Sideband generator, excint, $285. Sry, no shipping. QST also CQ 1954 through 1963: $3.00 per year. K2EN, A. Olson, 31 Jervis Rd., Yonkers, N.Y.

HAM Equipment. Buy, Sell. Trade. Details, 10¢. Lupi, 1225 Hillside Pl., North Bergen, N.J.

VIKING II, factory-wired, with 122 VFO, excint condx, $165; Eico 460 'scope, new, $65; LM-15 freq. meter, newly calibrated, with pwr. supply, $50. RME DB-20, $15. Winkelman, 13787 Farmington, Beaverton, Oregon.

SALE:Apache modified for push-to-talk; SB-10; Mohawk, all in perfect condition and operating. Going sideband mobile. Best offer over $400. No trades, cannot ship. Frank Travers, W3LNQ, 105 Landover Road, Bryn Mawr, Penna.

FOR Sale: KWM-2, 1 year old, never mobile, $850; PM-2, $100; 30L-1, $375; TH-4 beam, $75; better deal on package. CIE and Grantham correspondence courses, $25 and $35. WA2GFW, 410 Woodrow Avenue, Dunkirk, N.Y.

ATTENTION RTTY'ers: Typewriter ribbon re-inking device, $3.00 postpaid. WØAJL, Walter E. Nettles, 201 So. Eudora St., Denver, Colorado 80222.

JOHNSON Navigator, wired, sealed carton, $119; Heath DX-100, used, $99.00. Audio Exchange, 153-21 Hillside Ave., Jamaica, N.Y.

ELMAC AF67, Gonset Super Six with Superceiver, all power supplies and accessories: $125.00. W2DID.

SELL: Complete mobile rig, gud condx, Cheyenne rcvr, Comanche xmtr, E-V 727 mike, HP-10 power supply, speaker, cables, $100. A. S. Coverdale, 39 Vivian Court, Lakewood, N.J. 08701.

WANTED: Hycon-Eastern xtal filter 2215KB (.5 Kc). WA4QVF, Rte. 1, Box 415C, Englewood, Fla.

TRADE Adventurer w/cash for T-60, VFO. WN4RIJ.

SELL: Collins 32V-3, $260. Good condition. Doug Smyth, Bridgewater, Conn. K1UQJ.

ESTATE Selling. Make offer: National 303 receiver, Globe Chief transmitter, Lafayette TM-14 field indicator; National NC-57M receiver 303, TM14 and Chief used very little. All items in vy gud condx. R. L. Rodehorst, Adm., L. W. Rodehorst estate, 2510 7th St., Columbus, Nebr.

FOR Sale: 3 Jennings Vec var. conds. 1-4 to 250 mmfd, 5000 v. type VCSL, $40; 1-5 to 250 mmfd 10,000 volt type unknown, $25; 1-5 to 10 mmfd 3000 v. type USCL, $20; 3-13 mmfd 4000 volt oil, 2000 ea. new; 1- 5.0 mfd. 10,000 volt oil, $50. new; 3-Collins filters 250 Kc., $15,new. James Stafford, 478 Oriole St., Philadelphia 28, Penna.

HALLICRAFTERS SX-101A for sale, in top condition, $220. Johnson Ranger, top condition, $125. Going mobile. WA2FNI, Steve Fisher, 800 Greenwood Ave., Brooklyn, N.Y. TR 1-8670.

MUST Sell Gonset G-76, perfect, with A/C P/S and mike. Less than 25 hours' operation: $270. HQ-170C, as new, very little operating time with 24 hour clock, $270. Make offers. K3RMZ, 71 Saxton Rd., Dover, Delaware.

SALE: HQ-180, Viking Valiant, in perf. Condx: $225 ea or $400 takes both. New York Call TI 2-9500 Ext. 532 (W2DRS).

WASHINGTON Amateur Radio News. Free copy. Foundation for Amateur Radio, 2509—32nd St., S.E., Washington, D.C. 20020.

FOR Sale: 75A4, serial no. over 4000, with .5, 2.1 and 3.1 filters, excint condx, $550; Ham-M rotator, new, boxed, $100, used, reconditioned, $70; Gonset Bantam beam for 20 meters with new coils for 15 meters, $35. Gonset 201 linear, new, boxed, $270. Want: KWM2 and/or KWs1, late serial numbers. Maj. James W. Craig, 1646-B Sycamore Dr., Blytheville AFB, Ark. 72317. Tel Area code 501 532-4559.

FREE! Blue Book listings mailed on request. Our used equipment discounts lead the field. Over 1,000 items on hand. Two weeks trial, 90-day guarantee, nothing down, up to 24 months to pay. Full trade-in value toward new equipment for 90 days. World Radio Labs. Box 919. Council Bluffs, Iowa.

MOBILE Hi-power, all solid state, DC to DC converter 12 v. input, 300 to 600 v. output at 100 watts. Efficiency 70% minimum. Costs less than $20 to build. Send $3.00 for schematic and parts list. Jack Howell, Box 1293, Columbus, Ohio, 43216.

"WARRIOR" KW linear, $175; BC-221 frequency meter with AC power supply, $60; Heath Monitor 'scope, $40. All in A-1 state with manuals. WA2HSB, 5 Addoms St., Plattsburgh, N.Y.

COLLINS KW-1, serial No. 105, in immaculate condx. You ship. Best reasonable offer. W1ZIP/Ø, 269B Randolph, Grand Forks AFB, North Dakota.

SELL: Viking Valiant II, factory wired. Hammarlund HQ-170. Chicago and suburbs area. Phone ORchard 4-5848. W9OPI.

WANTED: Commercial, Military, All types, ARC, ARN, ARM, BC, GRC, PRC, TRC, URN, URM, TS, 618S-T, 17L, 51R, others. Ritco, P.O. Box 156, Annandale, Va.

RANGER, Timed sequence keying, A-1, $99.00. F.o.b. W9TJG, 12830 Cardinal Crest Dr., Brookfield, Wisconsin.

