

May 1969

75 Cents

QST

devoted entirely to

amateur radio

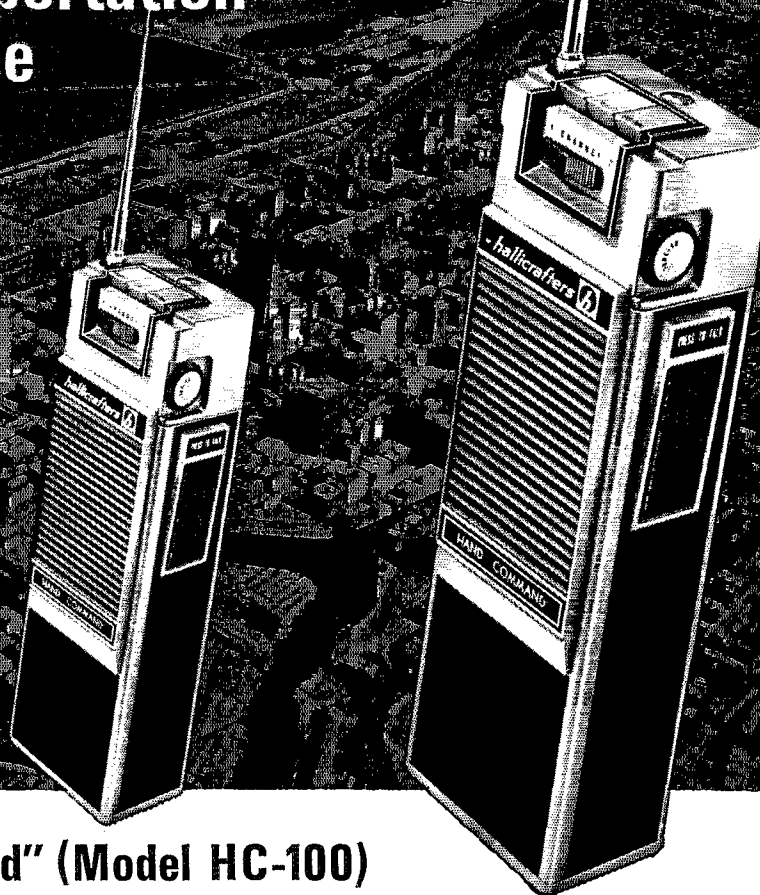


OFFICIAL JOURNAL OF THE ARRL

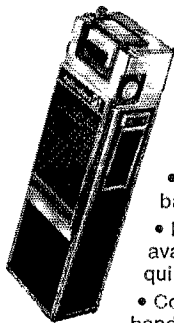


PORTABLE COMMUNICATIONS

...Public Safety...Industrial
...Transportation
...Marine



"Hand Command" (Model HC-100) puts them at your fingertips.



- Made in U.S.A.
- 2 Watts nominal output.
- Fully solid state, all silicon transistors.
- 2 Channel capability, field convertible.
- Available narrow or wide band, field convertible.
- Most serviceable portable available, no tools or jigs required.
- Covers 148-173 MHz frequency band.
- Full accessory complement.
- Reedless continuous tone squelch optionally available.
- Operates from nickel cadmium rechargeable batteries or mercury batteries.

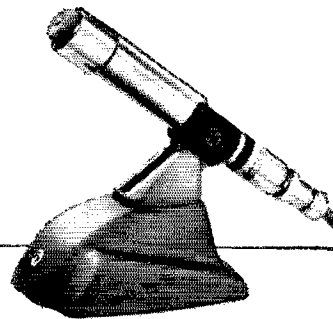
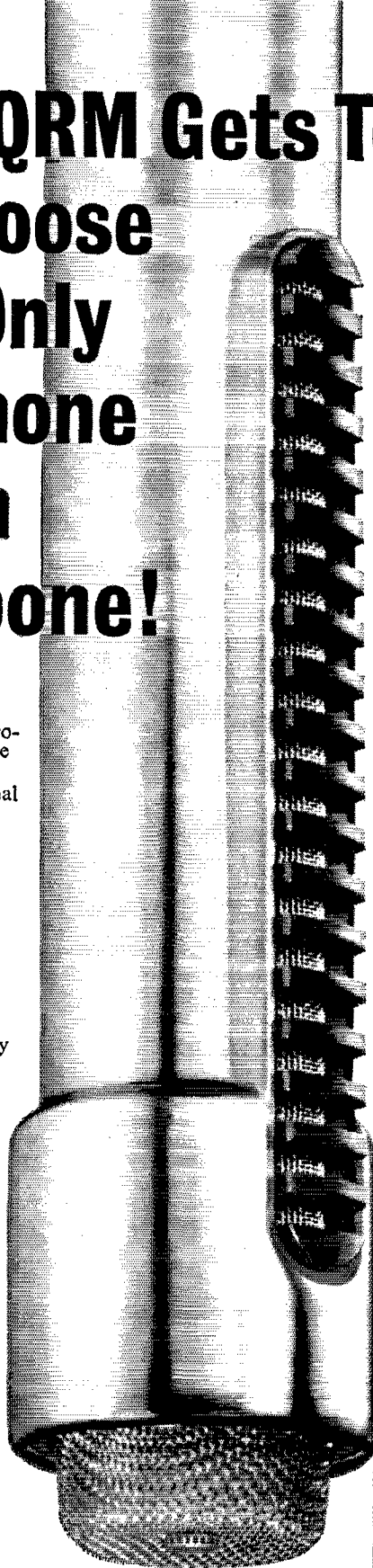
With a proud heritage of design, manufacture and field performance to demanding Government specifications, Hallicrafters' "Hand Command," Model HC-100, brings a new dimension to personalized two-way communications. Fully compatible with any existing radio system operating in the 148-173 MHz frequency band with or without continuous tone squelch. The "Hand Command" is now in use in a variety of applications, including Police and Fire, Plant Operation and Security, Railroads, Ships and Barges, and many others. Write today for complete details in free descriptive brochure.

the hallicrafters co.
A Subsidiary of Northrop Corporation



600 HICKS ROAD
ROLLING MEADOWS, ILLINOIS 60008

When QRM Gets Tough Choose The Only Microphone With Backbone!



**ELECTRO-VOICE
MODEL 676
DYNAMIC CARDIOID**

E-V The backbone of the Electro-Voice Model 676 is no mere decoration. It's visible proof of the most exciting idea in directional microphones—Continuously Variable-D (CV-D)TM.

Here's how it works. We attach a very special tapered tube to the back of the microphone element. This tube automatically varies in effective length with frequency. It's a long tube for lows—a short tube for highs. All this with no moving parts! The tube is always optimum length to most effectively cancel sound arriving from the back of the microphone, regardless of frequency.

This ingenious solution* is years ahead of the common fixed-path design found in most cardioid microphones. It means you pick up less noise and room reverberation, ensuring a crisp signal and optimum vox performance. It also is less sensitive to wind and shock—ideal for field days! There is almost no "proximity effect"... no boosted bass when you must operate extra close.

Long life and peak-free response are guaranteed by the exclusive E-V Acoustalloy[®] diaphragm. And the 676

has unusually high output for a microphone so small. Of course you get both 150-ohm and Hi-Z outputs, plus high efficiency dust, pop, and magnetic filters—indeed, all of the hallmarks of Electro-Voice design that have made E-V a leader for years.

But that's not all. The 676 has an exclusive bass control switch built in. Choose flat response (from 40 to 15,000 cps) or tilt off bass 5 or 10 db at 100 cps to eliminate power-robbing lows that reduce efficiency and lower intelligibility. You'll be amazed at the reports of improved audio you'll get when you switch to the E-V676.

Visit your E-V distributor to see this remarkable new microphone today. And when difficult QRM must be faced squarely, stand up and fight back with the microphone with a backbone (and CV-D)—the new Electro-Voice Model 676 dynamic cardioid!

Model 676 Satin Chrome or TV grey, \$53.40 net; In Gold, \$56.70 net. Shown on Model 420 Desk Stand, \$12.60 net. Model 674 identical except stud-mounted with On-Off switch, \$56.70 net.

ELECTRO-VOICE, INC.
Dept. 592Q, 631 Cecil Street
Buchanan, Michigan 49107

Electro-Voice[®]

A SUBSIDIARY OF GULFON INDUSTRIES, INC.

there's a reason for the S/Line's reputation

The main reason is performance. Amateurs around the world praise the S/Line's clean, strong signal. But there are design reasons, too. The S/Line is an engineered system. Each unit augments the others to provide single sideband operation at its best.

You can operate the system as a transceiver, or transmit with the 32S-3 and receive with the 75S-3B on separate frequencies. The S/Line offers upper and lower single sideband and CW operation . . . plus AM reception.

Two linear amplifiers, 500 watts or 1000 watts PEP, round out the full-performance S/Line.

See your Collins distributor for details on the most respected system in the amateur field.



STAFF

JOHN HUNTOON, WILVQ
Editor

E. LAIRD CAMPBELL, WICUT
Managing Editor

GEORGE GRAMMER, WIDF
Technical Editor

DOUG DE MAW, WICER
WALTER F. LANGE, W1YDS
ROBERT E. ANDERSON, K1TVF*
GERALD L. HALL, K1PLP
Assistant Technical Editors

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

LEWIS G. McCOY, W1ICP
Beginner and Novice

ROD NEWKIRK, W9BRD
WILLIAM SMITH, K4AYO
LOUISE MOREAU, W6BBO
JOHN TROSTER, W6ISQ
Contributing Editors

ROBERT J. RINALDI, W1CNY
Advertising Manager

EDGAR D. COLLINS
Advertising Assistant

J. A. MOSKEY, W1JMY
Circulation Manager

CARL E. SMITH, W1ETU
Assistant Circulation Manager

*On military leave of absence

OFFICES

225 Main Street
Newington, Connecticut 06111
Tel.: 203-666-1541

Subscription rate \$7.50 per year post-paid, U.S. funds, in Canada and U.S.; \$8 elsewhere. ARRL Membership, including *QST*, available only to individuals with a bona fide interest in amateur radio: \$6.50 per year, U.S. funds, in Canada and U.S.; \$7 elsewhere. Single copies, 75 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U.S. and for an equivalent amount in U.S. funds.

Second-class postage paid at Hartford, Conn. and at additional mailing offices. Copyright 1969 by the American Radio Relay League, Inc. Title registered at U.S. Patent Office. International copyright secured. All rights reserved. *Quedan reservados todos los derechos.* Printed in U.S.A.

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



OUR COVER
If you tend to think that v.h.f. gear is inherently inefficient, the performance figures for W1QWJ's 220-MHz. 500 watt-er may surprise you. See page 21

QST

MAY 1969

VOLUME LIII NUMBER 5

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

— CONTENTS —

TECHNICAL —

The D.C. 80-10 Receiver.....	Doug DeMaw, WICER	11
Legalize Your Phone Patch... J. B. Berry, Jr., W4PME		17
A 500-Watt F.M. and C.W. Transmitter for 220 MHz.	Richard B. Stevens, W1QWJ	21
The Mainline TT/L-2 RTTY Demodulator	Keith B. Petersen, W8SDZ	28
All-Driven Three-Element Mini-Beam	Allan A. Simpson, VE4AS	35
Long-Delayed Echoes . . . Radio's "Flying Saucer" Effect (QST Extra).....	O. G. Villard, Jr., W6QYT, C. R. Graf, WSLFM, and J. M. Lomasney, WA6NIL	38

Gimmicks and Gadgets:

A 160-Meter Converter For Ham-Band Only Receivers	James P. Gillespie, W4LQC/W8BKK	46
Technical Correspondence.....		48
Mobile Whips And Corona.....	B. J. Bittner, K0WQN	50

Recent Equipment:

Galaxy R-530 Receiver.....		54
----------------------------	--	----

BEGINNER AND NOVICE —

Some Common Problems and Their Answers	Lewis G. McCoy, W1ICP	44
--	-----------------------	----

OPERATING —

V.H.F. QSO Party Announcement.....		59
Rules For The 1969 ARRL Field Day.....		60
1969 Armed Forces Day Communication Tests.....		62
Getting Together.....		64

GENERAL —

The ARRL Intruder Watch	Richard L. Baldwin, W1IKE	71
U. S. — Europe Two-Way Slow-Scan TV QSO.....		75

ARPSOC.....	64	Index to Advertisers.....	158
ARRL QSL Bureau.....	70	"It Seems to Us".....	9
Coming Conventions.....	78	League Lines.....	10
Correspondence From Members	76	Operating News.....	94
Feedback.....	55	Silent Keys.....	58
Hamfest Calendar.....	79	Station Activities.....	98
Happenings of the Month.....	68	World Above 50 Mc.....	86
Hints & Kinks.....	52	YL News & Views.....	92
How's DX?.....	80	WIAW Schedule.....	96
IARU News.....	74	25 Years Ago in <i>OST</i>	63

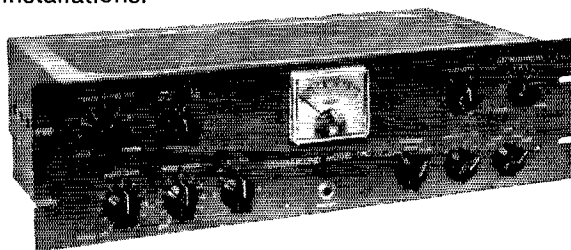
The Hammarlund Superpro

Nothing else even comes close.

For continuous communications under the most difficult conditions — when the message *must* get through — Hammarlund Superpros have been the mainstay of Armed Forces and Government Agencies around the world!

The world famous Hammarlund SP-600 series Communications Receiver is available in three frequency ranges (10 KHz-540 KHz, 100 KH-29.7 mHz, 0.54 mHz to 54 mHz); single or dual diversity. In cabinet or rack mounted units.

Tunable over 6 continuous bands, each band has 6,000 readable settings! Sensitivity of 1.0 microvolt on CW/SSB, 2.0 microvolts on AM. Image rejection is at least 74 db down and spurious responses at least 100 db down. Selectivity with three crystal and three non-crystal filter positions is from 200 Hz to 13 kHz. Radiation is negligible with no cross talk in multi-receiver installations.



The SPC-10 Single Sideband Converter can be operated with any receiver having an IF frequency of 450 to 500 kHz. When interconnected with the SP-600, it provides SSB reception at its best. The SPC-10 is a completely

self-contained unit with a tunable 60 db slot filter. Selectivity is variable in seven distinct steps. Selectable AVC. Together the Hammarlund SP-600 and SPC-10 have set a standard of performance rarely, if ever, equaled.

Send for the SP-600 brochure—it has all the facts!



The **HAMMARLUND**
Manufacturing Company Incorporated

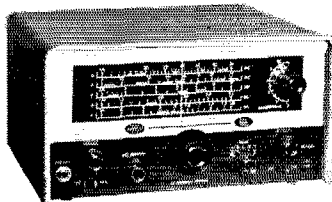
A subsidiary of Electronic Assistance Corporation
73-88 Hammarlund Drive, Mars Hill, North Carolina 28754



Just Getting Started In Ham Radio?

If your interest in ham radio has only recently developed you already know by now that there are hundreds of brands of equipment from which to choose, some costly . . . some not too costly. For years, Ameco equipment has appealed to the beginner because of its modest cost, yet with engineering and manufacturing quality you would expect to find in really expensive gear. Read about our All-Wave Receiver and Novice Transmitter below, then write for our new Ameco catalog to get complete specifications on these and other moderately priced items.

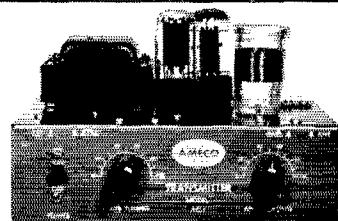
Model R-5A Allwave Receiver



An exceptionally fine receiver for the short wave listener and beginning amateur operator. Fully transistorized-solid state. Covers .54 Mc through 54.0 Mc in five continuous bands. Includes standard broadcast band, all foreign broadcast bands, all amateur bands from 160 through 6 meters, all 27 Mc CB channels, all 2 way radio frequencies from 30 to 50 Mc including many police and fire departments. Controls include Beat Frequency Oscillator, Noise Limiter, Bandsread. Provisions for external "Q" multiplier. Compare with tube-type units costing as much!

Wired and tested\$99.95
 Battery adapter kit. (permits operation from 12 VDC or eight "D" cells)\$ 3.95

Model AC-1 Novice CW Transmitter Kit



The ideal kit for the beginner who requires a reliable TVI suppressed transmitter. Keying is clean and chirp-free. Crystal controlled, PI-network Output Circuit. Includes AC Power Supply. For 40 and 80 meters, CW. Fifteen watts input. Kit is simple to build and easy to operate.

Kit with coil for any 1 band, including tubes \$23.95
 Extra coil kit for any 1 band, CK-11.00

Ameco Books and Records

- Radio Amateur Theory Course: Gives sufficient information to pass the FCC exams for the Novice, Technician, General and Conditional Classes of Amateur Licenses. The Ameco Theory Course is the shortest path to getting a ham ticket.
 No. 102-01, Over 300 pages\$3.95
- Radio Amateur License Guide: A study guide for those preparing for the Novice, Technician, Conditional and General Classes of Amateur licenses. Contains over 200 questions and answers.
 No. 5-01, 32 pages50¢
- Mastering the Morse Code: Teaches the beginner how to learn the International Morse Code.
 No. 6-01, 32 pages50¢
- Ameco Jr. Code Course: Fastest, simplest way to learn code. Contains 10 lessons and one 12" record in the 33 rpm series. Sample FCC-type exams included.
 Complete Jr. Code Course (100 series)\$3.95



Division of Aerotron, Inc.
 P. O. Box 6527 Raleigh, North Carolina 27608

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. General or Conditional Class licenses or higher may be appointed ORS, OVS, OPS, OO and OBS. Technicians may be appointed OVS, OBS or V.H.F. PAM. Novices may be appointed OVS. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

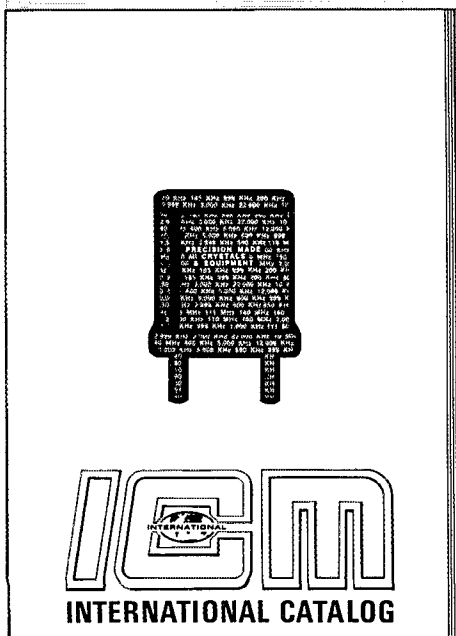
ATLANTIC DIVISION			
Delaware	K3NYG	John L. Penrod	RFD 1 Townsend 19734
Eastern Pennsylvania	W3HLK	George S. Van Dyke, Jr.	4607 Convent Lane Philadelphia 19114
Maryland-D. C.	K3LFD	John Miniholland	306 Holland Rd., Severna Park, Md. 21146
Southern New Jersey	W2ZT	Edward G. Kaser	19 Blackwood Drive Wilburta Gardens Trenton 08628
Western New York	K2KTK	Richard M. Pitzeruse	303 Woodland Rd. Syracuse 13219
Western Pennsylvania	W3GJY	John F. Wojtkiewicz	1400 Chaplin St. Conway 15027
CENTRAL DIVISION			
Illinois	W9PRN	Edmond A. Metzger	1520 South 4th St. Springfield 62703
Indiana	W9BUQ	William C. Johnson	2838 Hillside Ave. Indianapolis 46218
Wisconsin	K9GSC	Kenneth A. Ebnetter	822 Wauna Trail Portage 53901
DAKOTA DIVISION			
Minnesota	W0PAN	Larry J. Shima	11417 Goodrich Rd. So. Bloomington 55431
North Dakota	W0DM	Harold L. Sheets	21 Euclid Ave. Grand Forks 58201
South Dakota	K0TXW	Seward P. Hoyt	Box 58 Clear Lake 57226
DELTA DIVISION			
Arkansas*	W5UIS	Robert D. Shaefer	409 West Cedar Brinkley 72021
Louisiana	W5ZAI	R. Allen Swanson, Jr.	RFD 1, Box 354-E Covington 70433
Mississippi	WA5KEY	Clifton C. Confort	310 E. Washington St. Kosciusko 39090
Tennessee	K4RCT	Harry A. Phillips	5200 Oak Meadow Ave. Memphis 38128
GREAT LAKES DIVISION			
Kentucky	W4OYL	George S. Wilson, III	2113 Old Cabin Road Owensboro 42301
Michigan	K8HKM	Joseph L. Pontek	P.O. Box 288 Holt 48442
Ohio	W8ETU	Richard A. Egbert	6479 Red Fox Road Reynoldsburg 43068
HUDSON DIVISION			
Eastern New York	K2BJN	Graham G. Berry	51 Farcot Ave. New Rochelle 10801
N. Y. C. & Long Island	K2IDB	Btayne S. Johnson	266 Cypress St. Massapequa Park, L. I. 11762
Northern New Jersey	W2ZZZ	Louis J. Amoroso	180 Pleasant Ave. Bergenfield 07621
MIDWEST DIVISION			
Iowa	K0AMHX	Wayne L. Johnson	Rt. 1, Box #1 Kellerton 50133
Kansas	K0BKF	Robert M. Summers	3045 North 72nd Kansas City 68109
Missouri	W0GS	Alfred E. Schwaneke	Route 1, Box 169 Rolla 65401
Nebraska	K9OAL	V. A. Cashion	334 Pine St., Box 488 Chadron 69337
NEW ENGLAND DIVISION			
Connecticut	W1GVT	John J. McNassor	218 Berlin Ave. Southington 06489
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	55 Solar Ave. Braintree 02185
Maine	K1LFG	Herbert A. Davis	RFD 1 Franklin 04634
New Hampshire	K1QDS	Donald Morgan	Bayview Drive, P.O. Box 65 Laconia 03246
Rhode Island	K1AAV	John E. Johnson	30 Fruit St. Pawtucket 02860
Vermont	K1ALP	E. Reginald Murray	3 Hillcrest Drive Montpelier 05601
Western Massachusetts	W1STR	Norman P. Forest	36 Valley Rd. Springfield 01119
NORTHWESTERN DIVISION			
Alaska	KL7AEQ	Albert F. Weber	Box 735 College 99735
Idaho	W7ZNN	Donald A. Crisp	3408-8th St. F Lewiston 83501
Montana	W7TYN	Joseph A. D'Arcy	1916 Haggin Ave. Anaconda 57911
Oregon	W7KTV	Dale T. Justice	1369 N. E. Sunrise Lane Hillsboro 97123
Washington	K7WWR/ W7BQ	William R. Watson	1005 E. 1st Ave. Ellensburg 98926
PACIFIC DIVISION			
East Bay	K6LRN	Richard Wilson	629 Blue Ridge Dr. Martinez 94553
Hawaii	KH6BZF	Lee R. Weal	45-601 Luluku Rd. Kaneohe 96744
Nevada	W7PBV	Leonard M. Norman	652 Utah St. Boulder City 89005
Sacramento Valley	W6BJDT	John F. Minke, III	6230 Idle Bonito Drive Carmichael 95608
San Francisco	W6ARD	Donald Morgan	1015 Colman Drive Laconia 03246
San Joaquin Valley	W6JFU	Ralph Saroyan	6204 E. Townsend Ave. Fresno 93702
Santa Clara Valley*	W6VZT	Albert F. Gaetano	115 Old Adobe Rd. Lus Gatos 95030
ROANOKE DIVISION			
North Carolina	WA4UQC	Calvin M. Dempsey	1604 West Canal St. Tarboro 27886
South Carolina	W4PED	Charles N. Wright	711 Merriweather Drive North Augusta 29341
Virginia	W4SHJ	H. J. Hopkins	8600 Hammett Ave. Norfolk 23503
West Virginia	W8JM	Donald B. Morris	1136 Morningstar Lane Fairmont 26554
ROCKY MOUNTAIN DIVISION			
Colorado	W8SNI	Charles M. Cotterell	430 South Swadley St. Lakewood 80228
New Mexico*	W5NDI	James R. Price, D.V.M.	2735-A Socorro Loop Holloman AFB 88330
Utah	W7QWH	Thomas H. Miller	3148 South 3360 East Salt Lake City 84109
Wyoming	W7CQL	Wayne M. Moore	142 South Montana Ave. Casper 82601
SOUTHEASTERN DIVISION			
Alabama	W4WLG	Donald W. Bonner	2208 Rodgers Dr. Huntsville 35811
Canal Zone	KZ5OB	Russell E. Oberholtzer	P.O. Box 107 Margarita
Eastern Florida	WA4NEV	W. G. Blasingame	116 Magnolia St. Neptune Beach 32233
Georgia	W4RZL	Howard L. Scouther	P.O. Box 1902 Columbus 31902
West Indies	KP4DV	Albert R. Crumley, Jr.	P.O. Box 10073 Caparra Heights San Juan, P. R. 00922
Western Florida	W4RKH	Frank M. Butler, Jr.	323 Elliott Rd., S.E. Fort Walton Beach 32548
SOUTHWESTERN DIVISION			
Arizona	W7CAF	Gary M. Hamman	2813 E. Campbell Ave. Phoenix 85016
Los Angeles	K6UAV	Donald R. Etheredge	1240 Redbank St. Sun Valley 91352
Orange	W6DEY	Roy R. Maxson	1434 South Olive St. Santa Ana 92707
San Diego	WB6GIM	James E. Emerson, Jr.	6661 Foye Way San Diego 02117
Santa Barbara	WA8OKN	Cecl D. Hinson	1833 Coventry Court Thousand Oaks 91360
WEST GULF DIVISION			
Northern Texas	W5LR	L. E. Harrison	1314 Holly Glen Drive Dallas 75232
Oklahoma	W5PAL	Cecl C. Cash	1802 Smith Ave. Lawton 73501
Southern Texas	W5ALR	G. D. Jerry Sears	5634 Eskridge St. Houston 77023
CANADIAN DIVISION			
Alberta	VE6FK	Don Sutherland	444-25th Ave., N.E. Calgary, Alta.
British Columbia	VE7FB	H. E. Savage	1555 West 12th Ave. Vancouver 8, B. C.
Manitoba	VE4JT	John Thomas Stacey	19 Cottonwood Cres. Brandon
Maritime	VE1NR	William J. Gillis	Stediac Road, RR 6 Moncton, N. B.
Ontario	VE3BUX	Roy A. White	5 Northwood Crescent Burlington
Quebec	VE2OJ	Jim Ihey	1755 Brookdale Ave. Dorval, P. Q.
Saskatchewan	VE5HP	Gordon C. Pearce	1905 Connaught St. Regina

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

International Catalog

your electronics buying guide
for precision made radio crystals
and electronic equipment-

free!



ICM International Crystal Mfg. Co., Inc.
10 North Lee
Oklahoma City, Oklahoma 73102

Rush FREE catalog

NAME _____ PLEASE PRINT _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

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, W8TSN, 1952-1962
HERBERT HOOVER, JR. W6ZH, 1962-1966

Officers

President ROBERT W. DENNISTON,* WØDX
Box 73, Newton, Iowa 50208
First Vice-President WAYLAND M. GROVES,* W5NW
1406 West 12th Street, Odessa, Texas 79760
Vice-Presidents ROEMER O. BEST, W5QKF
P. LANIER ANDERSON, JR., W4MWH
Secretary JOHN HUNTOON, W1LVQ
Treasurer DAVID H. HOUGHTON
225 Main St., Newington, Connecticut 06111

Honorary Vice-President FRANCIS E. HANDY, W1BDI

General Manager JOHN HUNTOON,* W1LVQ
Communications Manager GEORGE HART, W1NJM
Technical Director GEORGE GRAMMER, W1DF
Assistant General Manager RICHARD L. BALDWIN, W1IKE
Assistant Secretaries PERRY F. WILLIAMS, W1UED
WM. I. DUNKERLEY, JR, W4ZINB ROBERT M. MYERS, W1FBY
225 Main St., Newington, Connecticut 06111

General Counsel ROBERT M. BOOTH, JR., W3PS/K4PS
1150 Connecticut Avenue, N. W., Washington, D. C. 20036
Associate Counsel ARTHUR K. MEEN, Q.C., VE3RX
Suite 2212, 44 King St. West, Toronto 1, Ont.

DIRECTORS

Canada

NOEL B. EATON* V
Box 660, Waterdown, Ontario
Vice-Director: Colin C. Dumbrie V
116 Oak Ridge Drive, Bale d'Urfe, Quebec

Atlantic Division

GILBERT L. CROSSLEY V
734 West Foster Avenue, State College, Pa.
Vice Director: Harry A. McConaghy W
8708 Fenway Dr. Potomac, Bethesda, Md.

Central Division

PHILIP F. HALLER W
6000 S. Tripp Ave., Chicago, Ill. 60626
Vice-Director: Edmond A. Metzger W
1520 South Fourth St., Springfield, Illinois

Dakota Division

CHARLES G. COMPTON* W
Box 226A R.R. 1, South St. Paul, Minn. 5
Vice Director: John M. Maus W6
Oakdale Addition, St. Cloud, Minn. 5631

Delta Division

PHILIP P. SPENCER WLDH/WV
575 Amethyst St., New Orleans, La. 7011
Vice Director: Max Arnold W4
612 Hogan Road, Nashville, Tenn. 3722

Great Lakes Division

ALBAN A. MICHEL V
359 Bonham Rd., Cincinnati, Ohio 452
Vice-Director: Charles C. Miller V
4872 Calvin Drive, Columbus, Ohio 432

Hudson Division

HARRY J. DANNALE* W
16 Arbor Lane, Dix Hills, N.Y. 11746
Vice Director: Stan Zak I
13 Jennifer Lane, Port Chester, New York 1

Midwest Division

SUMNER H. POSTER V
2110 Goblin's Gully Dr., S.E., Cedar Rapids,
52403
Vice-Director: Ralph V. Anderson W
528 Montana Ave., Holton, Kansas 6644

New England Division

ROBERT YORK CHAPMAN V
48 South Road, Groton, Conn. 06340
Vice-Director: Bigelow Green W
11 Law's Brook Rd., South Acton, Mass. 0

Northwestern Division

ROBERT B. THURSTON W
7700 81st Ave., N.E., Seattle, Wash. 981
Vice-Director: David O. Bennett W
Box 455, St. Helens, Ore. 97051

Pacific Division

J. A. DOC GMELIN W
10835 Willowbrook Way, Cupertino, Calif.
Vice-Director: G. Donald Eberlein W6
P. O. Box 475, Palo Alto, Calif. 94302

Roanoke Division

VICTOR C. CLARK W
12927 Popes Head Road, Clifton, Va. 220
Vice-Director: L. Phil Wicker W
4821 Hill Top Road, Greensboro, N. C. 27

Rocky Mountain Division

CARL L. SMITH* W
1070 Locust St., Denver, Colo. 80220
Vice-Director: Thomas G. Banks W
6500 Mossman, N.E., Albuquerque, N. M.

Southeastern Division

CHARLES J. BOLVIN K
2210 S.W. 27th Lane, Miami, Fla. 3313
Vice-Director: Albert L. Hamel V
220 N.E. 25th Street, Pompano Beach, Fla.

Southwestern Division

JOHN R. GRIGGS V
11429 Zelsah Ave., Granada Hills, Calif. 9
Vice-Director: Arnold Dahlman V
14940 Hartland St., Van Nuys, Calif. 91

West Gulf Division

ROY L. ALBRIGHT W
107 Rosemary, San Antonio, Texas 782
Vice-Director: Lester L. Harbin W
4515 Calmont, Fort Worth, Texas 7610

*Member Executive Committee

"It Seems to Us..."



PUBLIC RELATIONS

Every now and then a newspaper or magazine item will include mention of amateur radio activities in something less than complimentary fashion. The subject is usually amateur interference. Occasionally the item is directly antagonistic; more often the disparagement is implied, or conveyed by an inaccurate headline.

Usually, an alert local ham or club will take immediate action by contacting the paper or writing a letter to the editor in an attempt to obtain clarification and set the matter straight. While a desirable procedure, it still has the disadvantage of again mentioning interference and amateurs in the same breath, and thus tends to accentuate the association of ideas.

There's a much better basic approach.

What is needed is full, complete and accurate accounts of all *other* amateur doings, so that any localized problems such as interference will seem (as indeed they are) minor in comparison to the good that can be and is being accomplished by public-spirited hams. In other words, a good long-range public relations program. To paraphrase the song title, you eliminate or neutralize the negative by accentuating the positive.

Naturally, any emergency activities of amateurs should be promptly and fully reported to newspapers, radio and TV stations. If the report reaches the media while the emergency still exists there is a good possibility the editor will give pictorial coverage. But in any one community emergencies are few and far between. You can't create a disaster. Yet you can be alert to participation in civic projects, or to initiation of some of your own, to maintain and improve the local standing of your amateur group.

A number of clubs have cooperated in fund-raising drives — e.g., an all-night telethon on behalf of cerebral palsy, where a net control station at the Hq. channeled incoming pledge calls to mobile units spread around the city for prompt pickup. In another city, famous for its huge parades, hams offered their services to the grand marshal; the procession started on schedule for the first time in the city's

history — and hams did themselves a world of good in public relations.

But you don't need to wait even for fund drives or parades. Except in the larger cities, a great many amateur occurrences are considered newsworthy. The local club receiving its charter of ARRL affiliation; a local amateur making DXCC; setting up an e.m.e. or Oscar ground station; appointment of an emergency coordinator or RACES radio officer; participation by club members in a contest, Field Day, or hamfest; delivery of a message from a serviceman in Vietnam to his mother — these and a host of other activities, however common they seem to us, can mean an inch or two in the Daily Bugle or 30 seconds on "The Voice of Podunk."

Next month ARRL Field Day June 28-29 will present a special opportunity for good public relations. Moreover, the week of June 22-28 is listed as "Amateur Radio Week" in Chases' *Calendar of Annual Events*, which many editors, columnists and on-the-air personalities use as an idea starter.

What else? Well, is your PTA putting on a hobby show? Be in it! Kiwanis looking for a speaker? Volunteer! Does your company have a "house organ"? Its editor would probably be delighted to have a feature story on hams in the company.

Publicity helps are on tap at League Hq. to make it easier for you, too. A sample speech, interview, and b.c. program, each available for the asking, can be the basis for a presentation spiced with local color from your own experiences. And we have reprints of outstanding stories, which have appeared in nationally-known magazines, as handouts to an audience after your talk, or for distribution at your club's hobby show exhibit.

Good public relations are important to nearly every society, corporation or charity, but especially important to us — our very licenses depend on our activities being "in the public interest, convenience or necessity." We must leave no doubt in the minds of the public that we fill this requirement to overflowing.

QST

League Lines . . .

This page is prepared after the rest of the issue is put to bed, so here's some last-minute news of FCC-proposed changes in our rules. First, on petition by WA4FIJ, to allow maritime-mobile use of 7.0-7.1 MHz. when outside Region II, in addition to presently-authorized use of 20, 15 and 10 meters in those areas; Cmdr. Ackerman's request for 75-meter privileges was, however, denied. Second, on a somewhat dusty (1965) petition of ARRL, to establish an exclusive c.w. band 144.0-144.1 MHz. in place of the present one at the top edge of the band; and (another ARRL petition) to permit RTTY (F1) operation in the 10-meter c.w. band, i.e., 28.0-28.5 MHz. Comments from interested parties are solicited, with a deadline of June 11. Complete details in June QST.

If you work a lot of DX, or even a little, you should have a self-addressed, stamped envelope at your ARRL district QSL bureau. See page 70 for details on the system. If you expect a lot of cards, put on extra postage -- but not too much, or it will take longer than you think to fill the envelopes. A good compromise is 12 cents.

While a compliment or two, as usual, exists elsewhere in the annual report of FCC, one section of fiscal 1968 -- for the first time in Commission history so far as we can recall -- is sharply critical (underscoring added):

The past year has shown a significant trend toward increased on-the-air feuding and use of questionable language in a radio service which historically has prided itself on cooperative self-regulation. Limited manpower has prevented attention to any but the most flagrant cases. Approximately 2,800 violation and advisory notices were issued to licensees during the year.

Is a word to the wise sufficient?

Clubs wishing to set up FD operations in advance may do so again this year, but in such event only 24 consecutive hours (of the 27-hour FD period) are permitted. Any other contest rules comments? Send 'em to the now-elected chairman of the Contest Advisory Committee, W6CUF (see page 62, March QST).

Some confusion has been caused by editorial changes in the way FCC tabulates amateur band/mode privileges. F-3 is now listed with A-3 for all the h.f. bands, instead of the former designation "n.b.f.m." But the matter is clarified by Section 97.65(c): "On frequencies below 29.0 Mc/s and between 50.1 and 52.5 Mc/s, the bandwidth of an F3 emission (frequency or phase modulation) shall not exceed that of an A3 emission having the same audio characteristics . . ."

If any Life Member has not yet received his special emblem pin, let us know; a few appear to have gone astray. As a separate matter, we have provided some 800 lapel pins for 25-year membership records. No charge, but they are issued on your request not automatically. Write us if you rate one.

Quote-of-the-month from "Bandspread," newsletter of the Wabash Valley A.R.A. -- "It appears we were much better off when the subject of patches was ignored and was non-authorized equipment. Everytime someone brings up a problem we get it real good!"

The D.C. 80-10 Receiver

BY DOUG DEMAW,* WICER

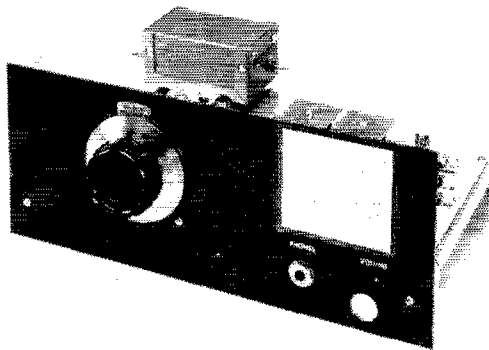
THE D.C. 80-10 should appeal to those amateurs who are interested in building practical solid-state equipment. This receiver operates from 12 volts d.c. and draws only 40 ma. These modest power requirements suggest that it could be operated for long periods from a flashlight-cell battery pack, an important consideration during portable and emergency operations.

A 0.3- μ v. c.w. signal can be detected easily on all of the ham bands covered by the receiver. Ample audio output is available to drive high-impedance phones to a comfortable listening level, on weak signals. Since there is no warm-up drift after approximately 10 seconds, good stability can be expected. A 2.5-kHz. toroidal audio filter provides suitable selectivity for copying a.m. and s.s.b. signals, even when the bands are crowded. Though the receiver operates nicely on c.w., additional audio selectivity could be added "outboard" by those who desire a narrower passband.

By using the direct-conversion approach in this design[†] complexity is greatly minimized. A product detector is used as the first stage of the receiver for 80-meter reception, and serves as the input stage of a tunable-i.f. receiver when the plug-in converters of Fig. 2 are used for receiving the four higher bands. The detector is used in combination with a b.f.o. which tunes the same range covered by the detector — 3.5 to 4 MHz. Audio output from the detector is passed through the 2.5-kHz. toroidal filter, then is amplified to headphone level by a single audio stage. Performance is comparable to that of a superhet except that single-signal reception (in which the audio image is eliminated) is not possible, nor is there any automatic gain control. Because of the simplicity of the circuit, and because there are only two operating controls, beginners should have no problems in building and using this receiver. The b.f.o. is always in operation, but a.m. signals (if they are stable) can be copied as easily as they are on a standard s.s.b. receiver.

* Assistant Technical Editor, *QST*.

[†] Hayward and Bingham. "Direct Conversion — A Neglected Technique," *QST*, November 1968.



Front view of the direct conversion receiver. The panel is finished in machine gray spray paint. The two controls are main tuning and audio gain.

A quick price analysis showed that the main section of the receiver costs approximately \$26, minus the circuit board, if all components are purchased brand new. The converters cost approximately \$12 each, less circuit board, when new parts are purchased. Naturally, the workshop "goodie" trove should provide many of the parts required, thus greatly reducing the total cost.

Circuit Information

Though the circuit of Fig. 1 may appear somewhat involved, it isn't. There are only three stages in the main receiver section — an integrated-circuit detector, U_1 , a JFET b.f.o., and a bipolar-transistor audio amplifier. The input tuned circuit, consisting of L_2 with C_1 , C_2 and C_{3A} , covers the range 3.5 to 4 MHz. Tight coupling is used between the tuned circuit and the detector input to minimize spurious responses from strong out-of-band signals, especially those of commercial broadcast stations. (Heavier coupling caused cross modulation to occur when the receiver was used in the vicinity of some local broadcast transmitters.)

The b.f.o. operates over the same range as the detector, and the two stages are gang-tuned by means of C_3 . The b.f.o. signal from Q_2 beats

Here is a direct-conversion receiver that is easy to build, uses semiconductors throughout, and provides ham-band-only reception from 3.5 to 29.5 MHz. with excellent stability and sensitivity. Circuit-board construction assures neatness and helps to minimize mechanical and electrical instability.

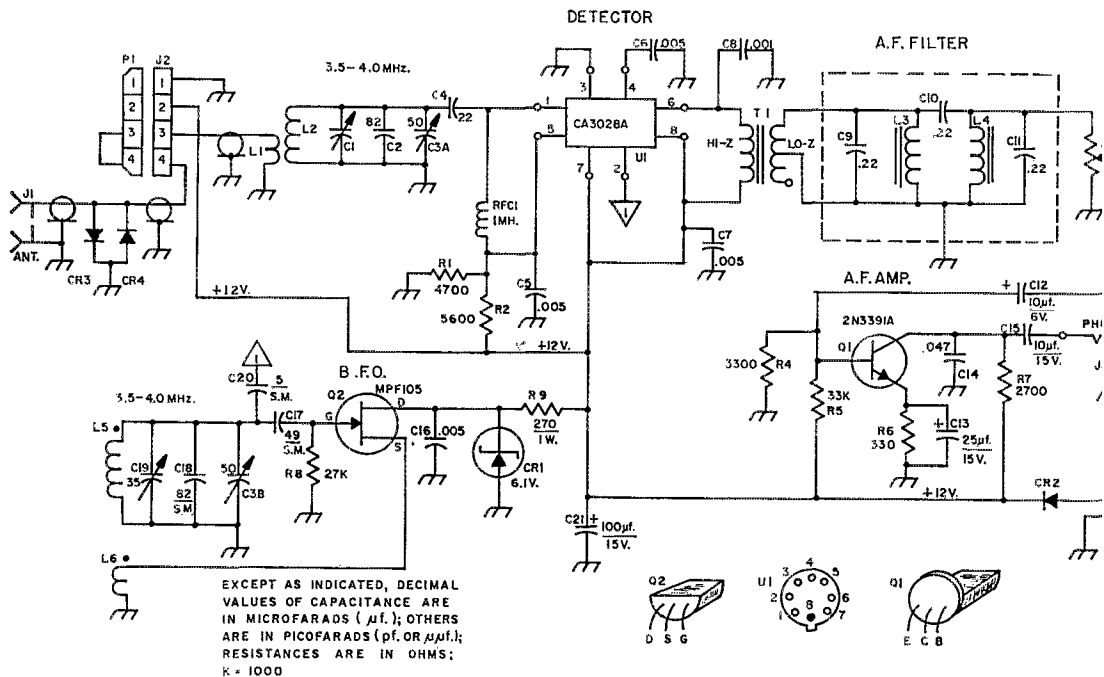


Fig. 1—Schematic diagram of the main portion of the D.C. 80-10. Capacitors with polarity marking are electrolytic. Other fixed capacitors are disk ceramic unless marked S.M. (silver mica). C₉, C₁₀, and C₁₁ are dipped polyester types. Fixed resistors are 1/2-watt composition unless noted otherwise. Component numbers not listed below are for identification purposes on the circuit board.

- C₁—3-30-pf. compression trimmer.
- C₃—Split-stator variable, 50 pf. per section (see text).
- C₉-C₁₁, inc.—Dipped polyester, 100 volts (Cornell-Dubilier type DMF suitable).
- C₁₀—7-35-pf. ceramic trimmer (Centralab type 827-D or similar).
- CR₁—Zener, 6.2 volts, 1-watt (Motorola HEP 103).
- CR₂—Silicon top-hat rectifier, 50 p.r.v., 100 ma. or higher (Motorola HEP-161 suitable).
- CR₃, CR₄—Small-signal silicon switching diode (1N465A or similar).
- J₁—SO-239-type chassis connector; phono jack also suitable.
- J₂—4-pin tube socket.
- J₃—Single-circuit phone jack.
- J₄—Male two-terminal chassis connector (Switchcraft 5501MP or similar).
- l₁—6 turns No. 24 enam. wound over L₂ to occupy 1/3 of core.

- L₂, L₅—36-inch length of No. 24 enam. on Amidon* T-68-2 toroid core; 45 turns total.
- L₃, L₁—88-mh. toroid (see QST Ham Ads for suppliers).
- L₅—14 turns No. 24 enam. wound over L₅ to occupy entire circumference of core. *Observe polarity.*
- P₁—Base from discarded 4-pin tube, or jumper made from two banana plugs.
- Q₁—Low-noise a.f. preamplifier transistor, n-p-n silicon, high beta rating.
- Q₂—N-channel JFET, 30-MHz. rating or greater (Motorola MPF105 or HEP 801).
- R_x—1000-ohm linear-taper carbon control.
- RFC₁—1-mh. r.f. choke (Millen J300-1000 or similar).
- T₁—10,000-ohm primary to 1000-ohm secondary driver (Lafayette Radio 99T6124; use 1/2 of secondary).
- U₁—RCA CA3028A integrated circuit.