DRAKE 2-B with xtal calibrator, in mint condx. Little used. First $250 or your best offer. Also Gonset Sideband Exciter GSB-100 (See Sept. 1959 QST "Recent Equipment" section), with defective phasing network. Needs factory trip, otherwise FB. Only $75. R. Lloyd Mize, W4HU1, RFD 4, Versailles, Kentucky 40383.

PRINTED Circuit boards, Hams, experimenters. Catalog, 10¢. P/M Electronics, Box 6288, Seattle, Washington 98188.

FREE, Complete information on circuit boards, Types, Methods. Cut to size. Write to Boards, P.O. Box 2498, Gardena, Calif, 90247.

WRITE For free lists of finest reconditioned amateur equipment. Guaranteed. On approval. Time payments. Buy the best for less. Henry Radio Co., Butler, Mo.

WANTED: Will pay cash for surplus Kenyon S-13483 transformers, W4MDQ, 2015 Alston Ave. Rd., Durham, N.C.

FOR Sale: HT-32; 75A3, Pair 813 GG amplifier, including heavy-duty p/s. $750. Package deal. Sry, no shipping. In mint condx. Ken L. Blamey, 24 Conestoga Dr., Bethel Park (Allegheny Co.), Penna.

BEST Offers take flawless equipment (all inquiries will be answered): SX-101, Mark III, SX-100; HT-32, Mark 1, HT-33B (less than 2 hours on final tube); Globe Chief 90A with screen modulator; SX-47 speaker; dispatcher mike. Am going mobile again! K9DNR, Box 183, Cicero, Ill. 60650.

SALE: Heathkit Marauder HX-10. In gud condx. Factory adjusted, with matching Electro-Voice mike, $279. Hy-Gain TH4 Tribander, never erected, $79. Heath SWR Bridge, $9. F.o.b. Augusta, Ga. Vic Brodeur, 2211 Montclair St.

WANTED: Socket for 212D. W1BYP, Wallace Paquette, Fairfield, Maine.

WANTED: Morrow MB-560A, BC-221 or LM, BC-376H. W9-CES, 6018 W. Henderson, Chicago, Ill. 60634.

COLLINS Noise Blanker for 75A-4, 136C-1, new, $49; VFO for 75A-4, 70E-24, new, $39; VFO for KWS-1, 70E-23, new, $39; DX Adaptor for KWM-1, 399B-3, new, $24; Hunter Bandit 2000A, $339.00; 51S-1, $1150.00. Richard E. Mann, 7205 Center Dr., Des Moines, Iowa.

Matching Heath Station, 10-80 M. Apache transmitter, $210. Mohawk receiver with matching speaker, $190. Both excellent, with manuals. $390 for pair. Moseley TA33Jr. triband beam, $45. Ham-M Heavy Duty rotator, $70. 32' Rohn tower plus 8' drawn seamless mast, $40. Power supply, 400 V. @ 200 ma. plus extra filament transformer, rack mounted with meter, $25. W2HTD, 86 Brook Rd., Red Bank, N.J. 201-671-0131

NO Antenna Clause. Heath SSB, HR-20, HX-20, HP-20 AC power supply, March QST. Meticulously assembled by NYC EE student. All in mint condx. Worked 92% WAS with Dipole. Also: GD-104, electronic keyer, Vibro-Keyer, SWR bridge, unused TR-44 rotor. Best rig anywhere near its price class. Will demonstrate. All inquiries will be answered. Andy Hock, WA2RTL, Tel: VI 9-3352. 84-50 Austin St., Kew Gardens, N.Y.

SELL: Vibroplex Semi-Automatic key "Blue Racer Deluxe", $18.00; Ameco code practice oscillator CPS-WT, $10. Harris Zuelke, 4157 N. Clarendon, Apt. 601, Chicago 13, Ill.

NC-300, like new, original carton, $175, or best offer. Rugged plastic multiconductor cables, ½ in. diameter, #1 cable consists 15 #18 wires and 9 #14; #2 cable 12 #14 and #12, all stranded, 25¢ per foot, 20 ft. $4.00. Transformer 3 KVA 110/220/440 volts, 80 lbs., $35; new tubes 2J36, $10; 304TH, $12. Oil capacitors last a lifetime, Bathtub type, 1 mfd 12 for $1.50. W1TZX, Erich Quast, Skymeadow Dr., Stamford, Conn. 06903.

WANTED: Tektronic 5" 'scope such as Model 514 for experimental home use. Please state lowest price and condition in your first letter. R. Bartel, W2AWS, RD #2, Box 31, Kingston, N.Y.

TOWER: Crank-up, 30 to 55 ft. with Ham-M rotator and 4-element Triband beam. Four sets stainless steel guys and screw lock anchors: $295. WA2NGQ. Phone 201-899-4302.

HAMMARLUND HQ-150, Q-multiplier, xtal calibrator, manual, gud condx, $170.00. Don Salley, Rt. 5, Box 545, Winston-Salem, No. Carolina.

FOR Sale: SX-101-A receiver, 2 years old. Perfect. In original carton. $245.00. Dr. M. B. Kassell, 7561 Overbrook Ave., Phila., Penna. 19151.

75A1, no dud. Very good condx inside and out. Best offer over $169. F.o.b. K1NNC, 100 South Main, Unionville, Conn.

WANTED: Rotator, Hy-Gain or Ham-M. Also weather gear. WA6YKR, 933 Gregory, Davis, Calif.

MOBILE Transistor power supply parts. Transformers and partial kits. Unequaled prices. Send stamp for information. C. F. Grice, 13114 Indian Creek Road, Houston 24, Texas.

HEATHKIT Impedance bridge, Model 1B-2A with instruction manual. Excellent condition. Built by former QST technical editor Robert Kruse: $75. Frequency meter. In mint condx. Model BC-221-AN with calibration book, instruction manual and carrying case. Built by Cardwell and supplied to Robert Kruse for consulting services: $100. Mrs. R. S. Kruse, Neck Road, Madison, Conn. 201-CI-5-9018.