* Amidon Associates, 12033 Otsego St., North Hollywood, Calif. 91607

Converter Coil—Capacitor Table

Band (MHz.)	Osc. (MHz.)	L ₇ (Turns)	L ₈ (µh.)	Miller No.	C ₂₂ (pf.)	L ₁₀ (µh.)	Miller No.	C ₂₈ (pf.)	C ₂₉ (pf.)
7-7.5	11.0	7	9.4-18.7	42A155CBI	33	1.7-2.7	4503	220	150
14-14.5	10.5	3	3.6-8.5	42A686CBI	25	1.7-2.7	4503	220	150
21-21.5	17.5	3	2.12-4.10	42A336CBI	15	1.7-2.7	4503	100	100
28.5-29	25	3	1.3-2.7	42A226CBI	15	0.44-0.76	4501	100	100

Capacitors C₂₈ and C₂₉ should be silver mica for best stability. Miller parts can be ordered from J. W. Miller Co., 5917 South Main St., Los Angeles, California 90003, or from authorized J. W. Miller distributors. L₇ is close-wound over ground end of L₈ using No. 24 enam. wire.

against the incoming signal to furnish a beat note for c.w. reception and to provide a carrier for copying s.s.b. signals. Zener-diode voltage regulation is used in the drain supply to Q_2 , to enhance the stability of the receiver.

Audio output from the detector is passed through a 2.5-kHz. bandpass filter which uses two telephone-type surplus 88-mh. toroids.² Output from the filter is routed to the gain control, R_3 , which terminates the filter in its characteristic impedance. A bipolar transistor, Q_1 , amplifies the audio signal to headphone level. The a.f. amplifier is designed for use with high-impedance phones, 1000 ohms or greater. A polarity-guarding diode, CR_2 , prevents damage to the circuit components in the event the power supply is connected for the wrong polarity. It will conduct when positive voltage is applied to its anode, but is nonconducting with negative voltage.

For 80-meter operation a jumper plug, P_1 , is inserted into J_2 , the converter socket. P_1 completes the antenna circuit by shorting terminals 3 and 4 of J_2 , and the receiver operates straight through. Plug-in converters are attached to the receiver at J_2 for 40-, 20-, 15-, and 10-meter operation. This results in a double-conversion arrangement, the main portion of the receiver being a tunable i.f. system. Diodes CR_3 and CR_4 conduct at approximately 0.6 volt to offer burn-out protection to U_1 during 80-meter reception. When operating the four higher bands the diodes protect the mixer FET in the converter being used. This precaution is necessary when the receiver is to be used near or in combination with a transmitter.

The circuit for the converters is shown in Fig. 2. Each consists of an FET mixer, Q_3 , and a fixed-

² Unused 88-mh. telephone-type toroids are usually listed in *QST* Ham-Ads. Many surplus houses handle them too.

tuned FET oscillator, Q_4 . A crystal-controlled oscillator was considered, but in the interests of economy a self-excited oscillator was used. It is very stable and is easy to adjust. Though Zener-diode regulation is not used on the drain-supply line to the converter, it could be added if desired. This would entail the addition of a 100-ohm 1-watt resistor and a 9.1-volt Zener diode. The Zener diode and dropping resistor would be connected to the circuit in a like manner to that used at Q_2 in the main receiver. The two components could be connected to the converter socket, J_2 , under the main chassis, at pin 2.

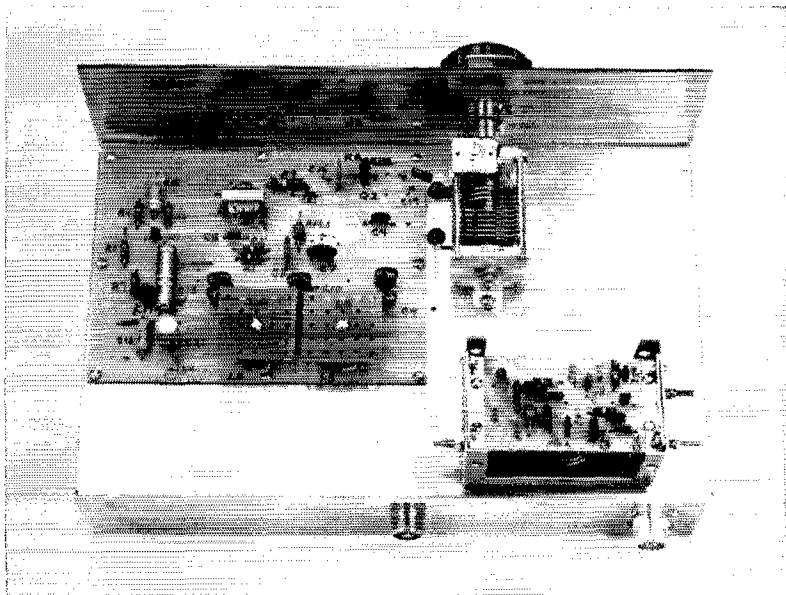
Construction Notes

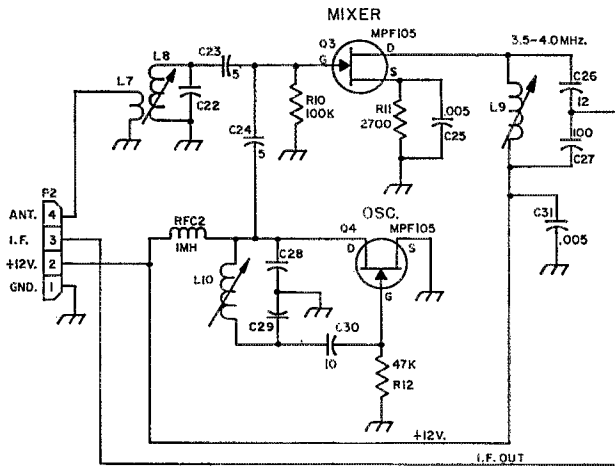
A hand-made aluminum chassis and panel are used as a foundation for the receiver. Since the chassis is 2 inches high, 11 inches wide, and 7 inches deep, a Bud AC-407 can be substituted. The panel is 11 inches long and 4½ inches high. The chassis is larger than necessary, but the unused areas provide space for additional circuits that may eventually be added, such as an audio amplifier board for speaker operation. If the builder wishes to make the receiver smaller in size, it should be a simple matter to rearrange the components accordingly.

Though etched-circuit construction³ is shown here, there is no reason why point-to-point wiring cannot be used. (Examples of both wiring methods are shown in Fig. 3. The circuits are the same, one converter being built for 40 meters and the other for operation in the 20-meter band.) The integrated circuit, U_1 , is mounted on the foil side of the circuit board by means of a 10-pin integrated-circuit socket (Motorola HEP 451).

³ Ready-made circuit boards for this receiver can be obtained from Stafford Electronics, 427 S. Benbow Rd., Greensboro, N. C. Also, Foto-Etch Co., 1760 Santa Maria Drive, Concord, Calif. 94520. Scale templates are available from ARRL for 25 cents.

Looking at the top of the chassis, the plug-in converter (its cover removed) is installed at one corner of the chassis. The main circuit board is located near the front panel and is mounted over a chassis cutout. Unused space remains for the addition of circuit refinements later on.





EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μ f.); OTHERS ARE IN PICOFARADS (pf. OR μ mf.); RESISTANCES ARE IN OHMS; K = 1000.



Fig. 2—Schematic diagram of the plug-in converters. These units can be used with any communications receiver that covers the 80-meter band. Capacitors are disk ceramic unless marked S.M. (silver mica). Numbered components not listed below are for circuit-board layout identification.

C22, C28, C29—See coil table.

L7, L8, L10—See coil table.

L9—120 to 190- μ h. variable inductor (J. W. Miller 4512).

P2—4-prong plug mounted on converter box (Amphenol 86-CP4 or equiv.).

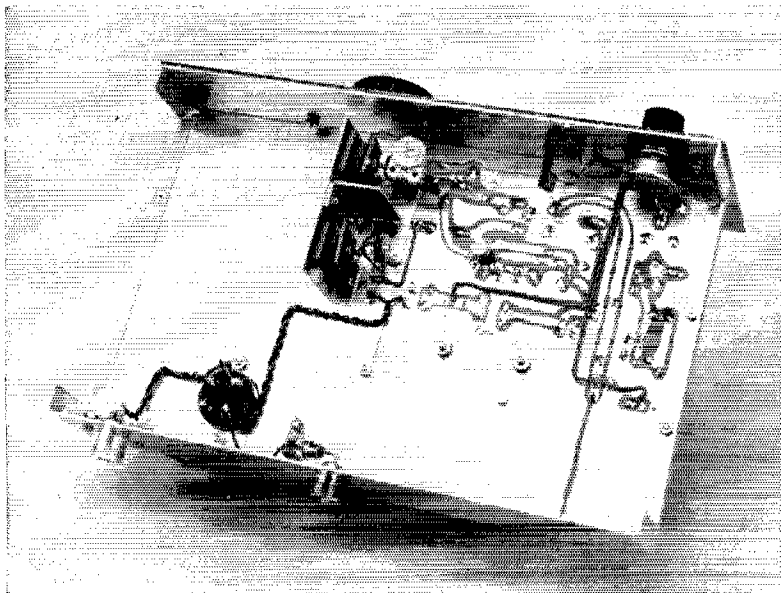
Q3, Q4—N-channel JFET, 30-MHz. rating or higher (Motorola MPF105 or HEP-801.)

RFC2—1-mh. choke (Millen J-300-1000 or equiv.).

The pins of the socket are bent out at right angles from the base, then are soldered to the foil elements of the board. The IC can be soldered directly to the board if desired, but the use of a socket is recommended to prevent damage from heating during installation.

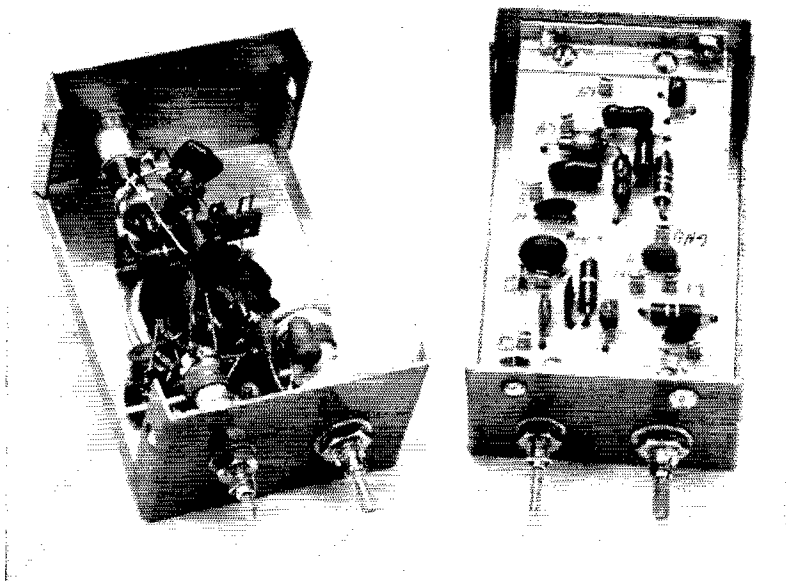
Toroidal inductors L3 and L4 are attached to the main circuit board by means of 6-32 \times 1-inch

machine screws and hex nuts. A small square of insulating board is used on each toroid as a retainer. Spaghetti tubing is slipped over each mounting screw so that the screw threads cannot damage the coil windings. Similarly, the r.f. toroids, L2 and L5, are mounted on an under-chassis aluminum bracket, but each coil has two squares (top and bottom) of insulating board



Looking into the bottom half of the chassis, the integrated circuit, U1, is at the center of the main circuit board. An aluminum bracket and divider holds toroidal coils L2 and L5. The coil leads connect to terminal strips which are mounted in front of the bracket. Twisted-pair hookup wire connects the antenna wire to the converter socket to input link L1. Diode CR1 is mounted on a terminal strip near the 12-volt input jack (J4) near the rear apron of the chassis (center). Diode CR2 and CR3 should be mounted directly at J1 (not shown here).

Fig. 3—Photo of two of the plug-in converters showing how point-to-point wiring compares to etched-circuit construction. The converters are built in $3\frac{1}{4} \times 1\frac{1}{2} \times 2\frac{1}{8}$ -inch Miniboxes. The three slug-tuned coils mount on the ends of the boxes. In the circuit-board version, the coils are below the board.



to hold it in place. The bracket (see photo) is made of aluminum sheet, 3 inches wide and $1\frac{3}{4}$ inches high. A 1-inch wide aluminum divider helps isolate the oscillator coil, L_5 , from the detector coil, L_2 . Though the toroidal inductors are self-shielding, the divider was added to help reduce capacitive coupling.

A transistor socket is used for Q_2 ; it was installed to permit various types of FETs to be tried in the circuit. Q_1 is soldered directly to the circuit board, but a socket can be put there if the builder wishes to use one.

Trimmer C_1 is mounted on the frame of C_{3A} between the rotor lug and the stator rod. Though an E. F. Johnson 167-52 is used for C_3 in this model almost any miniature 50-pf. split-stator capacitor can be used. A less expensive and more compact tuning capacitor would be the Hammarlund HFD-50, or the James Millen 21050RM. The primary requirement, as in any good receiver, is that the shaft of the capacitor turn freely and smoothly, and that the rotor bearings make positive contact with their connecting lugs.

In this model an imported tuning dial provides the vernier action for the tuning capacitor. Though low in cost, the dial mechanism works well. Some backlash was noted initially, so the unit was taken apart and inspected, and it turned out that the simple remedy was to flow solder over both sides of each of the three brass pivots on which the dial-drive wheels are mounted. Each has a peened roller shaft for its bearing, and some slack was noted at each point. The addition of the solder secured the three bearings, thus correcting the backlash. A 100-watt iron will be needed. Some other dials of the same manufacture were tried and showed no backlash. If you get a good one, fine. If not, the cure is a simple one. A good substitute dial drive would be one of the precision verniers taken from

a war-surplus TU-6B-series tuning unit — available from many surplus houses for a nominal price.⁴

There is room under the chassis to mount eight size-C flashlight cells by means of an aluminum bracket. Series connected, the batteries will provide the required 12 volts d.c. for the receiver. If this is done, an on-off switch can be added to the gain control, R_3 .

Preliminary Testing

It is always wise to inspect any etched-circuit board used in a new project before applying operating voltages. Make certain that there are no cold-solder joints. Inspect the board for unwanted solder bridges between the various copper elements. The next check can be made by connecting an ohmmeter between the circuit side of CR_2 and chassis ground. With a v.t.v.m. the d.c. resistance in this model is 170 ohms. With the test prods reversed a reading of 80 ohms was noted. The ohmmeter tests should be made with one of the converters plugged in, and with all semiconductors in their sockets. Any significant departure from these readings will indicate a bad component or a wiring error.

Connect +12 volts to J_4 after inserting jumper plug P_1 into J_2 . Tune in the signal from Q_2 on the 80-meter band of a ham receiver. (It may be necessary to connect a short wire to the antenna post of the monitor receiver, placing its free end near Q_2 in order to pick up the signal.) Adjust C_{19} so that the signal is heard at 3.5 MHz. when C_3 is fully meshed. With the plates of C_3 fully unmeshed the signal from Q_2 should be heard at 4 MHz. Actually, there should be some overlap at each end of the band, providing a tuning range of approximately 3495 kHz. to 4005 kHz. If

⁴ Available from Fair Radio Sales, Lima, Ohio. Catalog gives complete listing of available tuning units.

Q_2 does not oscillate, check to make sure that L_8 and L_9 are phased correctly as shown by the two black dots in Fig. 1. Both windings must be put on the core the same way; that is, both can be wound either clockwise or counter-clockwise, but not in opposite sense to one another.

After aligning the b.f.o., connect an antenna to J_1 and tune in a signal near the center of the 80-meter band. Adjust C_1 for peak signal strength. This will permit the detector and b.f.o. tuned circuits to track across the entire tuning range. Since there is no a.g.c. circuit in this receiver strong signals will overdrive the audio amplifier, Q_1 , if the gain control, R_1 , is set too high. Backing it off slightly will correct the problem, should it occur.

A plug-in converter can now be substituted for P_1 at J_2 . Its oscillator signal can be monitored on a general-coverage receiver during alignment. When this is done L_{10} , Fig. 2, is adjusted until the required oscillator frequency is heard (see coil table). With an antenna connected at J_1 , tune in a signal near the center of the band covered by the converter. Adjust the slugs in L_8 and L_9 for maximum signal response. The receiver should now be ready to use.

On 40 meters the band will tune "backwards," i.e., 7000 kHz. will tune in at 4 MHz. on the main dial, and 7500 kHz. will fall at 3.5 MHz. The other bands will tune conventionally, their low ends falling at 3.5 MHz. A calibration chart can be made up to show where the 10-kHz. points of each band fall on the tuning dial. A dial chart for the 80-meter band is pasted on the panel of this receiver, and calibration for the other four bands is carried out by means of mental gymnastics. Note: Other 500-kHz. segments of the 10-meter band can be turned by setting L_{10} for the proper frequency. Use the same 10-meter constants given in the coil table.

Performance

The operator of this direct-conversion receiver will be hard pressed to tell this equipment from a conventional superhet as he scans the bands. With only two controls to operate there is little to confuse a beginner. Sideband signals are tuned in the same way as with an s.s.b. receiver. The sideband being transmitted -- upper or lower -- will determine at which side of the signal the main dial must be set. A little practice will make this a simple procedure. A.m. signals must be tuned in at exact zero beat as is customary on an s.s.b. receiver. C.w. signals can be tuned in on either side of zero beat. The operator can select whichever side that has the least QRAM on it.

Sensitivity is about the same on 80 meters as it is on the four higher bands. Stability is comparable to that of most top-quality communications receivers. Hand-capacitance effects are minimal, eliminating the need for a shield around the main tuning capacitor.

Radiation from the 3.5 MHz. oscillator is low because of the low power level at which Q_2 operates -- 6.1 volts at 4 ma. U_1 offers additional isolation between the antenna and Q_2 . The oscillator signal should be heard only in the immediate neighborhood of the operator's home. Enclosing the receiver in a metal cabinet should further reduce radiation.

The total current drawn by the receiver, converter installed, is only 40 ma. This means that many hours of operation can be expected from a flashlight battery pack connected to give 12 volts. Penlight cells are not recommended because of their low capacity. This receiver is suitable for any class of ham station, and should not be overlooked as part of a homemade portable or emergency station, especially if battery operation is a prime consideration. QST

Strays

QST Congratulates . . .

Finley Carter, K6GT, on receiving the Founder's Medal of the IEEE.

Frank A. Gunther, W2ALS president of Radio Engineering Laboratories, on receiving the 1969 De Forest Audion Award.

Albert K. Nielsen, WB4EAI, author of a meditation published by the Upper Room, a worldwide interdenominational devotional guide.

Dominic Giangrossi, WB6KOH, named Veteran of the Month by California's Dept. of Veterans Affairs.

Willi Kluehe, W6RJR, who received the Scott Helt Award for having the best paper published last year in the Transactions of the IEEE group on broadcasting.

— . . . —

George Folk, K8QYG, received his confirmed 100th QSL for DXCC from an EI on the Emerald Isle on . . . you guessed it, St. Patrick's Day!

During the Armed Forces Communication and Electronics Asso. Convention in June, K4NAA will be operating daily from the Sheraton Park Hotel in Washington, D. C. AFCEA convention delegates with AR licenses are invited to take advantage of the Navy's ham radio station during the convention on June 3, 4, and 5. Operation will be from 0900 to 2200 EST with two available positions for c.w. and s.s.b. on 10, 15, 20, 40, and 80-meter bands. A special designed QSL card has been prepared to acknowledge contacts with the station. Thanks to LT J. I. Fagan, Jr., and LTJG K. H. Pearce, the Project Officers for the exhibit.

— . . . —

Podunk exists! Yes, the famous town is a real place and is, in fact, up for sale. A newspaper story that appeared across the country recently reported that the town, which is located a few miles southwest of Des Moines, could be purchased for \$8000. What a rare chance for a ham . . . imagine, a QSL from Podunk! (Thanks to W6ZZN for the clipping).

Legalize Your Phone Patch

By J. B. BERRY, JR.* W4PME

Here is a follow-up article on W9NLT's phone patch arrangement described in the March issue. It contains more information on the Voice Coupler and simplified means of meeting the technical restrictions.

ON January 1, 1969, the FCC allowed Bell System tariff changes to go into effect which provided for liberalized interconnections with customer-provided equipment and systems. In a previous issue W9NLT gave us information on how the new tariffs will work and described a hybrid-coil phone patch designed to meet the technical requirements contained in the tariff changes.¹ This article will give those of us that already own a phone patch additional ways of legalizing it for use with the telephone company's Voice Coupler. In particular, a simplified filter is presented for those who operate s.s.b. with selective receivers.

Interconnections of amateur radio voice signals to be transmitted over regular telephone lines must be made via a Voice Coupler provided by the telephone company. Most Bell System operating companies have, by now, filed tariff changes which provide such an arrangement for as little as 50 cents a month. A one-time installation charge may also be involved. The phone patch itself must be provided by the amateur. Either a commercial unit or a "home-brew" device can be used. However, in any case *the amateur is responsible* for complying with certain signal-level network-protection criteria included in the tariff. These were listed by W9NLT in his article. However, I will summarize them here in Table I as interpreted for the direct electrical Bell System Voice Coupler currently available for phone patch operation.

Table I is based on the Bell System 30 Type Voice Coupler². It has a design level of -3 dbm.³ at 900 ohms. If the telephone company installs some other type of coupler they will specify its maximum level and operating impedance. At any rate, a phone-patch arrangement which complies with Table I will be entirely "legal" for the 30 Type coupler. This coupler is connected to the dial telephone system via a Net-

work Control Signalling Unit as shown in Fig. 1. Fig. 2 is a simplified schematic of the Voice Coupler.

Referring to Fig. 1, note that the simplest kind of Network Control Signalling Unit available is a telephone set with a modified "exclusion key". A typical phone patch is set up via the telephone set. When the land-line connection is established the amateur operates the exclusion key, which bridges the Voice Coupler across the line. Unless you specify a handset cut-off key option (which you may specify at the time of your order) the telephone handset becomes your mike. Operation of the transmitter-receiver and phone-patch equipment may then proceed either via push-to-talk (p.t.t.) or VOX operation. Since the voice level received over the land-line connection is highly variable, VOX operation may not be satisfactory. If you wish the handset disconnected during phone-patch operation a cutoff-key telephone set can be wired to provide this feature. However, it is not a good idea in most cases since you may wish to break in on the phone-patch connection via the handset to identify, to clarify a phrase, and so on. The volume output of your handset will generally be 10 db. or more higher than the other end of the telephone connection, so it helps to muffle *your* talking volume by partially covering the telephone transmitter with your fingers. This also prevents room noises from entering the handset during the patch. At the conclusion of the patch

TABLE I

Summary of Network Protection Levels

Frequency, Hz.	Max. Level (Note 1)	
	dbm., 900 ohms	Volts, p-p, 900 ohms
1000 (reference)	-3	1.9
2450-2750 (2600-Hz. Signalling)	Note 2	Note 2
3995-4005	-21	0.24
4000-10,000	-16	0.43
10,000-25,000	-24	0.17
25,000-40,000	-36	0.043
40,000 and up	-50	8.5 mv.

Notes 1. Measured into a 900-ohm resistance termination and for the Bell System 30 Type Voice Coupler only.

2. Energy in this band must not exceed energy simultaneously present in the 800-2450 Hz. band.

* 750 Starlight Dr., N. E., Atlanta, Georgia 30305.