FOR Sale: Collins 32S-1, 516F-2 AC supply. $400. Will deliver within 100 miles. W9HED, 316 Elm Ave., Sussex, Wis.

GRICE Electronics, Inc. has Collins 75S-1 w/Watters Q mult., $425.00; 32V-2, $225.00; KWS-1, $800: Hammarlund HQ-100, $125; HQ-110, $150; HQ-170C, $235.00; Globe 500-B, $225.00; Johnson Valiant, $225.00. Write for free used equipment list. P.O. Box 1911, Pensacola, Fla. 32502.

DRAKE 2B, 2BQ multiplier, spkr, xtal calibrator, spotless, 3 months old. Went transceive. Best offer. WB2NDQ, 30 Omaha Dr., Cranford, N.J. Tel. (201)-276-2302.

SELL Or Trade: Heath MP-10 inverter, $25. WAØDFX, Rte. 1, La Junta, Colorado.

ELMAC PMR6A, 12v. supply, $40. Ameco TX-86, fw, $55. Six new RCA 829-Bs, $8 each. W9GLB/3, 5457 16th Ave., Apt. 204, Hyattsville, Md.

HAMMARLUND HQ-150 Superheterodyne ,54-31 megacycles receiver, Bandspread, Q-multiplier and other features. Excint condx, rack mounted, with 5 ft. 6 in. rack. Best offer over $225.00. Laurance Nagin, 425 Beach 146th St., Neponsit, N.Y. 11694.

SX-140 in excint condx with all manuals: $90.00. WA5HQY, Box 14, Goliad, Texas.

SELLING Collins 75S3 receiver, $425.00; Hallicrafters HT-32B, 6 months old, $450.00; 40 ft. E-Z Way Tower ground post crank-up tilt-over, $140.00. WA2GYC, 671 Bryant St., Westbury, L.I., N.Y. ED 3-0154.

VALIANT, Factory wired, serial No. 25327, $200. Absolutely brand new TR-3, $475.00. Rev. G. Melvin Palmer, P.O. Box 10021, Greensboro, N.C.

HALLICRAFTERS SX-110 receiver with R-48 spkr. In excint condx. Will take best offer. Carl Schneeberger, K8IDW, 3361 S. Wabash, Chicago 16, Ill. Tel: DA 6-9750.

FOR Sale: Hallicrafters SX-96, like new, w/spkr, $125.00. Heath SB-10, wired, never used, $60. H. M. Ash, Box 1066, Mountainside, N.J.

FOR Sale: Eimac 4-400A's. Brand new, in original cartons, $27.50. Used $17.50. Dick, KØRHO, 1834 Jefferson Ave., St. Paul, Minn. 55105.

FOR Sale: Heath DX-100, $140; VHF-1 used approx. 15 hours, $150; Tunnel diode GDO, $30; Hy-Gain No. 6BD doublet, $12. All in excint condx. Want: KWM-2 with PM2 power supply. Give condx and price. W2CUH.

HEATH: SSB complete station HX-20 with microphone, HR-20 with xtal calibrator, HP-10 and HP-20 power supplies, never mobile, excint, $350.00. Ross Sibley, K1ZUN, Walkley Hill, Haddam, Conn.

BIRTHDAY Anniversary, Christmas Gift. Page 176 May QST. DX QSO Recorder, $2.50. Pen pencil set with gold name and call, $4.50. Viking Products, Dept. A-5, Orange, Mass.

FOR Sale: Complete VHF station. Hallicrafters SX-96 receiver, 50 Mc. Tapetone converter, 144 Mc. Ameco converter, with provisions for 220 Mc. and 432 Mc converters all in the same cabinet. Lettine 262 transmitter, Globe 6N2 VFO, low pass filter, three Dow-Key relays and other accessories. Must see to appreciate! Best offer over $400. WA2BJA, 139-06 233 St. Laurelton 22, N.Y.

FOR Sale: W6BWK estate: Clegg Zeus 331, $495.00; Clegg Interceptor and power supply, $295.00; Lettine 262 and U.F.O. supply, $150.00; RME converter 56-220 Mcs., $175.00; Hallicrafters SX-101A, $300.00. Collins 75A2, $225.00; Johnson Kilowatt desk, Ranger exciter, kilowatt Matchbox with SWR, condx as new, $1000. Many other items. Tex Brix, 5573 No. Van Ness Blvd., Fresno 5, Calif.

SSB Transceiver HW-12, DC supply, PTT mike, Hustler antenna, complete, $180.00. DX-60, $60. Both perfect. K1LRB, 86 Haywood, Greenfield, Mass.

LIKE New, late model, spinner knob, KWM-2, $729; factory installed blanker, works like a charm, $79. Collins AC supply, $79; mobile mount, $79; Topaz 260 w. mobile supply, $99; Heathkit MP-1 inverter 6/12 DC-117 AC, $25.00; Heathkit HP-20 AC supply, $25.00; Globe SS3 Q multiplier, $10. F. Breidbart, 1725 Broadway, Brooklyn 7, N.Y. Tel: GLJ-2222.

6 Meter transceiver HE45B, used 2 hours, 115 VAC 12 VDC, $75 plus postage. Gene Reynolds, W3EAN, 53 Marple Rd., Haverford, Penna.

FOR Sale: Heathkit HR-20 SSB receiver in mint condx. Assembled and checked by an electrical engineer. Used vy little: $120.00. WA9KXE, Joe Firlit, 5875 Tower Road, Greendale, Wis.

CASH For Callbooks. Old citizens amateur callbooks before 1924. Also 1941 or 1942. U.S. Government Amateur Callbooks, any year, wanted. W8EF, 795 Lake Shore Road, Grosse Pointe 36, Mich.

SELL: Vesto 61-ft. tower, new, never erected, complete with crankover head, mast clamp, thrust bearing, motor plate, wooden platform, $475. F.o.b. Save $164.50. W3LOS, 138 Chautauqua Blvd., Erie, Penna.

CHRISTIAN Ham Fellowship now being organized (non-profit undenominational, fellowship organization). Christian Ham Callbook, $1.00 donation. Write Harry Wieskamp, WA8CFH, 96 East 21st St., Holland, Mich.

HEATH Twoer for sale. Includes Nuvistor preamp and push-to-talk relay with microphone; $60.00. WA6OHM, Peter Johnson, 3725 Cardinal, Bakersfield, Calif.

HRO5AT1, Viking Adventurer, Heath VEQ, Gonset Super Six converter, $170. takes the lot. WA2CKB. F23-0095, New York Area only.

SELL: RME 6900, HX-20 AC supply, both in A-1 condx. Best offer. WA2FXT, E. Prahl, 33 Kreisel Terrace, Amsterdam, N.Y.

WANT Good December 1925 issue of QST. State price. W5AMK.

AFRICA Mission needs ham equipment. Bishop Arnold Cotey, S.D.S. requests donations of new or used xmtrs and revrs for use by Catholic Missionaries in Diocese of Nachingwea, Tanganyika, East Africa. Needs several small mobile set-ups of 50 watts and one stationery unit of up to one kilowatt. Anyone willing to help should write to Bishop Cotey's stateside contact: Rev. Alfred Schmit, S.D.S., Salvatorian Center, New Holstein, Wisconsin, 53061.

BARGAINS For sale: Dow-Key relay, $10; TA-31Jr rotary dipole complete with direction meter, rotor and 75 ft. four conductor cable, $35.00; B-4 Mini Products mobile vertical for 6-10-15-20 meters, $10.00; Shure microphone, $5.00; Lafayette omnidirectional mike, $4.00; 200 ft. assorted lengths RG/58-U coax (some very long lengths) $8.50; 15 meter Signal Corps collapsible vertical mobile, $5.00, mobile base mount, $3.50. WA2PBY or call 212-BA-5-2933. Everyth'ng sh'pped collect express. WA2PBY 163-70 16th Ave., Whiteside 57, L.I., N.Y.

HT-32B and SX-101A with Johnson 6N2 converter. All in excint condx; $675.00. Will not ship, sry. You pick up. W3FGO, 2053 Springhouse Road, Broomall, Penna.

SELL: Hornet Model TB-750 three-element Triband beam. WØEQJ, D. Kieffer, 402 E. Park, Olivia, Minn. 56277

SACRIFICE: Complete legal limit station. SSB-AM-CW 80 thru 10. Eldico SSB 100F exciter with built-in 'scope; Eldico SSB 1000F linear with built-in 'scope; manuals Built-in VOX, 3 coax Dow-Key relays for transm/recv and low/hi power, Heathkit SWR bridge, D-104 mike, Central Electronics No. GC-1 compression amplifier, Collins 75S-1 receiver, Heathkit Q multiplier, Hammarlund spkr. Everything in top condx, and currently on air, beautiful signal. Complete package $975 firm. Cash & carry. S. W. Ellner, W2TC, 54 Highwood Rd., Oyster Bay, L.I., N.Y. Phone 516 WA 2-6163.

"KID From Texas" Summer Sale. SW-400 with SW-406 VFO $399, Ranger $99, KW-1 $695, B&W 5100 $129, SX-101 $165, HX-10 Marauder $289, HX-50 $319, GSB-201 $199, Valiant $149, HQ-180C $279, 75S-1 $299, New SB-33 $319, NXC-3 with AC & DC Power $399. Immediate delivery on SW-400. TR-3, Galaxy III & V, Johnson Viking II $99, HQ-145 $159, G-66B & 3 way supply $75, AF-67 $49. Single Band Swans $150, 75A-1 $199, NC-270 $149. Send for complete equipment listing. Bryan W5KFT, Edwards Electronics, 4124 34th Street, Lubbock, Texas, SW 5-2595. Cash, Trade, or 24 months to pay.

SELL: Knight T-60 xmtr, R-100 receiver, Lafayette KT-320 receiver. Best offer. Donald Mays, Rt. 4, Box 378, Madison Hgts, Va.

TELEPHONE Equipment wanted for transceivers. Interested in recorder connector, handsets, station sets, etc. KØHXV, 6018 Marquette, St. Louis, Mo. 63139.

COMMUNICATOR IV B, 12 xtals, mobile mounts, 5-element Hy-Gain and dyn, mic., all for $300. WA6WBZ, Ed Baldus, 5365 Dockweiler Pl., Los Angeles, Calif.

100 Mfd. (rpt: one-hundred microfarad), oil filled power condenser, 4000 wvdc, 6 x 8 x 13 in. Surplus but scarcely used. Have three. Best offer over $75. L. J. Kaufer, W7DXH, Seattle University, Seattle 22, Washington.

FOR Sale: Hallicrafters SX-111 receiver, in mint condx: $150.00. L. W. Stietz, WA2TAA, 203-9 St. Hicksville, N.Y. 516 Wells 1-6033 evenings.

HALLICRAFTERS SR-150, in mint condx, $399; AC power supply, $79; Hallicrafters SX-101, $150; perfect Valiant II, $275. All in spotless condition. Trades considered. Wayne Hicks, W5FYX, 3708 24th St., Lubbock, Texas.

SELL: Johnson Ranger, $145.00; NC-98, $100. Both just aligned and calibrated. Hickok signal generator and DB meter, $30.00. W3RKA/1, 17 Farwell Place, Cambridge, Mass. Tel: TR 6-1814.

MUST Sell GSB-100 SSB transmitter. Like new condx. Make offer. W. J. Shields, W5SUP, 4010 Roosevelt, Midland, Texas.

FOR Sale: KWM II SN 910, AC supply, $750; 75A4, perfect shape, SN984, $395. W2LEC, Shrewsbury, N.J.

FOR Sale: BC-348-P receiver, $50. W6BLZ, 528 Colima St., La Jolla, Calif.