¹ Schleicher, "Phone Patching — Legitimately," *QST*, March, 1969.

² Formerly coded F57948.

³ Averaged over any 3-second interval.

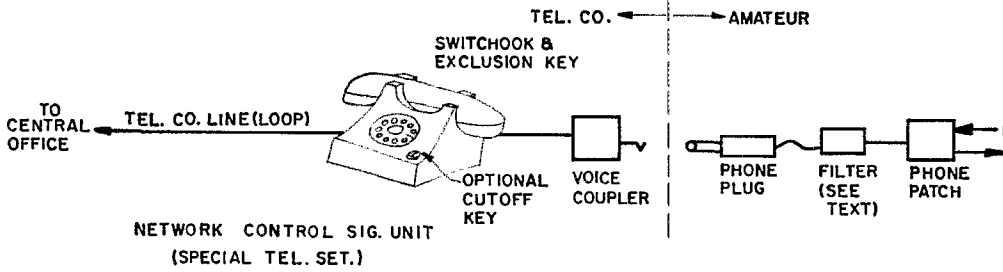


Fig. 1—Block diagram of Voice Coupler arrangement.

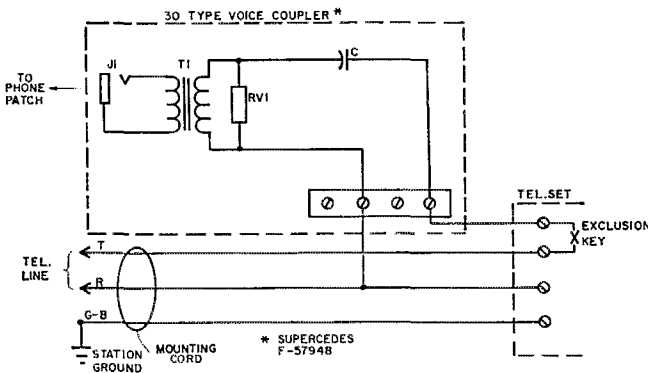


Fig. 2—Circuit diagram of 30 Type Voice Coupler. C—D.c.-blocking capacitor. J₁—Standard phone jack, for ¼-inch plugs. RV₁—Peak-limiting silicon varistors. T₁—Isolating transformer.

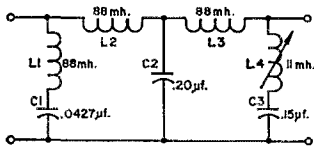
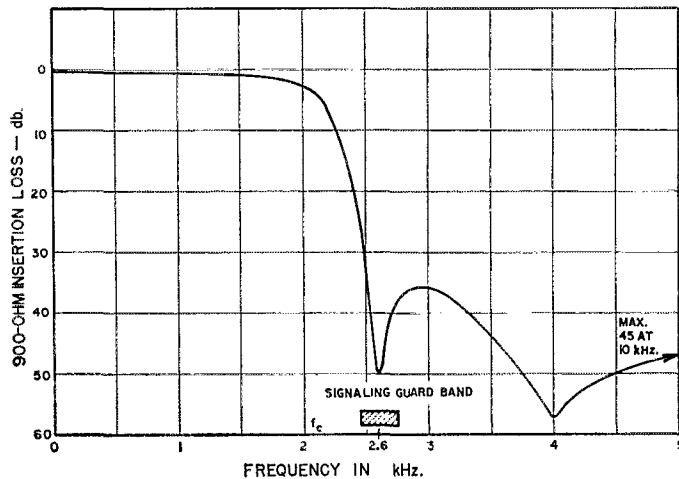


Fig. 3—Low-pass filter for network protection. See Fig. 4 for attenuation curve.

C₁—Paper; 0.04- and 0.0027-µf. capacitors in parallel. C₂, C₃—Paper. L₁, L₂, L₃—Surplus telephone toroids (see Ham-Ads). L₄—Adjustable (Miller 6314 or equivalent).

Fig. 4—Measured attenuation of the filter shown in Fig. 3



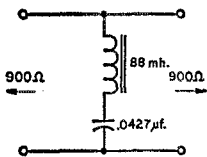


Fig. 5—Simple 2600-Hz. shunt filter. If the receiver selectivity is adequate to meet other requirements of Table I, this series-resonant circuit will provide the notch required at 2600 Hz.

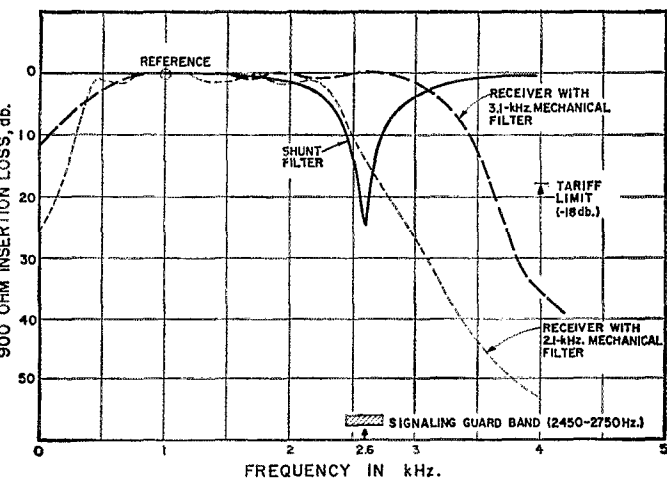


Fig. 6—Frequency response of shunt filter shown in Fig. 5 together with response curves of 2.1- and 3.1-kHz. mechanical filters of the type used in s.s.b. receivers.

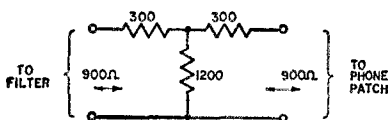


Fig. 7—6-db. pad for improving impedance characteristics. Resistors may be 1/2-watt composition.

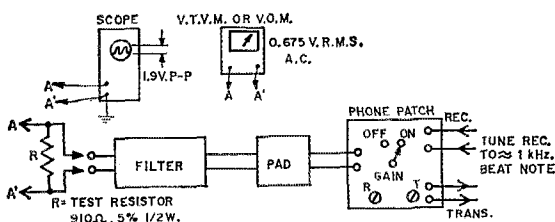


Fig. 8—Test setup for checking level and adjusting to -3 dbm.

tell the other party to hang up; then you can restore the exclusion key, hang up, and turn off your phone patch. Resume radio communications via the station mike.

In order to comply with the requirements listed in Table I you must make certain level measurements and adjustments, and you will probably need a special filter between your phone patch and the voice coupler. Fig. 3 is a schematic of a simplified low-pass filter designed and tested by the author to ensure compliance with these requirements. Its frequency response is shown in Fig. 4. The Appendix shows two computer designed filters of more sophistication. If your receiver has a 3.1- or a 2.1-kHz. mechanical or multi-element crystal filter with a good shape factor (3 or better) the 2.6-kHz. shunt filter shown in Fig. 5 may be adequate. It is designed to protect against heterodyne QRM "talkoff". Its response is plotted in Fig. 6 along with the response of a 2.1-kHz. and a 3.1-kHz. mechanical-filter receiver. If your phone patch is of the hybrid type and VOX operation is contemplated, an impedance-improving pad of about 6 db. is recommended, as shown in Fig. 7. Connect it between the phone patch and the filter (either type). Note that the input to the Voice Coupler is transformed coupled. Do not apply d.c. to this unit! The transformer is a miniature type and will saturate on direct current.

To adjust your phone patch use the test arrangement shown in Fig. 8. Turn on the phone patch, tune in an approximate 1-kHz. beat note from your crystal calibrator or v.f.o., and adjust the phone patch and receiver gain control for -3 dbm. into the 910-ohm, 5% resistor. As shown, this can be read with a v.t.v.m. (0.675 volt, r.m.s.) or with a 20,000-ohms/volt v.o.m. on the a.c. scale. However, the best way is to use an oscilloscope with an accurate voltage calibrator, to prevent waveform errors (adjust for 1.9 volts, peak-to-peak). Be sure the r.f. gain is turned up and all other receiver controls are just as they would be for phone-patch work. If your phone patch has a built-in VU meter the meter can be used as a reference but it cannot be used as a volt-meter. Mark all gain settings so that they can be referred to for phone-patch work. Remember, the peak limiter in the Voice Coupler is designed to prevent excessive voice energy from entering the telephone line, but it does not relieve you of the responsibility for setting your output to

A 500-Watt F.M. and C.W. Transmitter for 220 MHz.

Optimum Performance at the Top End of the V.H.F. Range

BY RICHARD B. STEVENS,* W1QWJ

THE 220-MHz. band is not unlike 144 in both transmitting and receiving requirements, except that getting top performance is just a little harder at the higher frequency. This may have deterred a fair number of potential 220-MHz. enthusiasts, and it is hoped that they will find this transmitter of interest. It is capable of more than 300 watts output, on c.w. and f.m. or the exciter portion may be used alone, to deliver up to about 8 watts.

Provision for f.m. and c.w. operation is included. The final amplifier could be plate modulated, but anyone starting out in the v.h.f. field today may well question the wisdom of building the expensive and bulky audio equipment necessary to modulate a 500-watt transmitter. Inclusion of f.m., on the other hand, adds almost nothing to either the cost or complexity of a v.h.f. transmitter, regardless of the power level. Deviation can be adjusted to fit the bandwidth of the usual converter and communications-receiver combination, or to work into the wide-band i.f. systems commonly used in fixed-frequency f.m. reception on 6 and 2 meters. If a v.f.o. is substituted for the crystal control shown, deviation can be expanded readily to true wide-band proportions, such as used in f.m. broadcasting. There is merit in any of these methods¹.

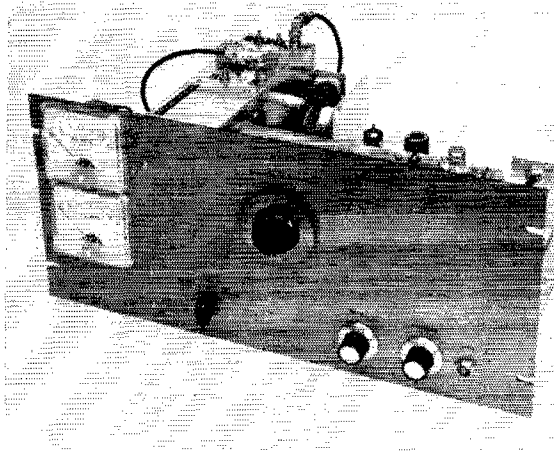
The R. F. Circuits

Looking at the schematic diagram, Fig. 1, it will be seen that the first three stages of the transmitter look very much like any v.h.f. transmitter using vacuum tubes. A conventional 6CL6 crystal oscillator, V_1 , uses 6-, 8- or 12-MHz. crystals, multiplying in its plate circuit to 24 MHz. (12-MHz. crystals should be the fundamental type.) A 6BQ5, V_2 , triples to 73 MHz., and drives a 2E26 amplifier, V_3 , straight-through on this frequency. A variable capacitor, C_6 , across the crystal permits a small adjustment of the frequency.

*151 Canterbury Rd., Springfield, Mass. 01118

¹The *Radio Amateur's V.H.F. Manual*, "Receiving F.M.," page 40-43. "Using Frequency Modulation," (in transmitters) p. 92-96.

We often hear the query, "Why don't you have more information on gear for 220 MHz.?" This transmitter, and the 220-MHz. FET converter in the current edition of The Radio Amateur's V.H.F. Manual and in the 1969 Edition of the ARRL Handbook should help to supply this demand.



The 220-MHz. transmitter is set up for rack mounting on an 8 $\frac{3}{4}$ -inch panel. Meters at the left can be switched to read driver plate, amplifier screen and amplifier plate currents, and amplifier plate voltage.

The tubes used, and other similar types, work very well in the lower part of v.h.f. range, but very few types do really well at 220 MHz. Thus, we use a varactor tripler, driven by the 2E26, to get up to 220. Requiring no power supply of its own, it is capable of more than enough power output at 220 to drive our 500-watt amplifier. Varactor multipliers have been dealt with extensively elsewhere,² so about all that need be said about this one is that it follows a design in *QST* and the *V.H.F. Manual*, except that it goes from 73 to 220 MHz., rather than 144 to 132.

The output of a varactor multiplier contains harmonics other than the desired one, so a stripline filter is connected between the varactor output and the final amplifier grid circuit. The filter is a separate assembly mounted on the end of the chassis, visible in two of the photographs. Full details of the filter may be found in any edition of the *V.H.F. Manual*, and in the *Handbook* from 1967 on.

The final amplifier is a 4CX250 series external-anode tube, with a coaxial tank circuit. The B version is used here, but the R and F types have the same mechanical design. Earlier versions such as the 4X250A and 4X150A are also usable. The latter has somewhat lower ratings. Many

²Cross, "Frequency Multiplication with Power Varactors," *QST*, October, 1962, and *V.H.F. Manual*, Chapter 10. Also, Blakeslee and DeMaw, *QST*, March, 1966.

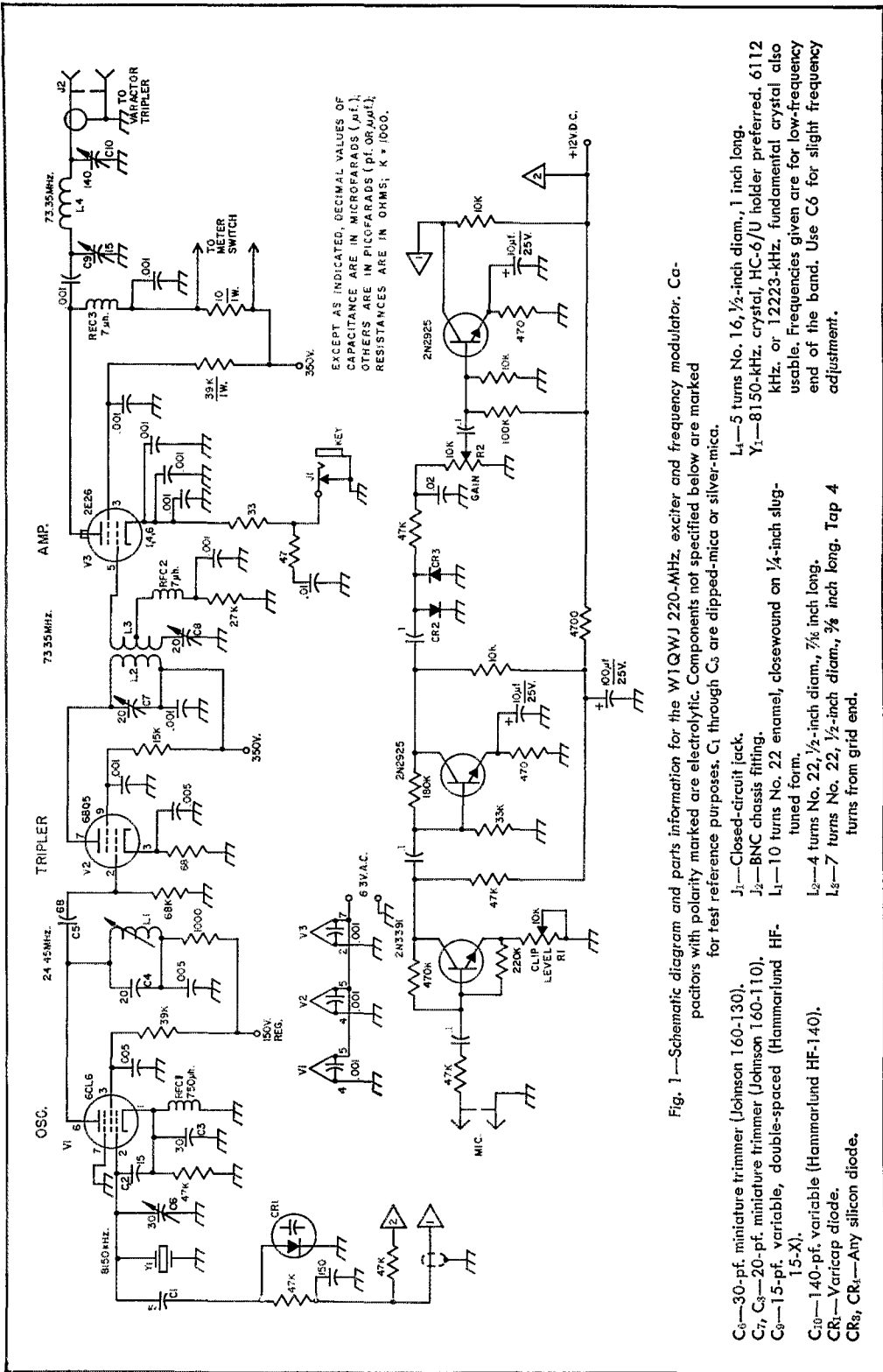
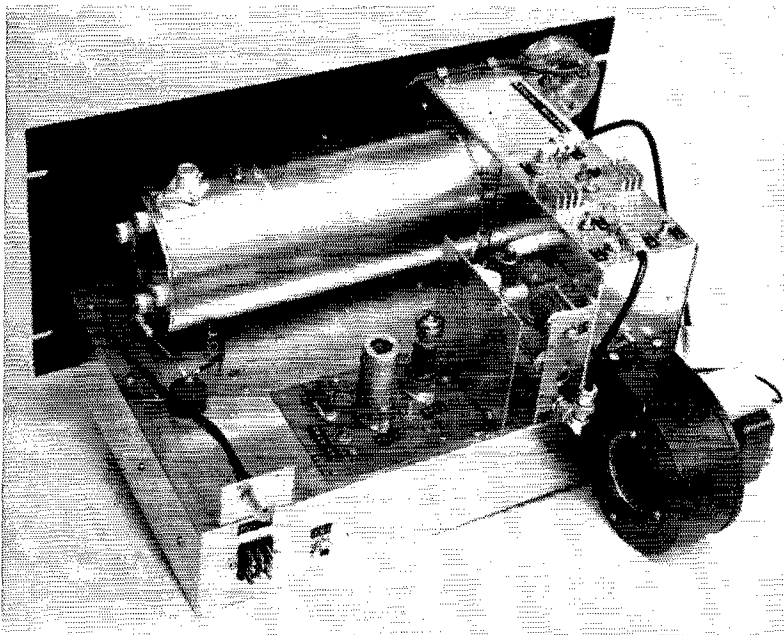


Fig. 1—Schematic diagram and parts information for the W1QWJ 220-MHz. exciter and frequency modulator. Components with polarity marked are electrolytic. Components not specified below are marked for test reference purposes. C₁ through C₅ are dipped-mica or silver-mica.

- C₆—30-pf. miniature trimmer (Johnson 160-130).
- C₇, C₈—20-pf. miniature trimmer (Johnson 160-110).
- C₉—15-pf. variable, double-spaced (Hammarlund HF-15-X).
- C₁₀—140-pf. variable (Hammarlund HF-140).
- CR₁—Varicap diode.
- CR₂, CR₃—Any silicon diode.
- J₁—Closed-circuit jack.
- J₂—BNC chassis fitting.
- L₁—10 turns No. 22 enamel, closewound on 1/4-inch slug-tuned form.
- L₂—4 turns No. 22, 1/2-inch diam., 7/8 inch long.
- L₃—7 turns No. 22, 1/2-inch diam., 3/4 inch long. Tap 4 turns from grid end.
- L₄—5 turns No. 16, 1/2-inch diam., 1 inch long.
- Y₁—8150-kHz. crystal, HC-6/U holder preferred. 6112 kHz. or 12223-kHz. fundamental crystal also usable. Frequencies given are for low-frequency end of the band. Use C₆ for slight frequency adjustment.

Rear view of the 220-MHz. transmitter. The exciter stages are on a circuit board in the foreground. Chassis at the right side houses the varactor tripler and the amplifier grid circuit. Air blows into this compartment and out through the center conductor of the coaxial plate-circuit assembly.



other tubes of this general family can be used, but may require alterations in the mechanical details.

The coaxial plate circuit follows a very old design,³ but one that is hard to improve on. The author and his associate, WIRVW, built a similar amplifier for 432 MHz., described in the *V.H.F. Manual*. Such a tank has extremely high Q , and the heavy copper (or brass) construction offers considerable heat sinking. Probably its only disadvantage is the necessity for feeding the high voltage in through some kind of r.f. bypassing. This and the other mechanical features of a good coaxial tank are not readily made with the simpler tools. Details of the assembly are given in Fig. 5.

The final grid circuit, visible in the end view along with the varactor multiplier and the strip-line filter, is a half-wave strip-line. The fan blows cooling air into the grid compartment, up through the 4CX250 socket, and out through the end of the tank assembly, by way of the hollow inner conductor, L_{1c} . The coaxial output fitting, J_6 , the coupling loop, L_{11} , and its series capacitor, C_{21} , are mounted on a small detachable plate bent to fit the curvature of the coaxial assembly, and mounted near the outer end. The varactor tripler is built into the top of the amplifier grid assembly, and is visible in the end view along with the final grid circuit and the strip-line filter.

Generating the Frequency Modulation

Where only a small swing at the control frequency is needed, as in a v.h.f. or u.h.f. transmitter having a high order of frequency multiplication, the modulation can be applied very easily.

³ Brayley, "Coaxial-Tank Amplifier for 220 and 420 Mc.," *QST*, May, 1951. Also, *V.H.F. Manual*, Chapter 10.

A voltage-variable capacitor, the varactor CR_1 , changes capacitance in relation to the audio voltage applied across it, and this changing capacitance is used to "pull" the frequency of the crystal oscillator slightly. A good 8-MHz. crystal can be pulled about 600 Hz. in this way. With 27 times frequency multiplication this gives a maximum deviation in excess of 16 kHz. at the operating frequency, close to the optimum for most of the f.m. receivers currently in use in fixed-frequency service on 6 and 2. Lesser deviation, for working into communications receivers, most of them having about a 3-kHz. bandwidth today, is merely a matter of applying less audio.

The communications effectiveness of f.m. is greatly enhanced if the deviation is held close to the maximum usable by the receiver in ques-

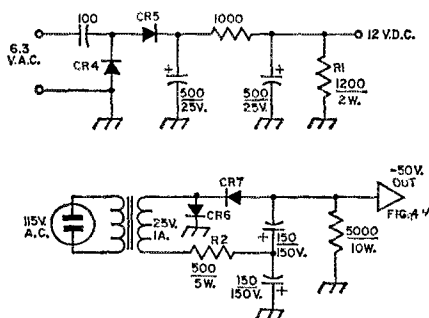
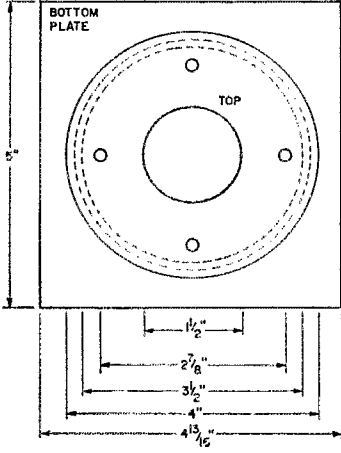
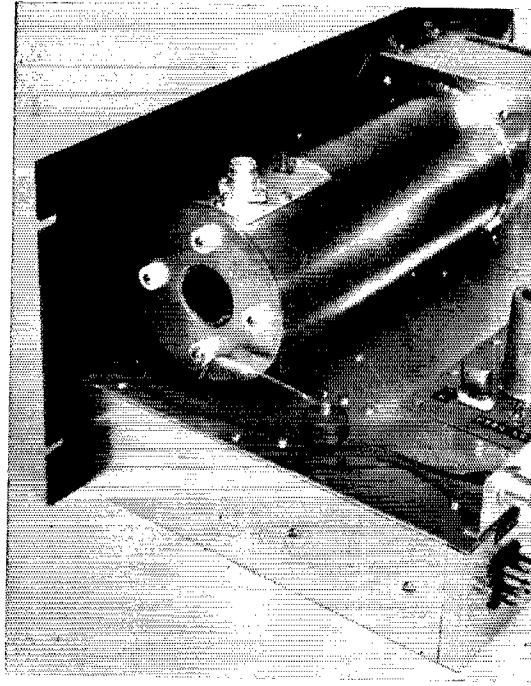


Fig. 2—Circuit details of the built-in power supplies for amplifier bias (lower) and speech amplifier-modulator (upper) for the 220-MHz. transmitter. Capacitors with polarity marked are electrolytic. All diodes are 200-volt p.i.v., 1 amp. R_1 and R_2 are approximate values. Select for 12 and minus 50 volts output, respectively. Capacitance is in microfarads.