SELL: Heath Warrior Linear amplifier, $160; NC-270 rcvr, $160; DX-60 with VF-1 VFO, $70; LW 6 mtr. converter and preamp, $15; Dow-Key DK60 coaxial antenna relay, $8. K8RCA, Bill Christoff, 10733 Wesch Rd., Rte #1, Brooklyn, Mich.

FOR Sale: Johnson Ranger, factory wired with PTT, $140; Eico model 232 peak to peak VTVM, $20; CW monitor, $5.00; auxiliary power supply, $5.00. Lower offers considered. Art Champagne, WA1BKF, 24 Northview Dr., South Windsor, Conn. 06074.

QST de K2BE. Owner retiring. Sacrifice sale: complete 500W. c.w. station plus variety ham gear, test equipment. BC645A, BC438, BC211's, meters, relays, components, tubes. Send stamped envelope for price list. G. H. Underhill, Clover Hill, Poughkeepsie 44, N.Y.

CASH For ham gear. Miller's, 600 W. Adams, Muncie, Ind.

NCX-3 purchased new never used. Want cash offers. K6VJE, 10234 Vista LaCruz, LaMesa, Calif.

APACHE $200, college costs: NC-98, $90. Also QF-1, Dave Koch, 472 Fair St., Berea, Ohio. 234-9105.

SELL: 75A-4 and KWS-1, $1100; FT 100 Triband beam, $50; 6 mtr. mobile FM units. M. H. Klapp, W2EQV, 17 Kenosha St., Albany, N.Y. 12209.

HOWARD Radio—July Specials. New store Demo's: NC-270 & Spkr, $209; LSA-3 & DC PS, $225; SB-33, $349; HT-37, $445; HT-41, $345; & 2B $255. Top condx used: HT-32, $325; NC-183, $189; SX-101A, $249; 10A, $79; G-76 w/AC or DC PS, $289; F/W Valiant, $175; F/W Ranger, $135; DX-100, $119; HQ-100, $119; SX-140 $99; SX-96, $149; GSB-100, $259, and many more. Free list. Box 1269, Abilene, Texas 79604

KITS Built, rebuilt, repaired and/or calibrated. Professional wiring. Lewis Newmire, WA4GHJ, Box 777, Blacksburg, Va.

NATIONAL NC-183. Must sell. Excellent condx. Matching speaker. Best offer. Write WA2PRQ, Robinson, Apt. 62, One Clark Street, Brooklyn or call UL 5-4604 (NYC).

CRYSTALS: MARS, SSB, Nets, etc. Notice C-W Crystals will be closed for vacation during August! FT-243 .01% custom etch finished 3500 to 8600 Kilocycles $1.75, five for $1.50, 10 same frequency $1.25 each. QST Kits, five FT-243: "DCS-500", "IMP" $9.95/set. Airmail 10¢/crystal, surface 5¢. C-W Crystals (Box 2065-Q), El Monte, California.

SELL: 14 AVS vertical, 800V power supply, Eico 'scope; D-104 mike, 8 amp. Variac. Sry, no shipping. NYC telephone AL-3232.

FOR Sale: Drake 1A receiver, $115. W9DUJ, Rte. #1, Box 164, Cedarburg, Wisconsin.

FOR Sale cheap: QST or CQ, any quantity. Send your list for quotation. Cash for call books before 1942. Want early radio gear and publications. Erv Rasmussen, Box 612, Redwood City, Calif.

SALE: Gonset G-50 6 meters VFO. Like new. F.o.b. $250.00. WA4KGI, 2923 Kilbride Rd., Chesapeake, Va. 23517

POLYCOM 62B, in mint condx. First certified check for $200 gets it. Fo.b. W4YDF, 9259 Atwood Ave., Norfolk 3, Va.

PERFORATOR Tape Buff. 35¢ roll, 40 rolls to case. F.o.b. our plant. Allen Paper Co., 111 N. Canal St., Chicago 6, Ill.

RTTY Model 15, table, W2JAV converter, $150.00. K9IBT, Hartford City, Indiana.

ALL New 550A, 551A coax switch, $5.00 each; UE572A, $6.00; 12VDC mobile P/S. Williams, 64 Prospect Ave., Hackensack, N.J.

SELL: 250-watt modulator, less power supply. $25.00; 20 meter SSB exciter, filter type, with VXO, 130 watts, $60; Sig. Sentry, $10; 2EZ6 VFO exciter, modulator and power supply, $35, you to pick up. K3BHQ. 1960 Lycoming Ave., Abington, Penna. 215-659,3584.

WANTED: 2-channel graphic recorder such as Sanborn. W8EGD, 22122 Hessel, Detroit, Michigan, 48219.

2 Meter Gonset GC-105. In excint condx. Best offer. Prefer trade for amateur or electronic equipment. Belvidere, Box 1103, New Britain, Conn.

SELL: Apache, $180; SX-100, $180; Mosley Tri-Band TA-33-Jr, w/tower, w/rotor, $75.00; in excint condx and appearance. Norman Wise, K2QDM, 108-14 65th Road, Forest Hills 75, L.I., N.Y.

COLLINS 75A4, 2 filters, speaker, serial number 3376, in excint condx, $425.00; Globe Hi-Bander, $70; Globe 6N2 VFO, $30. Paul Stitzel, 3130 Park Drive, Stow, Ohio.

DX-100 with continuous loading, one owner, very clean, plus incentive bonus of 25 Silver dollars, all different dates: $135.00. Vinson Casey, W7HLH, Rte. 2, Billings, Mont.

SX-111, mint condx, spkr, manual: $150.00; Heath HR-10, new, manual, $60; "Gimix", $2.00; Vibroplex, $10; D-104 mike $10, Counter dials, 50¢. Stamp for bargain list. WØLWZ, 1030 So. Dudley, Denver, Colorado 80226.