Close-up view of the amplifier coaxial tank circuit. The output coupling assembly is removable for adjustment purposes. Plate voltage is fed into the line on a ceramic bushing in the end plate.



and similar holders). The older types of holders also have higher capacitance, inhibiting the crystal frequency swing that can be obtained, as the holder capacitance is part of the total across the crystal. There is a limit to the amount of change you can make in the center frequency by adjustment of the trimmer C_6 .

The lower the capacitance setting of this trimmer, the greater the swing that will be possible. The value of C_1 , in series with the varactor, also has some bearing on this, as do the input capacitance of the oscillator tube and stray circuit capacitance.

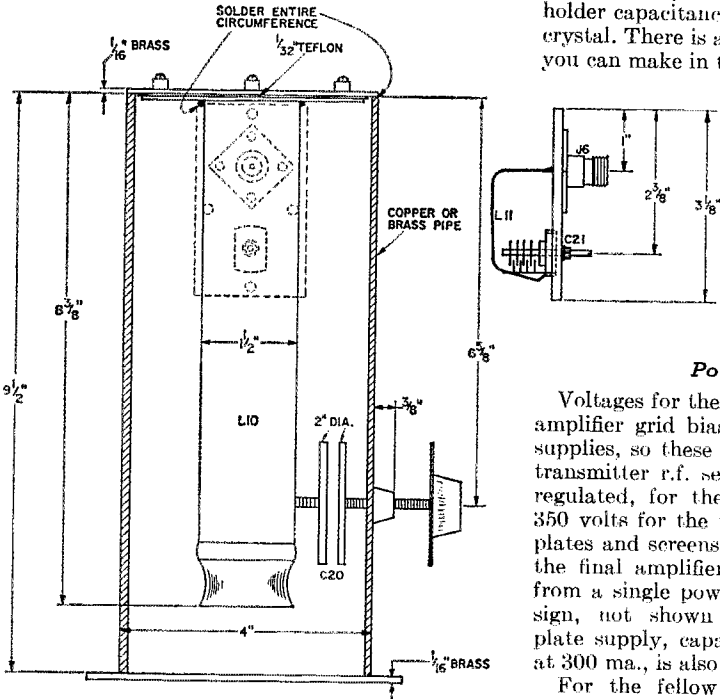
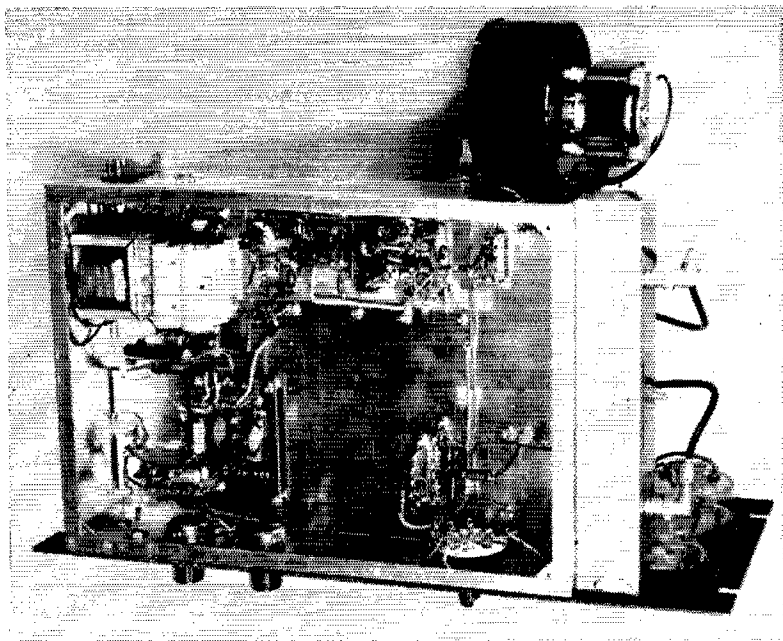


Fig. 5—Details of the coaxial-line plate circuit of the 220-MHz. transmitter.

Power Supplies

Voltages for the speech amplifier and the final amplifier grid bias are developed from built-in supplies, so these are shown schematically. The transmitter r.f. section also requires 150 volts, regulated, for the oscillator plate and screen, 350 volts for the tripler and 73-MHz. amplifier plates and screens, and 250 volts, regulated, for the final amplifier screen. These are all taken from a single power supply of conventional design, not shown herein. The final amplifier plate supply, capable of 2000 volts, maximum, at 300 ma., is also not shown.

For the fellow interested in experimenting with operating conditions in a transmitter of this kind, there is merit in making provision for varying the final bias voltage, the amplifier screen voltage, and the amplifier plate voltage.



Looking underneath the chassis of the 220-MHz. transmitter, we see the speech amplifier-clipper at the lower left, the exciter circuits across the top, power supply components at the upper left, and meter switching, lower right.

Most operation on 220 will not require maximum power. If the final plate voltage can be reduced and the other operating conditions adjusted accordingly, it will be possible to maintain high plate efficiency over a very wide range of operating conditions. It is nice to be able to drop the final plate voltage to 1000 or less, for example, and the 150 watts or so available at this level will be more than enough for most work. With f.m. or c.w. there is nothing critical about making such power changes, and provision for this is highly recommended.

Probably the most convenient way to vary final plate voltage is installation of a Variac or other means of varying the a.c. primary voltage in the final-stage power supply. Some power transformers also have tapped primaries, which provide degree of flexibility. If you don't have a 2000-volt supply, start with anything that will deliver 500 volts or more. The 4CX250-series tubes work very well over a wide range of plate voltage.

Adjustment and Operation

This is not intended to be a beginner's project, so detailed discussion of the mechanical layout will be omitted. The mechanical arrangement of the components could be altered to suit one's own requirements, since the complete transmitter is made up of many subassemblies. Adjustment for best results may be somewhat strange to anyone who has not had experience with varactor multipliers, so two adjustment procedures will be described. One involves instruments that not every v.h.f. man may have at his disposal. The other, worked out after the rig was checked out

by the first method, seems to give essentially the same results, and it requires less in the way of expensive gear.

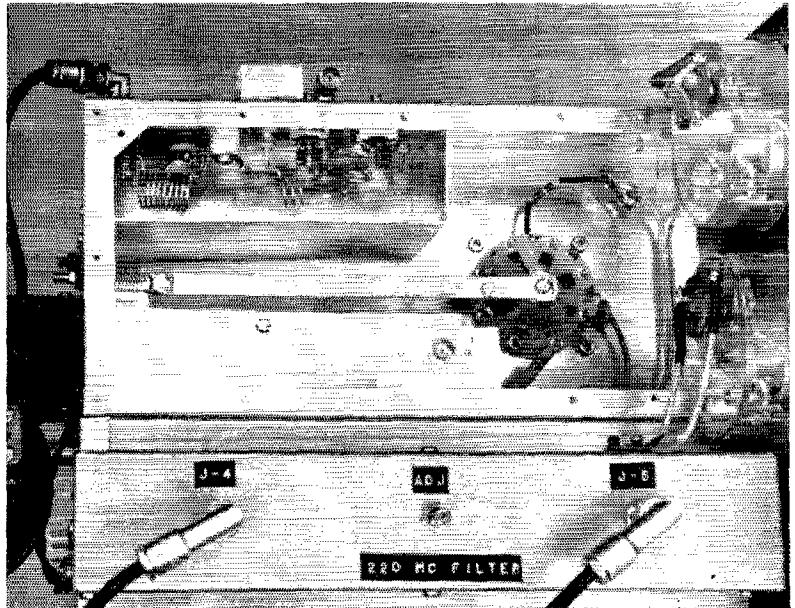
The first step is to get a good 52-ohm load. The Heath Cantenna will do, or a bank of resistors such as described in the *V.H.F. Manual* is suitable. For the present, it will have to handle a maximum of about 10 watts—but lamps are out—the load must have close to 52 ohms impedance at 73 and 220 MHz. A good s.w.r. bridge is also needed for the first method.

First, we must adjust the exciter. Procedure here is like that for any similar lineup of tubes, but the 2E26 must be adjusted for optimum results when working into a 52-ohm load. Once an output of 10 to 12 watts is obtained in this way, leave the tuning of the 2E26 and preceding stages alone thereafter.

Now connect the s.w.r. bridge output to J_3 of the varactor multiplier, and tune C_{11} and C_{12} for lowest s.w.r. indication. Leave the 2E26 adjustments alone.

Now connect a coaxial cable from J_2 to J_3 , and connect the s.w.r. bridge or wattmeter in a line from J_4 to the dummy load. Adjust C_{13} , C_{14} and C_{16} for maximum output at 220 MHz. Adjustments in the multiplier interlock, and several passes through all adjustments may be needed for best output. But remember that the 2E26 is set for a 52-ohm load. Leave it alone, and make the multiplier adjustments do the job. An indication of some 8 watts or so of output should be obtained. Part of this will be harmonic energy, however, so the s.w.r. bridge should now be connected between the strip-line filter and the amplifier grid circuit, and the filter adjusted for maximum forward power and the amplifier in-

Looking into the amplifier grid compartment. The varactor tripler is in the upper left portion. Below the compartment is the 220-MHz. strip-line filter.



put circuit for minimum reflected. This should result in maximum grid current in the final amplifier.

It is likely that getting enough grid current for the 4CX250B will not be difficult, as the lineup described gives more than ample drive. Up to 20 ma. grid current has been obtained, but not this much is needed. In fact, with f.m. or c.w. operation, only a slight increase in efficiency is noted after the drive is raised beyond the point grid current begins to flow. For plate modulation with good linearity, more drive is necessary. Follow the typical operating conditions for the tube and mode of operation you prefer.

Adjustment of the coupling loop, L_{11} , and the loading capacitor, C_{21} , will be fairly critical, if one is striving for the absolute maximum output. Following the manufacturer's recommendations as to maximum plate voltage and current, 2000 volts at 250 ma., resulted in about 320 watts output. Raising the plate current to 300 ma., by increasing the screen voltage, netted 400 watts output. Even at this input the tube seemed to be operating well and the tank circuit did not indicate excessive heating. There is little to be gained by pushing the limit, however, and tests with various plate voltages from about 1000 up showed optimum performance in the 1500 to 1800-volt range, where in excess of 65 percent efficiency was measured.

The simple-equipment tuneup involves some kind of r.f. indicator that can be placed near a bank of resistors used for the dummy load. A tunable field-strength indicator and wavemeter such as that shown in Fig. 11-7 of the *V.H.F. Manual* (any edition) will do nicely for the

2E26 tuneup. If the indicator's tuned circuit is made smaller, so that it will tune 70 to 220 MHz., it will serve for all adjustments. Of course a grid-dip meter is fine. Either will give a usable indication when its coil is placed close to a resistor bank used for a dummy load. If it will tune to 220 MHz. this kind of indicator can be used for checking the output of the varactor multiplier as well, in the same way. **QST**

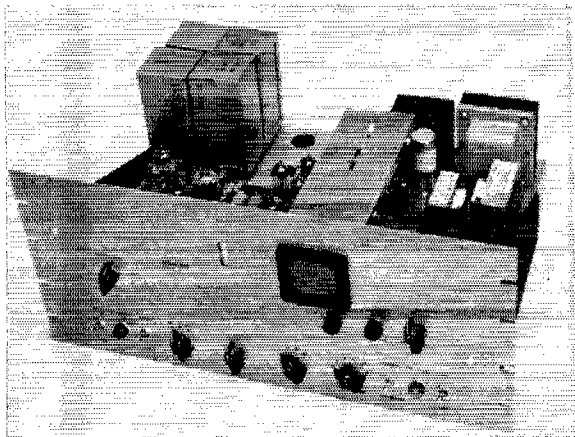
Back Copies and Photographs

Back copies of *QST* referred to in *QST* issues are available when in print from our Circulation Department. Please send cash, money order or check—75¢ for each copy—with your order; we cannot bill small orders nor can we ship c.o.d.

Full size (8 by 10) glossy prints of equipment described in *QST* by staff members (*only*) can be furnished at \$1.50 each. Please indicate the *QST* issue, page number, and other necessary identification when ordering, and include full remittance with your order—we do not bill nor ship c.o.d.

Sorry, but no reprints of individual *QST* articles are available, nor are templates available unless *specifically* mentioned in the article.

The Mainline TT/L-2 F.S.K. Demodulator



In Two Parts—PART I

Construction and Adjustment

A completed TT/L-2 demodulator built for rack mounting. This unit, constructed by John Roache, W1SOG, includes a phase shift oscillograph indicator in addition to the eye-tube indicator described in the text. The main and loop power supply components are mounted on the right rear of the chassis. Plugged into sockets at the left rear are the two Butterworth input-bandpass filters and the two discriminator filters, each built into a Minibox fitted with an octal plug. One of four vacant sockets may be seen at the rear of the unit. These sockets are used in conjunction with the spare positions of the discriminator filter selector switch.

BY KEITH B. PETERSEN,* W8SDZ

THE Mainline TT/L-2 Demodulator is an advanced-design unit offering high-performance f.m. (limiter) and a.m. (limiterless) reception of radioteletypewriter signals.

The TT/L Demodulator as published in 1965¹ was the result of almost two years' work. Because of the desire to make each part of the basic design as nearly perfect as possible, the circuitry has gone through continuous improvements since publication of that information. Advance information² has enabled many RTTY enthusiasts to build an earlier version of the demodulator described here. The TT/L-2, with the improved auto-receive stage and added anti-space circuit, is rapidly becoming the most popular demodulator for use in the h.f. bands because of its excellent performance. Its many advantages have also encouraged a number of v.h.f. operators to build the unit.

General Description of Changes

Some confusion has resulted with respect to the name chosen earlier for the "squelch" circuitry for the demodulator. In the original *QST* article, this section was called the AUTO-START stage. This name has become confused with the classic "auto-start" circuitry used at

*1418 Genesee Ave., Royal Oak, Mich. 48073.

¹Hoff, "The Mainline TT/L F.S.K. Demodulator," *QST*, August, 1965.

²Petersen, "The Mainline TT/L-2 FSK Demodulator," *RTTY Journal*, September, 1967.

v.h.f. for simple control of the printer motor. It has therefore been decided that it would be wise to change the name to AUTO-RECEIVE, a name which had been considered earlier.

The original TT/L unit included an input-bandpass filter only for 850-Hz. shift. The new version includes an additional bandpass filter for use with 170-Hz. shift, which is becoming increasingly popular at h.f. these days due to the advantage of noise and QRM reduction. The TT/L-2 also includes discriminators for both 850-Hz. and 170-Hz. shift.

Further included in the new design is a three-speed switch for the low-pass filter stage following the discriminator detectors. This feature selects the optimum cut-off frequency for each transmission speed, 60, 75, or 100 w.p.m. With

The TT/L F.S.K. demodulator described in an earlier issue of QST was an advanced design by the author and Irvin Hoff, W6FFC (formerly K8DKC), with the assistance of Victor Poor, K3NIO. With its designers continually striving for the utmost in operation from each part of the circuit, evolution has led to the unit presented here.

the increasing availability of equipment which will operate at higher speeds, this feature is especially timely.

The auto-receive stage in the TT/L-2 is significantly better than earlier designs because the time-constant portion of the circuit has been isolated entirely from the triggering neon. The charge voltage for the time-constant capacitor is determined entirely by the signal itself, because there are no "parallel-discharge" paths. This results in vastly improved performance. This circuit prevents the receiving teleprinter from printing garble when there is no RTTY signal present, and completely ignores c.w. and other non-RTTY signals which may be within the received passband. The auto-receive circuit also controls a motor-control stage which turns off the teleprinter motor approximately 30 seconds after the signal leaves. (This delay is sufficient to keep the motor running during station identification and subsequent "turn-over" to another station.) The combination of the auto-receive and motor-control stages provides an efficient and reliable system for obtaining unattended reception of RTTY signals. The motor-control stage design has been simplified and stabilized.

The TT/L did not include any protection against a steady space tone, which causes the teleprinter to "run open." The new anti-space circuit provides full protection against steady space signals. This circuit also prevents the auto-receive circuit from responding to steady space signals.

The TT/L-2 incorporates a new simplified mode-switching system, using a single six-position rotary switch. This feature eliminates much of the confusion resulting from the separate switches used in earlier designs. The switch controls four different functions, interlocking them so there is no possibility of a wrong combination which might cause improper operation.

The new design offers heavy-duty main and loop power supplies for cool operation and good regulation. This is especially important when the unit is used for continuous auto-start operation. It is surprising to note that the cost of the heavy-duty supplies is very nearly the same as for the earlier design.

The loop supply provides a balanced-voltage output for driving a saturated diode for f.s.k. or a.f.s.k. operation. The circuit also permits automatic retransmission of received signals — such as for relaying from another band or playing back from a tape-recorded signal.

A look at the TT/L-2 from the rear. Suggested chassis size is 13 x 17 x 3 inches, such as a Bud AC-420. The K5BQA printed circuit board was used in the construction of this unit. The two tubes appearing on the upper left corner of the chassis are the voltage regulator tubes of the power supply. The eye-tube indicator is mounted at the opening in the front panel. For this photograph, input-bandpass and discriminator filters built into Vector cans have been inserted in the filter sockets.

The EM84/6FG6 tuning eye has been retained because it is a more accurate indicator than either an oscilloscope or a meter. It shows at a glance when the signal has drifted, and is especially effective when "straddle-tuning" is necessary due to inaccurate shift by the sending station.

You will notice that no power-on indicator has been included in this design. It was purposely omitted because the tuning eye provides this indication.

The Circuit

The circuitry of the TT/L-2 Demodulator is shown in Fig. 1. Fig. 2 shows the schematic of the power supplies and the f.s.k. driver. A detailed description of the operation of each stage of this demodulator, including the function of each switch and control, is given later. However, the following brief description should enable the builder to satisfactorily construct and adjust the demodulator.

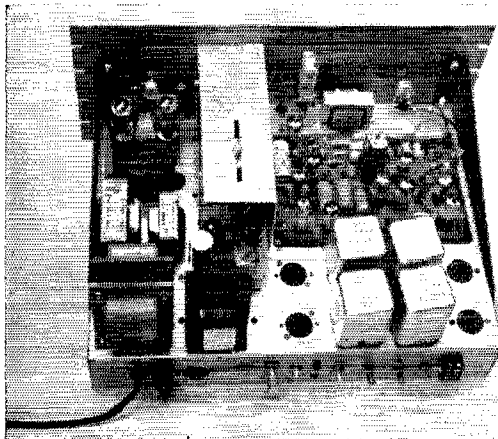
Two input-bandpass filters are provided, one for 850-Hz. and the other for 170-Hz. shift. Selection of the desired filter is made with S_1 . V_2 and V_3 , the limiter stages, are used for f.m. reception. These stages may be bypassed for limiterless reception with S_2 .

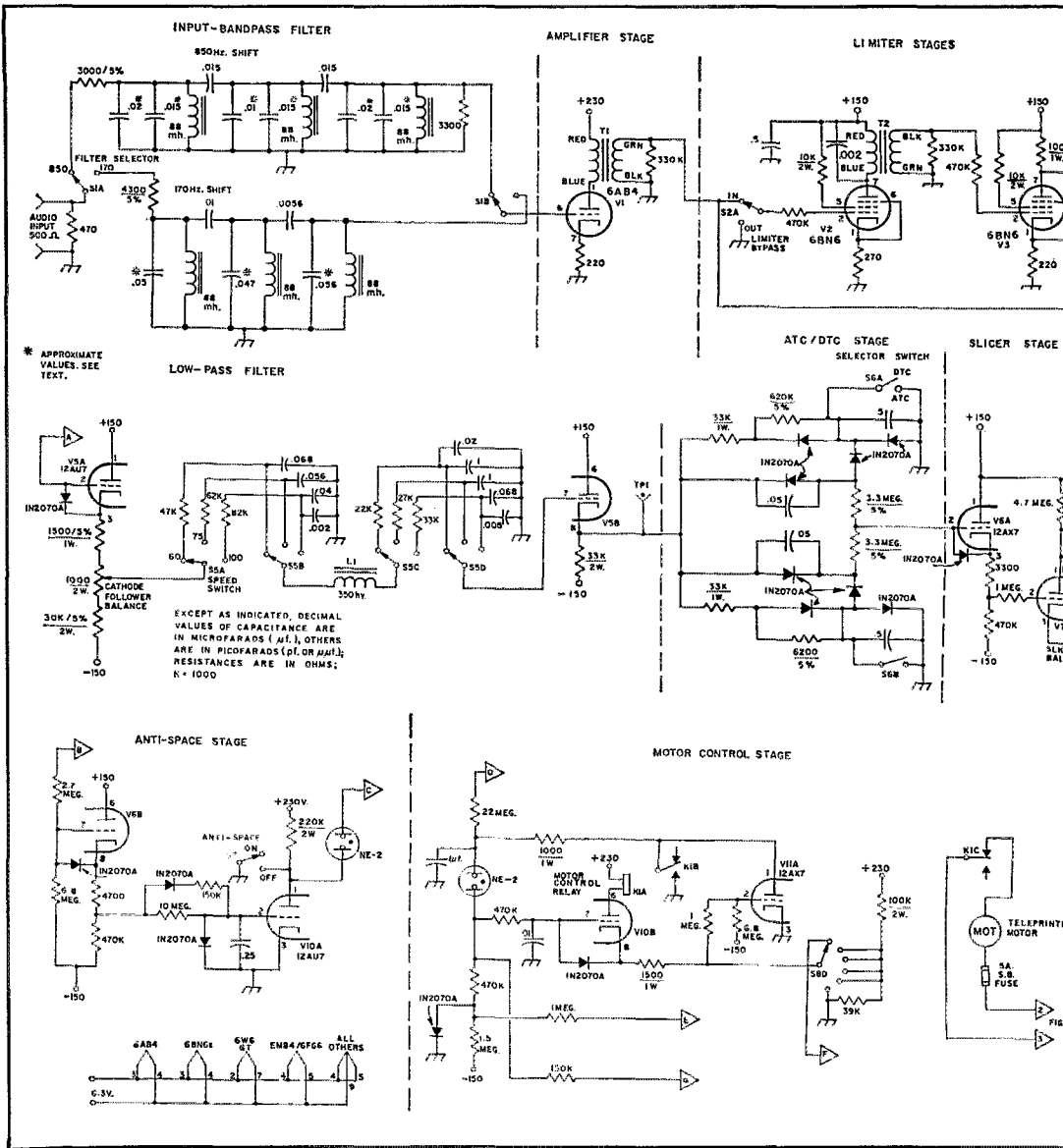
A four-position switch, S_3 , is shown in the discriminator filter section for selection of filters with different responses. Only two filters are included in this design, as it was felt that the builder might wish to add other filters at a later date, after becoming better acquainted with the operation of the TT/L-2. The narrow-band 3-pole Butterworth filters described earlier in *QST*³ could be installed in the extra switch positions.⁴

The speed switch, S_5 , is used to select the components for 60-, 75-, or 100-w.p.m. signals.

³Hoff, "High-Performance RTTY Filters," Part II, *QST*, September, 1966.

⁴Or the builder might wish to install filters for special shifts, or select a heterodyning mixer and filter system in these switch positions. — Editor.





This switch is shown in the 60-w.p.m. position, and may be omitted if you have no interest in 75- or 100-w.p.m. operation. In this case, only the parts associated with the left position of the switch are required.

Special Notes

All components required for the construction of the TT/L-2, with the exception of the 88-mh. toroids, are available from a single source.⁵ A

⁵A complete package of parts is available from Newark Industrial Electronics Corp., 2114 South Division Ave., Grand Rapids, Mich. 49507, attention Truman Boerkoel, K8JUG. If the builder prefers to buy only certain specific parts, they are available from this same source.

fiber-glass-epoxy printed circuit board has been designed for the builder wishing to use this time-saving construction technique.⁶ Should the builder lack the necessary equipment for tuning the filters or otherwise desire to obtain complete filters, these are also available.⁷

⁶A well constructed undrilled board, designed to match the physical sizes of the parts included in the package list above, is available at reasonable cost from James R. Salto, K5BQA, 11040 Creekmore, Dallas, Texas 75218.

⁷Completed and tuned input-bandpass and discriminators are available from J. & J. Electronics Communications Specialists, Windham Rd., Canterbury, Conn. 06830, as are the narrowband 3-pole Butterworth mark and space channel filters described in September 1966 QST. Custom-made TT/L-2 demodulator units are also available from this source.

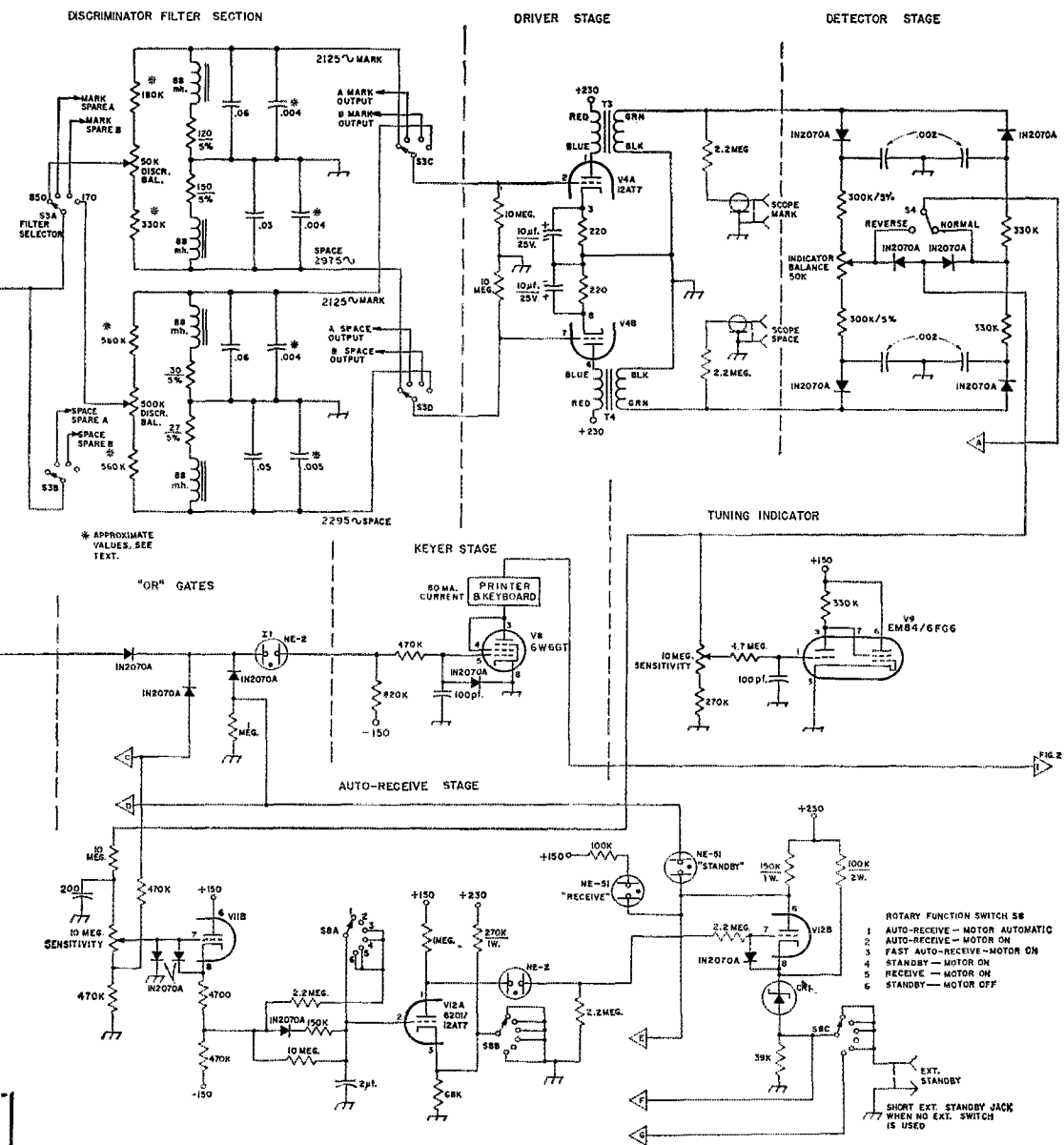
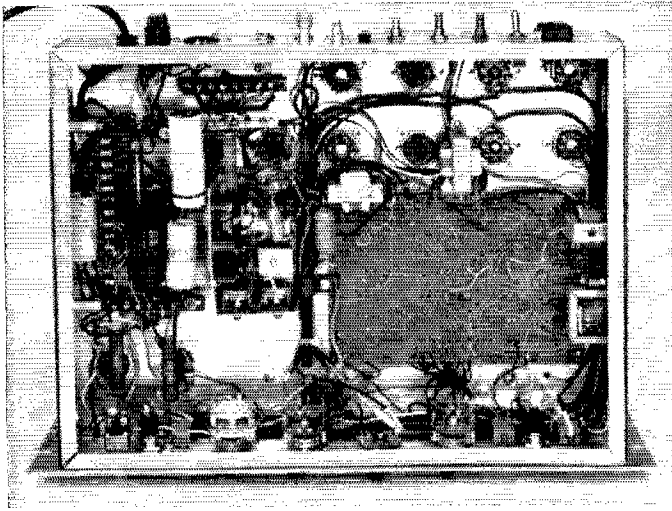


Fig. 1—Circuit of the Mainline TT/L-2 F.S.K. Demodulator unit. All resistors are 1/2-watt, 10% tolerance, unless otherwise indicated. All capacitors are mylar, 10% tolerance, except those indicated in pf. which are mica, and those with polarity indicated which are electrolytic. See QST "Ham-Ads" for obtaining 88-mh. toroids.

- CR—Zener, 10 volts, 1 watt (International 1ZC10T10).
 I₁—For text reference.
 K₁—110-volt d.c. relay (Potter and Brumfield KAP-11DG or KRP-11DG).
 L₁—350 henrys, 5 ma. (Stancor C-2345).
 S₁ S₂—D.p.d.t. rotary, non-shorting (Centralab 1464).
 S₃—Miniature phenolic rotary, 2 sections, 4 poles, 5 positions (1 position unused), non-shorting (Centralab PA1013).
 S₄—S.p.d.t. toggle.
 S₅—Same as S₄ except 2 positions unused.
 S_N—D.p.d.t. toggle.
 S_T—S.p.s.f. toggle.
 S_R—Miniature ceramic rotary, 2 sections, 4 poles, 6 positions, shorting (Centralab PA2010).
 T₁, T₂, T₃, T₄—Interstage audio, 1:3 primary:secondary turns ratio; 10 ma. (Stancor A-53).

- ROTARY FUNCTION SWITCH S8
- 1 AUTO-RECEIVE - MOTOR AUTOMATIC
 - 2 AUTO-RECEIVE - MOTOR ON
 - 3 FAST AUTO-RECEIVE - MOTOR ON
 - 4 STANDBY - MOTOR ON
 - 5 RECEIVE - MOTOR ON
 - 6 STANDBY - MOTOR OFF
- EXT. STANDBY
 SHORT EXT. STANDBY JACK WHEN NO EXT. SWITCH IS USED



The inside of the TT/L-2. Components at the left are those of the power supplies. The concentration of parts inside the partially-shielded compartment is associated with the phase-shift indicator circuitry. Most small components are mounted on the opposite side of the printed circuit board.

All diodes except those in the power supplies and the Zener in the auto-receive stage are type 1N2070A. It is important, especially in the ATC/DTC stage, that the diodes have at least 200 megohms back resistance.

All controls are linear taper. Those marked 2 watts are Ohmite type AB or equivalent.

Capacitor values shown with asterisks in the input-bandpass filters are approximate. Using the tune-up instructions appearing in the September 1966 issue of *QST*,³ tune individual sections of the 170-Hz. filter to 2200 Hz. The 850-Hz. filter requires no tuning if 5% tolerance capacitors are used. Otherwise, tune filter sections A and C to 2400 Hz., and section B to 2300 Hz. Figs. 12 and 13 in the September 1966 article show these filter sections.

Capacitor values in the discriminator filters are approximate. Choose values for resonance with the appropriate toroid at the desired frequency.

Construction Notes

The layout used for construction of the TT/L-2 should be similar to that used in a high-quality audio pre-amplifier. This type of layout is desirable because of the very high-gain circuitry used. Be sure to shield all audio and high-impedance d.c. leads which might otherwise pick up extraneous signals or noise because of physical length or placement.

The wiring associated with the grids of V_1 , V_{5A} , V_{6A} and V_{11B} should either be very short or else be shielded.

It is most important that T_1 and T_2 be mounted in such a way that they will not pick up inductively from each other, from T_3 and T_4 , or from the power supply transformers and chokes. The best method is to mount each of the four transformers on different axes. Do not mount one above and one below the chassis in an effort to avoid inductive coupling, because the usual aluminum chassis used will not provide inductive

shielding. Also be sure that the 350-hy. choke in the low-pass filter section is not mounted near any of the power supply transformers chokes.

The 5-volt a.c. winding of the main power transformer, T_6 , is not used, and the lead should be insulated and secured to prevent the shorting out. This winding is a spare, for possible future use. Particular attention should be paid to the indicated connection of the secondary transformer T_2 for proper phasing to avoid feedback.

Shield all leads associated with the limit bypass switch, S_2 . The 0.47-megohm series grid resistors for V_2 and V_3 should be located right at the grid pin for each tube socket. All switches except S_7 should be mounted on the front panel. S_7 , the anti-space ON-OFF switch, is used for test purposes only, and may therefore be mounted on the rear panel since it is not used in normal operation.

The test point located at the cathode follower output of the low-pass filter should be mounted in a convenient spot on or near the rear panel.

The auto-receive sensitivity control and the indicator sensitivity control should be mounted on the front panel. All other potentiometers should be mounted on the rear panel.

The RECEIVE and STANDBY neon indicators may be mounted on the front panel, if desired, to show when the unit is ready to receive a signal. Be sure the sockets do not contain a resistor. If the builder does not wish to include these indicators for front panel use, the RECEIVE neon and its resistor may be omitted. The STANDBY neon must be retained, however, as it is used as a coupling device. It has been the author's experience that many neons (about 20%) are not good performers due to manufacturing tolerances, so an extra few should be purchased. If any trouble is experienced with either the auto-receive or the motor-control stages, the builder should try another neon.

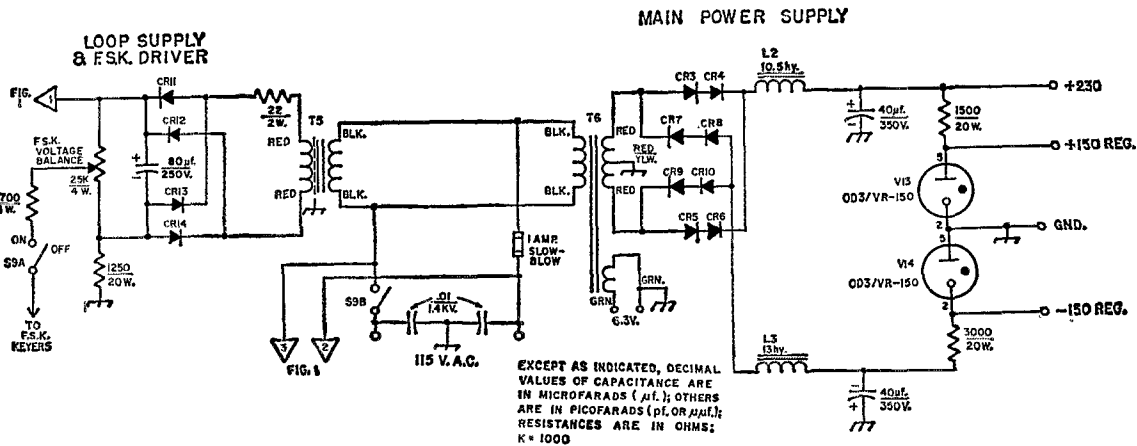


Fig. 2—Power Supplies and F.S.K. Driver for the TT/L-2 Demodulator.
 CR₃-CR₁₄ incl.—Silicon, 800 p.i.v., 500 ma. (Sarkes-Tarzian F-8).
 L₂—10.5 henrys, 110 ma. (Stancor C-1001).

L₃—13 henrys, 65 ma. (Stancor C-1708).
 S₀—D.p.s.t. toggle, 15 amp., 125 volts.
 T₅—115 volts, 35 volt-amperes. (Triad N-51X).
 T₆—550 volts c.t., 110 ma.; 6.3 volts, 5 amp.; 5 volts, 2 amp. (Triad R-12A).

Adjustment Instructions

Allow the unit to warm up for at least fifteen minutes before *any* adjustments are made. The tubes will age during the first few days of operation, so it is wise to repeat the entire adjustment procedure approximately a week after initial set-up has been performed. These adjustments should always be done in the order shown below, or improper operation will result.

CATHODE FOLLOWER BALANCE

The first adjustment to be made is the cathode follower balance control in the low-pass filter stage. Connect a sensitive v.o.m. or a v.t.v.m. to the test point, TP₁. Remove the audio input from the TT/L-2 by unplugging the input cable. Set the limiter bypass switch to the OUT position. Adjust the cathode follower balance control for zero volts d.c. at the test point. If it is not possible to reach zero, and a new tube has already been tried, change the value of the 1500-ohm resistor in the cathode circuit of V_{3A} as necessary so the adjustment can be made properly.

SLICER BALANCE

The slicer balance adjustment is also made with no audio input and with the limiter bypassed. The anti-space switch, S₇, should be set to the OFF position and the rotary function switch, S₈, should be set to position No. 5 (RECEIVE — MOTOR ON) for this adjustment. Turn the slicer balance control until the teleprinter "runs open." Then turn the control in the opposite direction until the printer returns to the marking condition. Note these two points, and set the control midway between. No further adjustment is necessary.

Return the anti-space switch to the ON position.

DISCRIMINATOR FILTER SECTION

The discriminator filters should be tuned to resonance for the desired tone frequencies by varying the capacitors marked with asterisks. When adjusting the filters for resonance, the resistors in series with the ground connection of the toroids should be temporarily shorted out. Be sure to remove these shorts after the tuning is completed, or severe distortion of the received teleprinter signals will result. For additional tuning hints, refer to the article in September 1966 *QST*.³

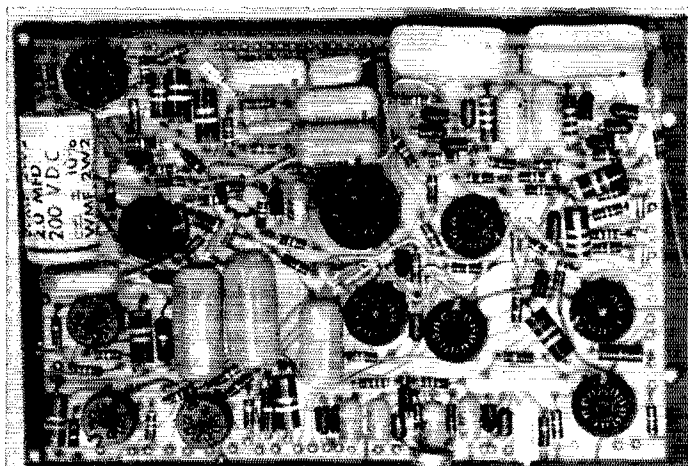
The resistors marked with asterisks on either side of the balance controls should be chosen for each filter so that the d.c. voltages developed from mark and space tones, when balanced, do not exceed ±60 volts at the Test Point 1. If adjustment is required, change both resistors by an equal amount, so as to maintain a balance within the range of the control.

Adjustment of each discriminator balance control is made with the limiter bypass switch set to the IN position, and the normal-reverse switch, S₄, set in the NORMAL position. Alternately apply a mark and space tone to the input of the TT/L-2. Adjust the discriminator balance control so that the mark and space d.c. voltages are equal, but of opposite polarity, at the test point.

INDICATOR BALANCE

After the discriminators have been balanced, set the normal-reverse switch in the REVERSE position. Now adjust the indicator balance control for equal mark and space d.c. voltages at the test point. Observe the tuning eye. Carefully adjust the indicator balance control to eliminate any eye movement when alternating between mark and space tones. No further adjustment is necessary.

A close-up of the printed circuit board with all components mounted. Measuring approximately 6×9 inches, the board contains tubes, the amplifier, limiter, driver, detector, low-pass filter, ATC/DTC, OR gate, keyer, anti-space, motor-control, and auto-receive stages.



F.S.K. VOLTAGE BALANCE

Set the rotary function switch, S_8 , to position 4 (STANDBY — MOTOR ON). Connect a test voltmeter from the F.S.K. DRIVER output to ground. Disconnect the external f.s.k. keyer lead during this adjustment. Alternately open and close the printer loop by pushing the "break" key or opening the keyboard contacts at the teleprinter. Adjust the f.s.k. voltage balance control for equal but opposite mark and space d.c. voltages. The mark voltage should be approximately -45 volts and the space voltage should be approximately $+45$ volts. No further adjustment is necessary.

CORRECT VOLTAGE CHECKS

With a 1.5-volt peak-to-peak 2125-Hz. tone at the grid of V_1 and the limiter switched in, there should be approximately 40 volts peak-to-peak at the plate of V_1 , 10 volts peak-to-peak at the grid of V_2 , 45 volts peak-to-peak at the grid of V_3 , 40 volts peak-to-peak at the center of the discriminator balance control, and 40 volts peak-to-peak at the plate of V_{4A} . There should be about 120 volts at the secondary of T_3 .

D.c. voltages are present from this point on. The grid of V_{6A} should be approximately -50 volts with the ATC/DTC switch at DTC, and about $-2S$ volts at ATC. All of the following voltages should appear with the switch at DTC. The cathode of V_{6A} should be about -50 volts, the grid of V_7A -45 volts, and the grid of V_8 between 0 and -0.2 volt. With a space tone at the input and with the anti-space switch turned off, the grid of V_8 should be about -50 volts. The junction of neon I_1 and the two resistors in the keyer stage should be at $+10$ to $+20$ volts with a mark-tone input.

Operation

The proper audio input level for the TT/L-2 is that which produces the same amount of tuning-eye closure in either the f.m. (limiter) or a.m. (limiterless) mode of operation. You will find that this is slightly above normal room

volume, and it will be necessary to install a pad in the speaker circuit to bring its volume down to a suitable listening level. The pad also offers the advantage of decoupling the variable impedance of the speaker from the receiver output circuit.

It is best to use your receiver's 100-kHz. crystal calibrator or an actual signal to make the auto-receive sensitivity adjustment. Set the rotary function switch to position 2 (AUTO-RECEIVE — MOTOR ON). With no signal (just noise) input to the TT/L-2, adjust the auto-receive sensitivity control to a point just below that where the teleprinter prints garble. The printer should now remain quiet. Now adjust the sensitivity control so that when a signal is applied there is a 3- to 4-second delay before the RECEIVE neon indicator lights. If your adjustment is correct, the teleprinter should print five or six letters after the signal leaves, and then remain quiet.

The auto-receive circuit was designed to be used only when receiving in the f.m. (limiter) mode. When the a.m. (limiterless) mode is used, the rotary function switch, S_8 , should always be placed in the No. 5 position (RECEIVE — MOTOR ON). The motor-control stage works only when the auto-receive circuit is in operation.

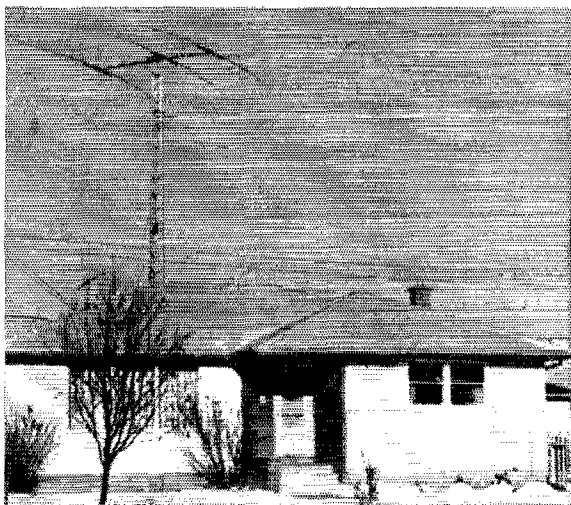
The tuning-indicator sensitivity control is provided so that the user may control the amount of eye closure during operation. The best setting is one where the eye just closes with the signal properly tuned. If the signal drifts, the eye immediately starts to open, signaling the operator to retune.

S_6 is used to select the Automatic Threshold Corrector or the Decision Threshold Computer. The DTC is used at all times except for reception of mark-only or space-only signals.

During transmission, the EXT. STANDBY switch must be opened, so that the signal will not feed back into the loop. When retransmitting or transmitting from tape-recorded signals, the switch must remain closed.

(Part II will appear in a subsequent issue of QST.)

All-Driven Three-Element Mini-Beam



The mini-beam for 20 meters is approximately the same overall size as a regular 10-meter beam.