COLLINS Kilowatt complete, perfect condx. Forced sale: KWM-2, 516F-2, 312B-5, SM-2, 30S-1. Also Hy-Gain 18T vertical. Waters Q-multiplier, extras. Practically brand new. Best offer to Prof. Weller, F & M College, Lancaster, Penna. Tel: 717-393-3621.

SELL: HW-32 with HRA-10-1, 20M SSB transceiver, excit performer, getting similar all-band job, $125.00. Viking II with Johnson VFO, $135. Central Electronics 10A exciter with tubeless VFO, $75. R. W. Woodward, W1VW, 41 Middlefield Drive, West Hartford, Conn.

Flushing, Michigan, 48433.

FOR Sale: 150 ft. Blaw-Knox self-supporting tower, type UH. For supporting of UHF antenna, base 12 ft. square. Weight 8300 lbs. Dismantled and ready for you to come and pick up. $1900 cash. W. C. Kasson, W8HRL, 4305 N. Seymour Rd.,

"HOSS Trader" Ed Moory can sell cheaper for cash because he operates in a small town with low overhead. New Galaxy and A.C. supply, $295; new TH-4 beam and demo Ham-M rotor, $159.00; demo new, 2-B, $229; new Swan SW-240, $279; new NCX-3, $295; demo Drake TR-3, $475; new Hunter Bandit, $409; new Hammarlund HQ-180-C slight freight damage, $339; new SB-33, $299; 32S-3, used 12 hours, $475; KWM-2 $859.00; new KWM-2 and DC supply with mount, $1195. Used bargains: HT-37 $279; 2-B, $189; Galaxy III, $289; SB-33, $279; 75S-1, $279. Term: Cash! Ed Moory Wholesale Radio, Box 506, DeWitt, Arkansas. Phone WH 6-2820

SALE: Perfect Drake 2B and 2BQ, $240; very gud DX-100, unmodified, $100; KW Linear, 4-811A's, 2-866's, prefer a pick-up deal, $100. K4QIE, David Frohman, 104 Third St., Leaksville, N.C.

GOOD B&W 5100-B transmitter, $195. Willie Murphey, W5SAR, Guthrie, Okla.

QUALITY QSLS. Custom and stock. Samples, 10¢, 25¢, 50¢. Savory, 172 Roosevelt, Weymouth, Mass.

SELL: CDR TR-44 rotator, 100 ft. cable. Hy-Gain 20-meter beam. Never been used. Robert Quandt, 520 Fourth St., Hartford, Wisconsin.

VIKING II, $125; SB-10/PS, $80; VF-1, $15.00; Cheyenne, $60; 813 linear/PS, $90. Al Foskett, K1NTR, 800 Wolf Hill Rd., Cheshire, Conn.

WANTED: KWM-2 and 1 KW Matchbox. Have a new Invader 200 to trade or sell: $495.00. WA4LXX, F. E. Coble, 251 Collier Ave., Nashville 11, Tenn.

KWM-1 excellent, $290. F.o.b. 1285 So. Smith Ave., St. Paul 18, Minn. KØGVX.

HIGH Speed code practice tapes, used at WIEIA/WINJM. Am surveying 27 obsolete perforated and recorded audio tape. Pay only my costs. WINJM, 66 Highland St., Newington, Conn. 06111.

HALLICRAFTERS HT-32B with xtals and extra set of tubes, $355; B&W kil. linear LPA-1 with matching LPS-1 P/S, $195. All in new condx and reliable. W3AUR, 215-525-6079. 811 Oak Ridge Road, Rosemont, Penna.

GIGANTIC Sale, factory checked new 6883 (12V-6146) $1.29; DS501 3—$2.50; sil. rect. 600 PIV 750 Ma. 10—$2.50; meter saver diodes, $1.98. Diodes, transistors, zeners, SCR's. A-B Engineering, 2043 E. 52nd St., Brooklyn 34, N.Y.

KWM-2 with Waters Q-multiplier. Best offer or trade for 32S-1 and 32S-3. K8CSW, Robin Anderson, County Line Rd., Chagrin Falls, Ohio

HALLICRAFTERS SR-150, PS-150 AC and PS-150—12 DC, in mint condx, 5 months old. First check for $600 gets. K5JTH/5, 3200 B Chandler, El Paso, Texas.

SELL: SX-88: $275.00 WAØAWL.

SELL! Swap equipment! Interesting offers galore in "Equipment Exchange". 12 big issues, $1.00. Sample copy free. Write to Brand, Sycamore, Ill.

TWOER HW-30, 1 month old. Perfect. Delivered to your door, $39.00. K3JZH.

DRAKE 2A,B users! Improved bandspread system for read-out to one-tenth Kc. $2.50. G. A. Guter, 543 Lesterwest Way, Glendora, Calif.

FOR Sale: Apache $175; SB-10, $75; Mohawk, $185; Marauder, $325.00. Gordon Wright, K5EHX/W5IPA, 4515 Gloster Rd., Dallas 19, Texas.

FOR Sale: Apache SB10, HQ-170C, D-104 PTT mike, DowKey relay Johnson TR switch, $550; package price or sell separately. K5WIC, 1015 James Parkway, College Station, Texas.

Index of Advertisers

How to buy $15,852 for $37.50 a month

Unless you've begun to feel your age a bit, chances are you haven't given much thought to retirement plans. So you may be surprised to see how nicely a fund grows when you set up a plan to buy Savings Bonds and stick to it.

Let's say you decide to buy a $50 E Bond each month, cost $37.50. (An easy habit to get into on Payroll Savings because your employer saves the money for you *before* you get it.)

Keep it up for 17¾ years (E Bonds continue to earn 10 years beyond maturity) and you'll have Bonds worth $11,175. At this time you switch into H Bonds, adding enough to round out the total to $11,500. And during the next 10 years, you collect interest twice a year, mailed to your house.

Here's where you stand, 27¾ years after you signed that first Payroll Savings form. You own $11,500 worth of Bonds. You've collected interest checks of $4352.75. You've realized a total of $15,852.75 at a cost of $8312.50, a tidy reward for your efforts.