A Modification of the Compact 20-Meter Parasitic Array

BY ALLAN A. SIMPSON,* VE4AS

SEVERAL years ago, after a somewhat frustrating attempt at phasing a couple of $\frac{1}{2}$ -wave vertical elements on 20 meters, I decided the time had come to graduate to a rotatable beam. Disregarding the advice of local DX enthusiasts, who advocated the largest Yagi possible or at the very least a two-element quad, I decided to build a somewhat smaller antenna, consistent with available resources and the homebrew s.s.b. exciter, converted surplus receiver and junk-box 813 linear in use as a station.

After weighing the pros and cons of a full-size 2-element or compact 3-element affair, I decided in favor of 3 elements mainly because the beam would look more symmetrical when in the air. The miniature 20-meter beam described in the *ARRL Handbook*¹ using center-loaded elements and a 12-foot boom was chosen as a guide. I say "guide" because I have the habit of improvising when involved in a construction project. When completed my beam was similar to the one in the article with the exception that the boom was one foot longer, the coil material was No. 6 copper, the coils differed in diameter, length and number of turns, the element lengths were very slightly longer, and the element diameters went from $\frac{3}{4}$ -inch aluminum tubing at the center down to $\frac{1}{4}$ -inch solid aluminum hydroline tie wire at the ends.

The beam was mounted 30 feet above the ground on the roof of the house, using a TV pop-up mast with an AR-22 rotator at roof level turning the mast and beam through two ball-bearing guy rings, and was used for a year or so with good results until the competition for DX forced an acknowledgment of the limitations in gain, beamwidth and side attenuation characteristics of the small loaded beam. Always on the lookout for a "something-for-nothing" scheme, I began searching for methods to make the mini-beam act like a maxi-beam. The text book, of course, said that this was impossible.

Accepting the fact that to do the impossible sometimes takes a little time, the investigation continued based on a reasoning that improved pattern characteristics might be achieved by

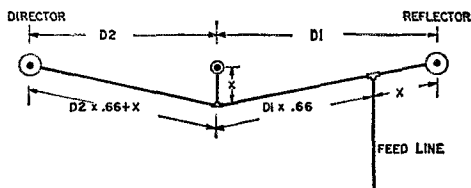


Fig. 1—Side view of the driven mini-beam, showing arrangement of phasing harness. The X dimension can have any convenient value. In the beam at VE4AS, D₂ is 5.5 feet. Element dimensions and loading-coil construction are described in the text.

* 17 Barberry Road, St. Boniface 6, Manitoba, Canada.
¹ "A Compact 14-Mc. 3-Element Beam," *Antenna Chapter*; p. 376 in 1968 edition.

more efficient interelement coupling. This led to a review of the literature on phased arrays, and in particular the unidirectional end-fire array. Available data suggested that a 3-element end-fire array would require an overall length of $\frac{1}{2}$ wavelength and involve very tedious adjustment to obtain the required element-current ratios. A reference in the *ARRL Antenna Book* did, however, hold promise of being adaptable to the mini-beam,² and the principle was stated as follows:

"The requirement for unidirectivity is that there must be a progressive phase shift in the element currents equal to the spacing, in electrical degrees, between the elements, and the amplitudes of the currents in the various elements also must be properly related."

I felt that it was technically feasible to phase elements with spacings of less than $\frac{1}{4}$ wavelength, and from a gain point of view that the mini-beam spacing of a little less than one-eighth wavelength would, in fact, be an advantage. From a practical point of view, the center loading coils of the mini-beam would facilitate the link coupling of phasing lines and the degrees of coupling could be used to adjust for correct element-current ratios. Impedance changes and matching problems were expected, but disregarded for the moment.

Fig. 1 describes the phasing network and formula based on the use of RG-8/U coaxial cable. Calculating the phasing-line lengths was straightforward; however, in applying the velocity factor the resultant line lengths turned out to be shorter than the element spacings. In the circumstances, a convenient length of line, designated *X*, was added to sections of the phasing network in such a way that it lengthened the lines sufficiently to span the distance between elements but did not change the relative phase.

Element tuning and driven-element coupling were left adjusted for optimum operation as a Yagi, and the phasing network was added to the beam. Initially, coupling to the outside elements was made the same as that for the driven element (5-turn links). The pattern was checked and it was found that there was little or no front-to-back ratio and the side nulls were much too sharp and somewhat unsymmetrical. Element-current ratio adjustments were then carried out by decoupling the two outside elements. This was accomplished by unwinding the link coupling coils one turn at a time and using the length of wire unwound to increase the diameter of the remaining turns of the link. After several adjustments, followed by pattern checks, it was found that 2-turn links on the outside elements together with the original 5-turn link on the center element produced substantially improved pattern characteristics. The beamwidth narrowed down considerably, with the half-power points in the order of 70 degrees, and the front-to-back ratio went to approximately 16 db. The *E*-plane plot shown in Fig. 2 was arrived at by rotating the

antenna while measuring the strength of a horizontally-polarized signal from a station located approximately one mile from the antenna.

With the beam mounted at 30 feet the s.w.r. was not good, but last summer the height was increased from 30 feet to 40 feet when a tower was procured, and at this height the s.w.r. is in the neighborhood of 1.7 to 1 over a major portion of the band when the beam is properly tuned and without further attempts at matching.

Construction Details

Four-foot sections of $\frac{3}{4}$ -inch, $\frac{5}{8}$ -inch and $\frac{1}{2}$ -inch o.d. aluminum tubing were used for the elements in this case because the $\frac{7}{8}$ -inch tubing called for in the *Handbook* article was not available locally. While these sizes have been found satisfactory, slight element sag is evident and the tubing called for in the original article would be more desirable. The element lengths change appreciably with loading coil changes and the reason for the solid aluminum sections on the ends of the elements was that when fully extended the elements would not resonate in the 20-meter band. To lengthen the elements, short solid aluminum sections were slid into the $\frac{1}{2}$ -inch diameter end sections and wedged there using wedges made from the same material. The lengthened elements were required regardless of the increased number of turns in each coil over that called for in the original construction data. Anyone constructing this beam should make provision for increasing the length of the elements. Short pieces of $\frac{1}{2}$ -inch o.d. tubing slipped inside the $\frac{5}{8}$ -inch end section would do nicely.

The instructions call for an increasing number of turns in each coil going from the reflector to the director; however, I reversed this so that the elements would be almost equal in length.

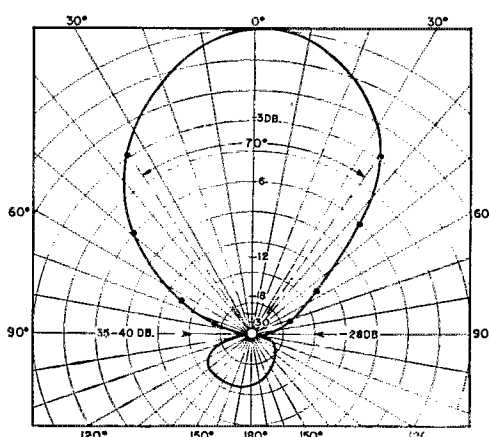
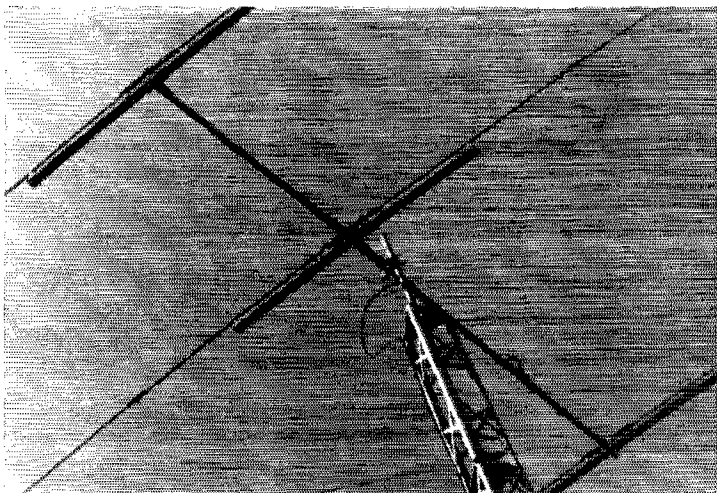


Fig. 2—Measured pattern of the VE4AS beam, made by rotating the beam and recording field strengths measured by a Stoddard Model NM-20B field-strength meter from a horizontally-polarized signal one mile distant. Frequency approximately 14.2 MHz.

²Chapter 4, section on Unidirectional End-Fire Arrays; p. 147 in 11th edition.



View of the element supports and loading coils. In general, the construction follows that described in the *Handbook compact-beam design*, but the reflector and director are driven through phasing lines instead of being parasitically excited.

The coils were made by tightly winding No. 6 solid copper wire on a $\frac{3}{8}$ -inch form. The slight spring to the material resulted in the coils ending up with a $\frac{3}{4}$ -inch inside diameter. The tightly wound coils were then spread just enough so that the turns did not short. They were then slipped over the $\frac{3}{8}$ -inch polystyrene-bar coil form which provided support. The coils are approximately 10 inches long and adequate space for mounting must be allowed when fixing the elements to the redwood supports. The ends of the coils were bent so that they could be clamped to the elements using hose clamps. The copper-to-aluminum connections must be very clean, securely clamped and perfectly sealed from the air. The number of turns in each coil is as follows: reflector 48 turns, driven element 46 turns, and director 44 turns. While the element lengths will vary considerably depending upon the coil characteristics, the tip-to-tip lengths (including the coil length) required in my case is close to the following: reflector 24 feet 4 inches, driven element 24 feet, and director 23 feet 8 inches.

After mounting, the coils were wrapped with a couple of layers of plastic tape (all clamped joints on the beam were similarly taped) and the 5-turn coupling link was tightly wound around the center of the driven-element coil using No. 12 copper wire with a heavy plastic coating. This type of wire was also used for the other coupling coils and is stiff enough to be self-supporting when loosely wound. Connection to the link coils was by means of coaxial cable connectors, and the female connectors were mounted on aluminum brackets fixed to the redwood supports near the centers of the coils.

The element mounting insulators were made from 2-inch lengths of $\frac{1}{4}$ -inch diameter polystyrene rod suitably drilled and tapped on each end to facilitate mounting and element fastening. One feature not shown in the original article but very definitely required is the use of aluminum plates on each side of the redwood element mounts to distribute the pressure when the boom

U-bolts are tightened. In my case the element separations are: reflector to driven element 7.5 feet; driven element to director 5.5 feet.

Coaxial T connectors were used for each of the three-way connections in the phasing network. Length λ in my case was 2 feet 9 inches and was chosen simply because a couple of pieces of RG-8/U cable with connectors on the ends were on hand at the time. The two outer link-coupling coils were wound in the same direction as the original driven-element link coil. The phasing line network was secured to the beam by taping with plastic tape.

In conclusion, while the call sign VE4AS may never show up on the DXCC Honor Roll without resorting to the use of a monster beam, the mini-beam has worked an average of seventy-five new countries a year over the past three years from a somewhat-less-than-ideal city location — not bad for a 20-meter beam no larger than the usual 10-meter Yagi.

The principles described when applied to 40- and 80-meter beam construction might just produce directional antennas small enough to be rotated within the capability of the average amateur station. Anyone interested in a five-band DXCC Certificate?

QST

Strays

To commemorate the town's Centennial, the Fort Sill, Okla., ARC, K5VOZ, MARS station K5USA, and all members of Lawton — Fort Sill ARC, will be on-the-air from 1500 GMT July 4 to 0200 GMT July 7 to conduct QSOs with stations interested in competing for the Fort Sill Centennial Award. Space does not permit listing the award rules but a SASE to the club will bring complete information on the award. Special QSLs will be used to confirm all QSOs.

Long-Delayed Echoes . . . Radio's "Flying Saucer" Effect

BY O. G. VILLARD, JR.,* W6QYT, C. R. GRAF,** W5LFM, AND
J. M. LOMASNEY,*** W6GNL

HAVE you ever had the experience of hearing your own voice repeat the last couple of words of your transmission, after you have switched over to receive? Or have you been aware, after another station stands by, that a weaker signal on the same frequency is repeating the last few words of the transmission, with exactly the same "fist"?

Well, believe it or not, some amateurs have. If you, dear reader, think us out of our minds to even bring this matter up, rest assured that there are many others who share your view and would cheerfully consign us to the booby hatch. If you haven't tuned out by now, you are undoubtedly asking: just who are the folk who have had this experience? Are they emotionally unstable types, prone to LSD-style hallucination? But hear this: one is a professor of mathematics at a well-known West Coast university; another is a physicist at a midwest research foundation; still another has managerial responsibility for important communication satellite programs at a prominent West Coast aerospace corporation, and most of the rest have a professional connection with electronics in some way . . .

*Trustee, W6YX; Radioscience Laboratory, Stanford University, Stanford, California 94305.

**207 Zornia Drive, San Antonio, Texas 78213

***2501 Waverley Street, Palo Alto, California 94301.

Amateur help is needed in unraveling the mystery of signal "echoes" which persist for times much longer than round-the-world propagation delays. This baffling and unexplained effect, wherein whole words—and not just syllables—are repeated, was first reported in 1928, and occurs so rarely that many doubt its reality. Interest in the subject has been reawakened by recent discoveries in plasma physics which—if applied to the ionosphere—suggest new possible explanations. The authors review the reports known to them, suggest that the effect is real, and solicit further observations.

Hard to discount their reports, it appears. Were these men hoaxed, you ask? That's always a possibility, and it apparently has happened in the past. But what about the instances where the echo was heard *both* on the ham's own signal, *and* on the signal of the station being worked? It would take a pretty clever spoof to simulate both the sound of long-distance transmission and the transmit-receive timing. Still, it could be done, just as a photograph of a flying saucer can be handily simulated with the aid of ordinary crockery.

That's what makes the study of long-delay echoes (LDEs) exciting. At the moment, there is no really indisputable proof that they exist. Scientists remain unconvinced about UFOs, and LDEs are in the same category. However, an increasing body of experimental evidence argues for the reality of LDEs, and it is interesting that a number of new ideas for possible theoretical explanations have come to light only within the last couple of years.

Scientific research is placed under great handicaps when the effect being studied is highly infrequent in occurrence. The handicap is even worse when there is no satisfactory theory to guide experimentation. In these circumstances it hardly pays to set up a special test if a useful result is achieved only once a year on the average. This problem is well known to astronomers, who depend almost entirely on amateur reports to locate comets which pop into view in unannounced places and at unannounced times. Busy professionals simply cannot devote that many hours per year to scanning the skies. LDEs provide an analogous opportunity for hams to be of service to the professional community. Reports on LDEs, with time logged accurately, should be invaluable in helping to solve this particular puzzle.

Background

Echoes of very long delay were first reported in 1928 (References 1 and 2), not long after international short-wave broadcasting got under way. Transmitter powers were around ten kilowatts; antennas were tilted wires (see Fig. 1); the radio frequency used was around ten megacycles, and receivers were for the most part regenerative. Oscilloscopes and tape recorders were unheard-of.

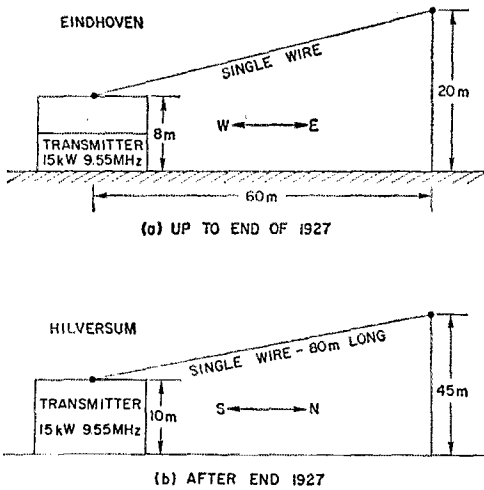


Fig. 1—Details of the transmitting setups used for the first observations of long-delayed echoes.

On the other hand, interference levels were far below those of today. The experiment consisted of transmitting one or more dots or dashes, and timing the received signals with the aid of a stop watch. Delays ranged from 2 to 30 seconds. Echoes were heard at locations both close to and distant from the transmitter, sometimes apparently at the same time. Fig. 2 shows an example.

A number of theories in explanation of the observations were tried and discarded. The basic difficulty is that radio waves in most circumstances travel at the velocity of light (186,000 miles per second), so that a complete transit of the earth takes only one-seventh of a second. A trip to the moon and back takes roughly two seconds. One theory held that the waves might be slowed down sufficiently if they happened to be close to the ionospheric "critical frequency;" however, it soon became obvious that the accompanying losses would inevitably swallow them up. Loss also makes the possibility of multiple passes around the earth unlikely (210 are required for a 30-second delay) — for the ionospheric gas is by its very nature a lossy dielectric. The hypothesis that echoes might be returned from uncharted clouds of electrons far distant from the earth was seriously considered at the time; today, of course, we know that deep space holds no surprises of that particular sort.

By the middle 1930s few echoes were being received, and the matter remained dormant until the Cavendish Laboratory of Cambridge University undertook a study in 1948 (Reference 3). In a careful year-long test involving transmission of about 27,000 test signals at 13.4 and 20.6 MHz., not one LDE was recorded. No further published scientific activity seems to have taken place since that time. In the intervening years

there appears to have been at least one amateur report which was discovered to be a hoax, and in another instance a mechanical fault in a recording was responsible for reports of "delayed echoes" audible on a standard-frequency-station time announcement.

In scientific work when none of the postulated explanations satisfactorily explains a reported effect, and when a reputable scientific organization attempts to find it experimentally and doesn't succeed, there is an understandable and almost overpowering impulse on the part of other members of the scientific fraternity *not* to become further involved. This is how LDEs came to have roughly the same dubious status as UFOs.

More Recent Experiments

In 1958, W5LFM drew W6QYT's attention to field-strength recordings in which there was an apparent decay of received-signal energy during the 30-second interval of carrier interruption for identification purposes. This behavior, which *could* have been ascribed to weak (perhaps incoherent) long-delayed echo energy, turned out in the end to be due to the effect of mechanical "stiction" on operation of the pens of the then-standard Esterline-Angus paper-chart recorders. The observation did, however, suggest an inexpensive means for collecting data on possible LDEs: use a more suitable recorder and see what is left behind on the frequency when WWV's carriers leave the air once an hour. Studies of this sort were made by W6QYT with the help of various part-time graduate-student assistants at Stanford University in the period 1958-1960 (Reference 4). The following suspicious circumstances were — very occasionally — noted:

- 1) extra noise, decaying exponentially for tens of seconds,

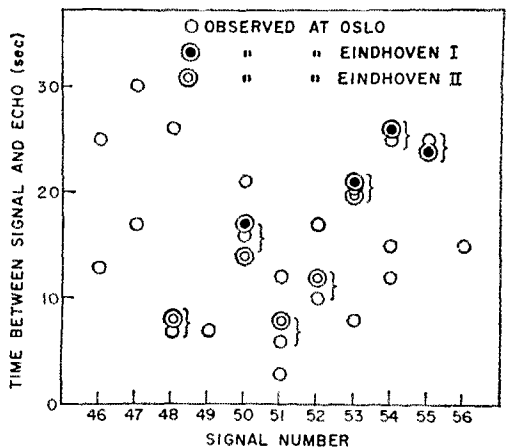
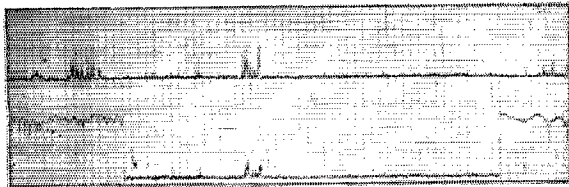


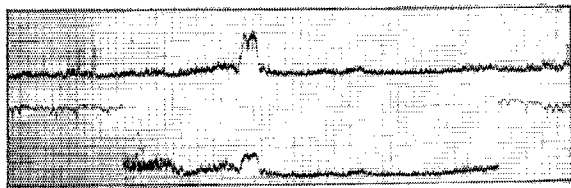
Fig. 2—Some early observations of long-delayed echoes, some of which were apparently audible at three locations at the same time. Signals were sent every 30 seconds; note the brevity of the total period of reception. (From Reference 2).



TIME --

4 MINUTES
(0645 P.S.T. MARCH 1, 1959)

Fig. 3—Signal-intensity-versus-time recording for normal conditions. Upper channel is background noise 30 kHz. away. Lower channel is standby of WWV-20 carrier. Note rapid drop into background noise level. Receiver bandwidth: 100 Hz.



TIME --

4 MINUTES
(0845 P.S.T. FEB. 28, 1959)

Fig. 4—Note the weak signal persisting on the WWV-20 frequency for roughly 30 seconds after standby. There is no proof, but it *might* be long-delayed echo energy.

2) extra noise of roughly constant intensity, enduring for about the same period of time (see Figs. 3 and 4), and

3) instances where the same noise actually contained a weak signal similar to the WWV carrier. (An example is shown in Fig. 5.) Some 18 of the type 3 events were observed in a period of about a year. These findings were reported to the Office of Naval Research under whose contract the work was performed, but they were never published because it could not be proved beyond reasonable doubt that the observed signals were in reality caused by the WWV transmissions. They could, for example, have been the result of an obscure fault in the transmitter, although this is considered highly unlikely. WWV frequencies are shared by other standard-frequency stations throughout the world; this introduces troublesome uncertainty. (So does harmonic radiation from 100-kHz. crystal oscillators on the Hewlett-Packard Palo Alto production line, as WB6FDV found out in a classic bit of detective work.) A more sophisticated experiment was clearly needed to decide the matter one way or another, and the effort was sidetracked owing to the pressure of other activities.

Possible Theoretical Explanations

If h.f. signals are to endure for tens of seconds, a way must be found for ionospheric loss to be

overcome. In the 1930s the possibility of signal amplification in the ionosphere had not occurred to anyone, but today we can visualize a number of means by which this might take place. Parametric amplification has been suggested (Reference 5): the ionosphere is not a perfectly linear dielectric, and if we could exploit this property, one signal — in principle — could “pump” another. Another new development is maser amplification; the ionospheric plasma is acted upon by a whole spectrum of radiation from the sun: is it possible that amplification-producing population inversion somehow takes place? Still another explanation has to do with signal storage in the ordered motion of electrons spinning around magnetic field lines; for example, there might be an ionospheric analogue of the phenomenon of spin echoes in nuclear magnetic resonance.

Professor F. W. Crawford of Stanford University has been studying — on paper and in the laboratory — plasmas that “talk back,” almost like Edison’s original phonograph (Reference 6). A complex signal is fed in, which then disappears insofar as the external circuit is concerned. To call it out, the plasma is pulsed; a replica *reversed in time* then appears (see Fig. 6). These “plasmas with memory” — and the above is only one scheme of many — are most readily studied when comparatively high pressures and gigahertz radio frequencies are used. The tantalizing feature of these experiments is that if they *could* be extended to ionospheric pressures and h.f. frequencies, the indicated time delays fall right in the 3-30 second ball park.