You'll also probably be warmed by the thought that all the time you were building your "escape fund," Uncle Sam was putting your dollars to work, helping keep the world as free for your golden years as it was during your younger ones.

Worth thinking about, isn't it, whether you happen to be feeling your age or not.

Keep freedom in your future with

U.S. SAVINGS BONDS

This advertising is donated by The Advertising Council and this magazine.

from ALLIED

EXCLUSIVE MONEY-SAVING BUYS ON FAMOUS *Clegg* TRANSCEIVERS

BIG REDUCTION ON

FAMOUS "99'er" 6-METER TRANSCEIVER

Regular Price $179.95

EXCLUSIVE ALLIED PRICE 149.95

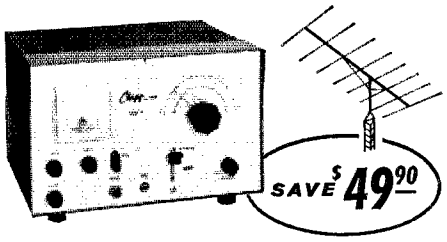
YOU SAVE $30.00

Top-notch transceiver with advanced new circuitry and outstanding features. Has double-conversion superhet receiver with 10 tuned circuits for best sensitivity and selectivity. Plate-screen modulated 7558 final works "straight through." S-meter doubles as tune-up meter. Includes: crystal oscillator; spot switch; pi-net output; 5-to-1 vernier tuning; ANL; TVI suppression. Uses any crystal or external VFO. For fixed or mobile use. 6 x 10 x 8". For 110-120 v. AC. Less mobile supply. Shpg. wt., 20 lbs. First time at Allied's exclusive money-saving sale price.

No. 90 SX 146AH. Save $30.00. *Now only*.... **$149.95**

SUPER-BONUS PACKAGE!

CLEGG "99'er" 6-METER TRANSCEIVER with HY-GAIN 68-B 8-ELEMENT BEAM and 100-ft. RG8/U Polyfoam Coax Cable



Regular Price $229.85

EXCLUSIVE ALLIED PRICE 179.95

YOU SAVE $49.90

This combination package saves you $49.90 over regular prices of its components. Features the famous Clegg "99'er" 6-Meter Transceiver with its superior performance, and includes the dependable Hy-Gain 68-B 8-Element Beam with 12.1 db gain; plus 100' RG8/U Polyfoam coax cable with connectors installed. This complete combination package regularly sells for $229.85—at the exclusive Allied price of $179.95 YOU SAVE $49.90! Take advantage of this money-saving bonus deal—order your combination Clegg-Hy-Gain package today. 50 lbs.

No. 23 SU 790-3AH. "99'er," 68-B, and cable. Save $49.90. *Now only*..... **$179.95**

Beam gain referenced to isotropic source

NEW

CLEGG "22'er" TWO-METER TRANSCEIVER

ONLY $239.50 This ready-to-go station is great for getting started in VHF! Features dual-conversion receiver with crystal-controlled first injection oscillator; crystal lattice filter; S-meter doubling as tune-up meter; full 143.8-148.2 mc coverage with calibrated tuning dial; fine tuning control; excellent AGC; ANL. Transmitter has broadband exciter stages; crystal-controlled 18 watt input; high level plate and screen mod with speech clipping. Includes self-contained universal solid-state power supply for 115 v. AC and 12 v. DC. Shpg. wt., 15 lbs.

No. 86 SX 320AH. *Only*..... **$239.50**

THESE SPECIAL BUYS AVAILABLE ONLY FROM ALLIED

USE THE ALLIED CREDIT FUND PLAN

ORDER TODAY

ORDER TODAY FROM

ALLIED RADIO

America's Ham Headquarters

ALLIED RADIO
100 N. Western Ave., Chicago, Illinois 60680

Ship me:

- ☐ Clegg "99'er" 6-Meter Transceiv. No. 90 SX 146AH ($149.95)
- ☐ Clegg "99'er" with Hy-Gain 68-B. No. 23 SU 790-3AH (179.95)
- ☐ Clegg "22'er" 2-Meter Transceiver No. 86 SX 320AH (239.50)

$_____ enclosed (check) (money order)

Name_____
PLEASE PRINT

Address_____

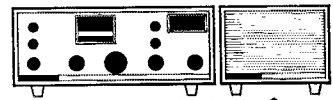
City_____ Zone_____ State_____

It's got guts!

It takes more than handsome, functional styling to make a great transceiver . . . In plain language, it takes guts. The rugged good looks of the NCX-3 were styled by Industrial Designer Gregory Fossella to complement the performance and features engineered into the NCX-3 by National's Advanced Development Team. Take a good close look at the photo below. 18 tubes and 6 diodes add up to the one SSB/CW/AM transceiver in the $300-$400 price range that gives you the features you want and need — with the conservatively rated parts, handsome layout and wiring workmanship that you expect from National. The NCX-3 wasn't designed with the intention of providing marginal "condensed communications" — It has a lot of parts. But notice that components run at right angles for easy circuit tracing and service . . . that it isn't necessary to unsolder three layers of wiring to get at one component . . . that even the resistor color codes all run in a parallel direction!

It's no wonder that the NCX-3 is backed by National's One Year Guarantee, or that the NCX-3, by actual dealer count, outsells all other transceivers. It's no wonder, because the NCX-3 at $369 is the only transceiver in its price range with built-in important features required for fixed station as well as for mobile applications: • Complete coverage (with overlap) of the 80, 40 and 20 meter phone and CW bands • Built-in grid-block break-in keying • Built-in Vox, as well as push-to-talk • Built-in RF-derived SSB/CW AGC without annoying pops or thumps • Built-in S-Meter and PA current meter • Built-in AM detector for fully compatible AM operation • Conservatively rated Pi-network final amplifier runs black at full 200 watts PEP • Mobile mount included in the price!

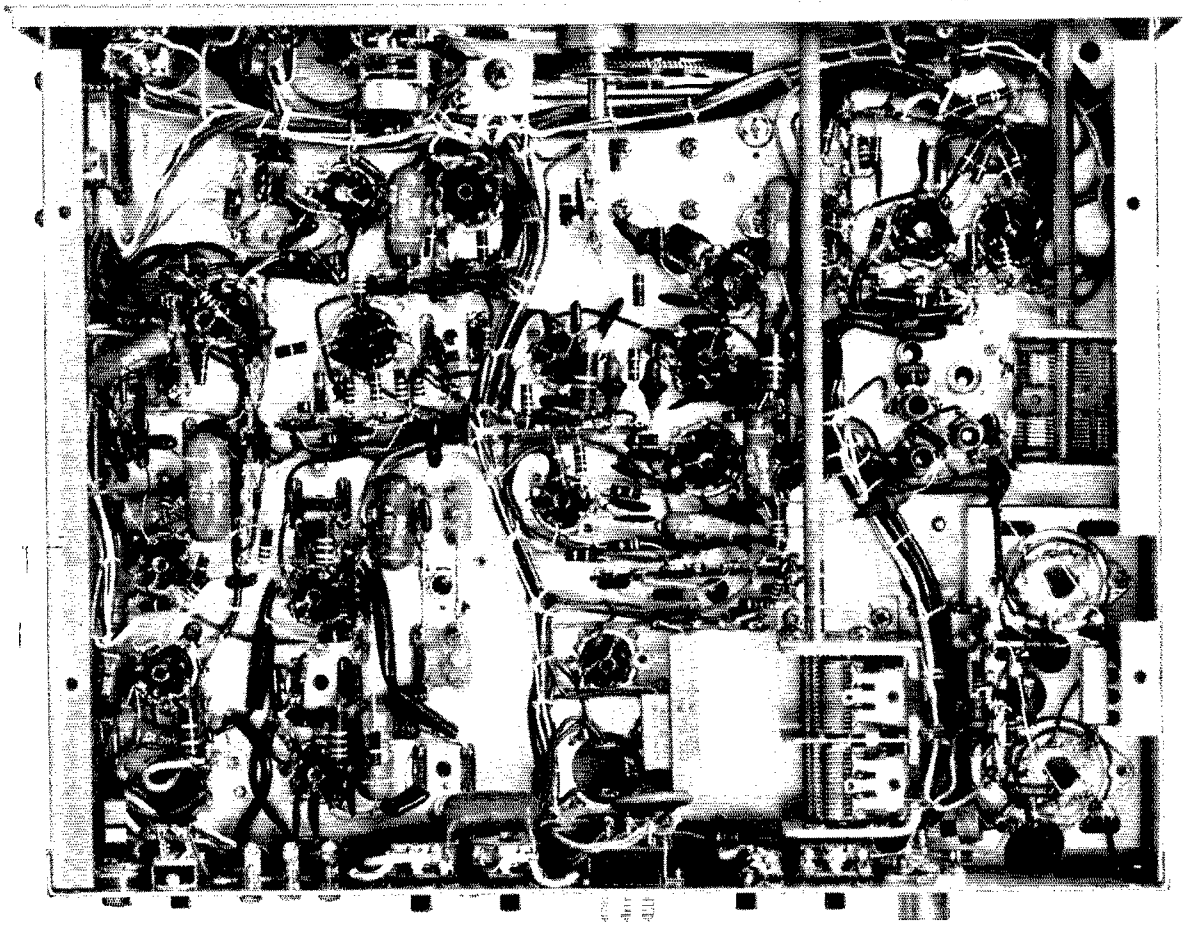
A lot of sideband transceivers have been advertised recently . . . nevertheless, we suggest you take the time to compare all of them with the NCX-3 — we know of no better way to satisfy yourself that you'll be happy with your choice — that you've chosen a rig that does what you want it to do. As a first step, write us today (enclose 50¢ for handling and postage) for a copy of the NCX-3 Instruction Manual. In the meantime, ask your National Dealer to give you an actual demonstration of the NCX-3 Tri-Band Transceiver.



NATIONAL RADIO COMPANY, INC.

37 Washington St., Melrose 76, Mass.

Department QST-07-64



A Wholly Owned Subsidiary of National Company, Inc. World Wide Export Sales: Ad Auriema Inc., 85 Broad St., N.Y.C. Canada: Tri-Tel Assoc., 81 Sheppard Ave. W., Willowdale, Ontario.

A special message to every Amateur using a 6146, 6146A, or 8298

33⅓% HIGHER POWER INPUT

—with this new beam power tube

If you are now using a 6146, 6146A, or 8298 in class AB_2, B, or C—you can replace it with a new RCA-6146B/8298A and increase your power input in these services by one-third. A single tube takes up to 120 watts plate input, ICAS; *two take nearly a quarter kilowatt!*

What must you do? You simply pull out the old tube. Plug in a 6146B/8298A. Increase screen voltage slightly. Then load up. All you need then is the extra reserve in your power supply.

And there is more about this tube than just high power. "Dark-Heater" design lengthens heater life—makes it possible for the tube to deliver full power output over wide swings in heater-supply voltage. Plate dissipation rating exceeds any design in the 6146 family. And when this new tube operates at 6146 plate input, life expectancy goes up substantially.

Install RCA-6146B/8298A's. Increasing your power was never easier.

Available from your Authorized RCA Industrial Tube Distributor.

ICAS Operating Conditions (Heater voltage range, 6 to 7.5 volts)			
Class of Service	DC Plate Volts	Plate Dissipation Watts	Plate Input Watts*
SSB	750	35	120
Class C AM	600	23	85
Class C CW	750	35	120

*Full input to 60 Mc; reduced input to 175 Mc.

For technical bulletin on new RCA-6146B/8298A write: Commercial Engineering, Section G-37M, RCA Electronic Components and Devices, Harrison, N.J.

The Most Trusted Name in Electronics