Another remarkable and comparatively recent finding is the so-called “stimulated natural emission” observable at v.l.f. At very low frequencies (on the order of 15 kHz.), radio signals both travel underneath the ionosphere and penetrate it. Those which penetrate are guided by the magnetic field lines and travel from northern to southern hemispheres at phenomenally high altitudes over the equator (one or two earth radii). During their travel, these waves actually rearrange the ambient electrons and store energy in them. This energy is available to amplify any signals of the same frequency after the causative wave is shut off. As a result, an unstable but recognizable replica of the signal is heard after the original transmission stops. Examples are shown in Fig. 7, which is taken from Reference 7. This mechanism most emphatically will *not* work at h.f., since the circumstances are then wholly different. But the fact that radio signal amplification in the ionosphere can happen at all, makes the possibility that something analogous might happen at h.f. seem more likely.

These new developments in the understanding of plasmas stimulated W6QYT to ask for reports of LDEs at a recent get-together of the Northern and Southern California DX Clubs; to his surprise five excellent ones were received; they are included in the summary on the next page.

W5LFM, who has also been interested in this subject since 1958, has collected reports from

Summary of LDE Reports

Date	Call	Band, MHz.	Approx. duration, seconds	Time, GMT	Phone/c.w.	Audible on Own/Other
Oct. 16, 1932	W6ADP	28	18	≈1800	c.w.	Own
Winter, 1950-51	W5LUU	7	5	≈0300	c.w.	Own
Winter, 1965	K6EV	14	3-4	0600-0700	s.s.b.	Own
Dec. 2, 1967	W5VY	28	3	1328	s.s.b.	Own
Jan. 27, 1968	W5LFM	10	½	1400-1430	Time Ticks	Station RID
Dec. 18, 1968	W6KPC	28	1	≈2000	s.s.b.	Other
Jan. 21, 1969	W6OL	14	6-10	1536	c.w.	Other
Feb. 17, 1969	K6CAZ	2	≈2	1430-1500	s.s.b.	Own and Other

W5VY and W5LUU, and has himself observed a difficult-to-explain half-second time delay on the time ticks of a Russian standard-frequency station.

Summary of Characteristics

The Stanford recordings suggested — but did not prove — that incoherent noise “echoes” may exist, as well as coherent ones containing a replica of the signal. The amateur and the early reports, of course, deal only with the coherent variety, which seem to be appreciably less frequent in occurrence. Following is a summary of the conclusions which can be derived from the ham reports taken as a group:

- 1) multiple-second “coherent” signal echoes, either phone or c.w., appear to be real, and are observable for short periods of time at highly infrequent intervals.
- 2) they are audible both on a station’s own signals, and on signals of other stations,
- 3) they have been observed at 7, 14, 21, and 28 MHz., but apparently not at higher frequencies,
- 4) They either occur most frequently (or perhaps are most easily heard) when a given band is just “opening up” — i.e., when skywave propagation to some point on earth is just becoming possible.
- 5) They seem to be audible when long-distance propagation is good, and when geomagnetic activity is low. (The presence of long-path as well as short-path propagation, or signals from stations at antipodal locations, is apparently a good omen.)
- 6) Stations reporting LDEs typically have been ones having antennas well up in the air, at locations reasonably good for DX, but other than that no exceptional facilities seem to be required.
- 7) An active ham who DXes one or two hours a day, may expect to hear an LDE once a year, on the average.

- 8) The LDEs appear to be one single echo, rather than several successive ones.
- 9) No Doppler shift is perceptible.
- 10) The sound of the echo resembles that of a DX signal (i.e., it apparently involves long-distance multipath propagation.)
- 11) The strength is usually weak, although some reports have put it at S3 or more.
- 12) Echo strength always decays with time, rather than the other way around.
- 13) The total time interval during which the echo effect can be heard is remarkably short — usually no more than a few minutes.
- 14) There is some indication that LDEs may be heard more frequently on signals which have travelled through the northern and southern auroral zones.

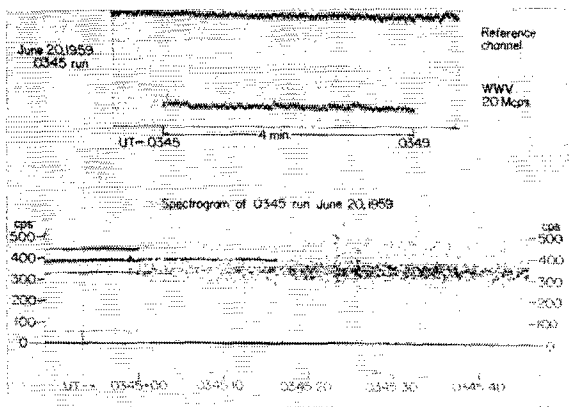


Fig. 5—Lower record (a frequency-amplitude-time plot) shows possible 15-second “echo” of WWV-20 transmission. (Note the 60-Hz. hum side frequencies on the WWV carrier prior to standby.) There is no proof that this signal was really related to the WWV transmission; only a presumption based on observation of a large number of records of this type.

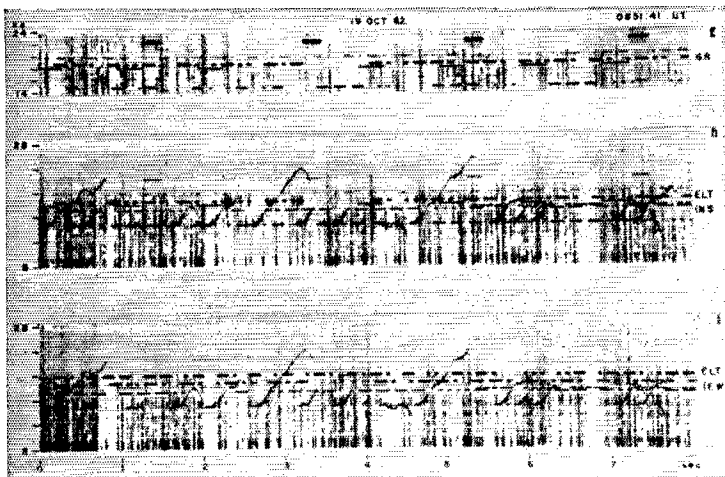


Fig. 7—Artificially-stimulated natural emissions (similar to "echoes") at v.l.f., shown here as a matter of interest only. Uppermost spectrogram shows v.l.f. spectrum as received near the transmitters; NAA is the lowest frequency signal, at 14.7 kHz. Lower two records, taken aboard the USNS *Eltanin* in the Antarctic, show diagonal emissions growing out of NAA dashes. Energy stored in the magnetosphere while NAA is transmitting, is released in the form of unstable, partly coherent radio signals. Note: this particular mechanism does not work at h.f.; however, it is conceivable that something analogous might. (From Reference 7).

A Comparison

It isn't clear that the currently-observed effect is the same thing as was reported in the 1930s, since the early accounts all stressed a multiplicity of signals returned for a single outgoing pulse. But a connection is certainly possible.

It is interesting to compare the circumstances of the experiments of those times with those of today. The early work involved high transmitter power (10 kw. or so), relatively non-directional antennas (tilted wires) radiating upward as well as outward, frequencies of the order of 10 MHz., and comparatively short-distance propagation. Today's observations were performed with lower power, higher beam gain, higher frequencies, antennas directing their energy closer to the horizon, and long-distance propagation.

As the Cambridge group (Reference 3) pointed out, perhaps the most significant difference between "then" and "now" is the greater crowding of the h.f. spectrum. In their view their lack of results might in part be explained by the difficulty of finding a clear channel. It is certainly true that they operated in commercial telegraphy bands, which are comparatively crowded; it is also true that their antennas were directive upward, since they were primarily looking for reflections from electron clouds in space. It is also possible to speculate that, if maser amplification were involved, interference would have the effect of siphoning off amplifying power which might otherwise go into keeping the echo going. (This would be in addition to the obscuring effect of the interference.) The QRM would tend to be amplified, instead of the echo, since stimulated electrons in giving up their energy will tend to lock themselves to the strongest signals of the appropriate frequency present at any given time.

What Amateurs Can Do To Help

Additional amateur reports of LDEs are urgently needed to guide on-going research. If an

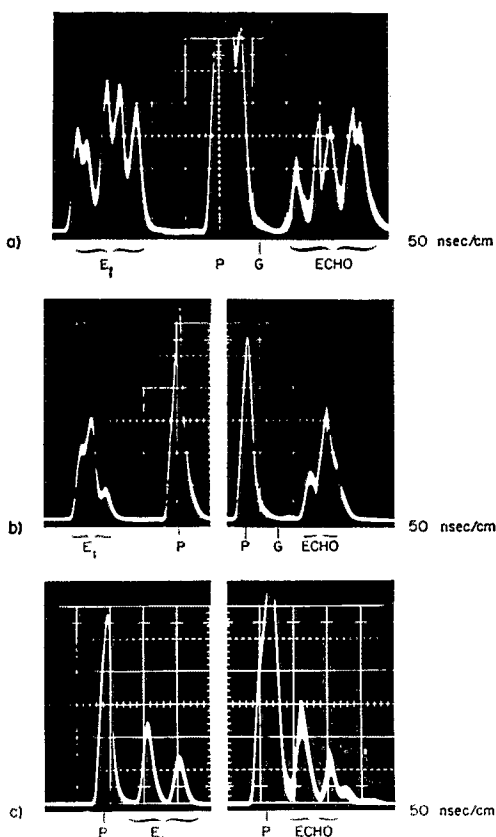


Fig. 6—Examples of signal storage in plasma at microwave frequencies. Above are plots of amplitude versus time (from left to right). The signals marked E_1 are the inputs, which are stored; the readouts are the replicas designated "echo," which require for their release application of the pulses "P." (Photo courtesy of Professor F. W. Crawford.)

LDE is experienced, the most important single piece of information to write down is the exact time of occurrence. Because LDEs are so transitory, it may be possible to establish a relationship to other, equally transitory geophysical events simply by making a time-of-occurrence comparison. Try to log, *at the time*, all the circumstances of the experimental setup — frequency, antenna heading, etc., plus a careful description of the observed effect.

It is suggested that the making of special transmissions in the hope of catching an LDE is a sure road to total frustration. Best bet is to act as if they didn't exist. However, if you have a tape recorder which can be spared from other duty, use it to record the output of the station receiver at all times. A single tape can be used over and over again. Then, should an echo put in an appearance, you'll have it trapped — if the tape hasn't worn out in the meantime! Frequency-amplitude-time plots (similar to "voice prints"), made from such recordings, should be very instructive. However, tapes (like photos of UFOs) can be easily faked, so don't expect to convince skeptical scientists and garner instant glory by producing a single example: nobody will bite. Nevertheless, many tapes collected over a period of time at many locations, and containing internally consistent information, may well permit the piecing together of a sensible explanation.

It's fun to think that in this era of "big" science, there is still an area where amateur radio operators can make contributions which will be as uniquely valuable as those provided to astronomers by the amateur comet-watchers.

Some Reactions Upon Hearing LDEs

Those who are privileged to hear LDEs are clearly members of a highly exclusive club, since many hams active for 20 years or more have never observed anything like it. Yet some who do, such as W5VY and W6CAZ, report that they hear LDEs on the average about once a year when they are operating regularly (perhaps 1-2 hours per day on the average). Hence, the effect must happen at least this often.

W6QYT has queried ship-to-shore radiotelegraph operators of the Mackay Radio receiving site at Half Moon Bay, California with negative results. It appears that these men, who contact ships at varying distances throughout the world, every day, around the clock, and in several wavebands, simply do not hear LDEs. However, a typical ship transmitter has a power in the order of 150 watts, and a non-directional antenna; hence it is not as potent as most ham stations.

Psychologists say that the human mental computer is astonishingly efficient at recognizing something which is known. This is probably an important aspect in the identification of one's own voice or "fist." One wonders how many weak LDEs associated with other transmissions may have gone unnoticed, because the ear tends to shut out — automatically — anything it classes

Please send reports to W6QYT, Radioscience Laboratory; Stanford University, Stanford, California 94305. All communications will be acknowledged and credit given.

as QRM, and therefore spurious.

The almost universal reaction to hearing a good LDE is total astonishment. For this reason the memory tends to be fresh even after the passage of years. Some of the reports convey this feeling quite dramatically. According to W6OL, "I was just tuning the band, listening, and heard this Russian working someone. There was some slight QRM on his transmission but the copy was reasonably good. However, I heard him sign and then I realized that the QRM was his echo, and that I could again copy the last part of the transmission." Says W6KPC, who heard "whole words, if they were not too long, . . . the echo was so loud, long, and startling that my reaction was to 'talk' about it with someone! . . . I've never heard such long echoes before or since." In W6ADP's words, "I was calling ON4AU on 28 Mc. and switched over to listen and heard on my own frequency ON4AU de W6ADP K. Was very weird and never will forget it. Signal sounded like it was coming a long way but was S6 or so."

Acknowledgement

The assistance of Professor B. Dueno, KP4HF, is gratefully acknowledged. Members of the staff of WWV and WWVH have provided useful information. Measurements at Stanford University were supported in part by the Office of Naval Research under contracts Nonr-225(24) and Nonr-225(64).

QST

References

1. Stormer, C. *Nature*, 122, 1928, p. 681.
2. Van der Pol, B., *Nature*, 122, December, 1928, pp. S78-9.
3. K. G. Budden and G. G. Yates, "A Search for Radio Echoes of Long Delay," *Jour. of Atmos. and Terr. Physics*, 2, 1952, pp. 272-281.
4. Quarterly Status Reports, Tri-Service Contract Nonr-225(24) NR. 373 360. Stanford Electronics Laboratories, Stanford, California. See reports 17-25, covering the period October, 1958-December, 1960.
5. Harker, K. J. and Crawford, F. W., Stanford University Institute for Plasma Research, Report No. 264, December, 1968.
6. F. W. Crawford, "A New Look at Very Long Delayed Radio Echoes," Combined Session, URSI Spring Meeting, April, 1968.
7. R. A. Helliwell, *Whistlers and Related Ionospheric Phenomena*, Stanford University Press, Stanford, California, 1965.

**SWITCH
TO SAFETY!**



● *Beginner and Novice*

Some Common Problems and Their Answers

BY LEWIS G. McCOY,* WHICP

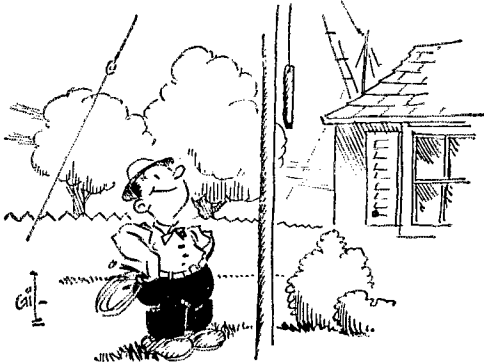
IN handling questions from amateurs, both at ham meetings and through the mail, certain queries are much more common than others. Possibly one of the questions treated in this article is one that bothered you.

"I read your recent article on a transmatch but nowhere in the article do you say, or imply, that you should turn off the power when making adjustments on the transmatch. Should I turn off the power?"

Let's make one thing clear: always turn off the power when you handle any circuit or unit capable of having power in it. It is common practice to make adjustments on a transmatch coil with the transmitter a.c. voltages turned on, but not with r.f. flowing or being generated, such as when the key is left open. While it may be common practice, it is not a good one; the reason is that it is possible for a blocking capacitor in the amplifier tank circuit to fail, and under such conditions, the amplifier plate voltage could appear on the coil of the transmatch and such voltages can be very dangerous.

In addition to the danger of such failures and d.c. voltages being on the transmatch coil, if the transmitter were turned on, r.f. voltages would appear on the transmatch coils. While r.f. voltages are not usually lethal, they can cause very nasty r.f. burns which are slow to heal. And, even running very low power, some very high r.f. voltages can develop on coils in a transmatch. So as like we said, turn off the rig before making any adjustments.

* Novice Editor



The antenna wire can be stranded or solid . . .

"In putting up a wire antenna, is it all right to use a "coated" (insulated) wire or should I use bare copper wire? Also, I plan on going high power when I get my General and I want to use a so called "invisible" antenna; can I use wire as small as No. 30 for high power?"

It doesn't make any difference whether the wire is coated or not; the antenna performance will be the same in either case. Also, the antenna wire can be stranded or solid. One type of wire commonly used for antennas is copper-coated steel electric fence wire, available at any farm supply dealer.

You can use No. 30 wire for high power, even the full amateur limit. If you should happen to look up the current-carrying ratings of wire in any wire table you are liable to be misled by the figures. For example, No. 18 wire may be rated at slightly less than 2.5 amperes but this figure is for transformer windings, where the wire would be enclosed. No. 18 has a continuous duty rating for a single wire *in air* of 16 amperes. Bear in mind that amateur radio operation would not be continuous, but intermittent. In this case the rating would be much higher than 16 amperes.

We tested an antenna made from No. 30 wire, running a full kilowatt input under conditions that put some rather high current points on the antenna. The antenna "took" the power with no trouble at all.

"I have my antenna in the same room as my rig; are there any radiation hazards from my home station such as I read about from TV picture tubes?"

Some readers may chuckle at this question but after all, if you don't know, one *could* worry about radiation hazards in this day and age!

The answer is no, there is no danger from radiation — at least not from any commonly-used amateur radio frequencies. By commonly-used we are referring to everything below the ultra-high frequencies — below 300 Mc., that is. There can be radiation hazards when working with equipment operating above 300 Mc. WB6IOM in a recent article in *Ham Radio*¹ points out some of the dangers in working with a high-power amplifier on the 1296-Mc. band. However, for the bulk of ham work, radiation is not a problem as far as health is concerned.

"I notice articles describing the construction of transmatches never discuss the need for shielding

¹ Laakman, "High Power Linear For 1296 Mc.," *Ham Radio*, Aug. 1968, page 17.

transmatches to prevent TVI. Do you or don't you have to shield a transmatch?"

Shielding a transmatch will have little, if any, effect on reducing harmonic radiation from your equipment. For effective harmonic TVI suppression, the transmitter must be thoroughly shielded so that any harmonics generated within the transmitter cannot escape. Output from the transmitter must come out via a shielded coaxial feed line and into a low-pass filter, which attenuates any harmonics that are present. It follows that any r.f. reaching the transmatch should be clean of TVI-creating harmonics, and therefore there should be no need for shielding the transmatch.

Along the same line is a frequently-asked question about using a low-pass filter with an inadequately-shielded transmitter — will the filter help, or is it useless without shielding? Probably the best answer is that *everything* in the way of harmonic suppression helps to some degree. Many commercial rigs these days don't have really adequate shielding when it comes to dealing with truly fringe-area TVI. However, the important point is that the low-pass filter will help to some degree, but how much it helps is impossible to answer without trying it. If it is determined that the TVI is the fault of harmonics, and the low-pass filter doesn't help much, then it is highly probable a case of inadequate shielding of the transmitter.

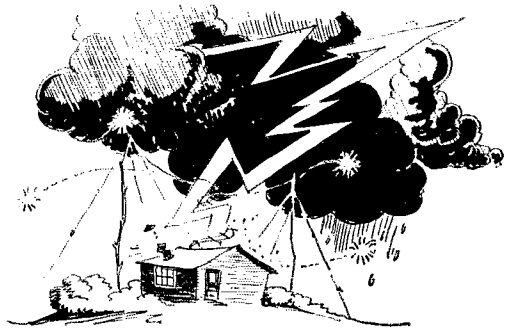
"When I am on the air, my neighbor complains that I interfere with his telephone. What must I do to my transmitter to stop this type of interference?"

There is nothing you can do to your transmitter to stop the interference, (except to turn it off!). However, the interference is *not* the fault of your transmitter but rather that of the telephone system itself. In such a case, tell the complainant, as diplomatically as possible, that his telephone is at fault and that the phone company will install appropriate filters. Not that we expect you would, but you shouldn't offer to fix the phone, assuming you know how. It is the telephone company's property and their obligation so let them fix it.

"I have heard that strong signals can burn out my receiver. Is this true, and if so, how can I protect my receiver from accidental burn out?"

It all depends on what one means by "strong" signals. It would be almost impossible to damage the normal receiver from signals picked up on a receiving antenna. However, nearby lightning strokes could generate enough "static" electricity to cause damage to a receiver's front end. Also, many newcomers make mistakes in hooking up antennas to their transmitters and receivers and sometimes accidentally feed the transmitter output into the receiver, which would of course damage the receiver's front end.

One simple precaution that can be taken to protect the front end of a receiver is to install a pair of 1N60 diodes between the antenna terminal and chassis ground. The diodes will limit any incoming signal to about $\frac{1}{2}$ volt. Fig. 1



Nearby lightning strokes can generate harmful static that can cause damage . . .

shows the circuit connections for connecting the diodes. The diodes should be connected from the inner conductor pin of the antenna input connector to chassis ground.

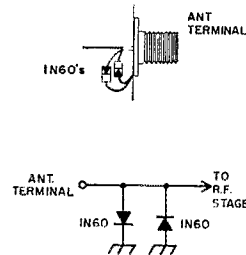
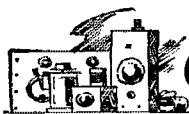


Fig. 1—The 1N60, or similar types, can be used to protect the input of a receiver from harmful overload. The diodes should be connected from the antenna terminal to chassis ground.

"I have a two-stage c.w. transmitter that has a bad chirp when I use some crystals, but not with all of them . . . what gives?"

In a crystal-controlled transmitter the frequency controlling device is the crystal. When voltages are applied to the oscillator tube and the key is opened and closed the oscillator goes on and off. At the same time, the crystal goes from a point of not oscillating to full oscillation. As far as the crystal itself is concerned, once it is in full oscillation, its frequency is fully "established." However, some crystals are "sluggish" and take their time, so to speak, in coming to full oscillation. During the time from full off to full on, the crystal frequency changes and this in turn causes a "chirp" on the transmitted signal. One simple answer to eliminating this problem is to leave the oscillator run, and key the amplifier stage only. This will help a great deal in eliminating chirp. Such keying may not get rid of the chirp completely because another cause of chirp is changing the load across the crystal. And keying the stage following the crystal oscillator stage does change the load the oscillator stage "sees."

(Continued on page 51)



A 160-Meter Converter For Ham-Band-Only Receivers

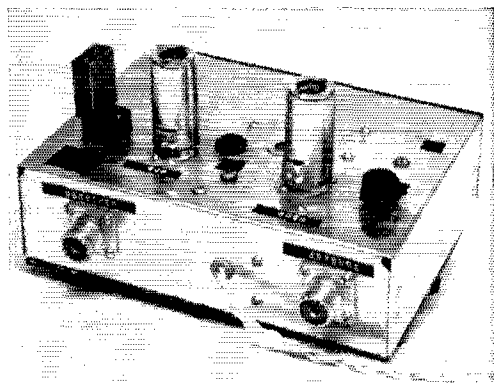
BY JAMES P. GILLESPIE,*
W4LQC/W8BKK

WITH the expansion last year of 160-meter amateur privileges, there has been an increase in activity on the top band. Owners of general coverage receivers can tune in right away, but those possessing ham-band only receivers are usually left in the cold, as most of their sets don't cover 160. For the latter bunch of fellows, here is a converter that provides high performance and good stability on the top band. It can be constructed with a minimum of effort and expense.

The circuit, which is shown in Fig. 1, is essentially that used by Deane in a series of simple mobile converters.¹ The incoming signal is mixed

* 1228C 18th Ave. South, Nashville, Tennessee 37212.

¹ Deane, "Simple Crystal-Controlled Converters," *QST*, Dec., 1954.



Top view of the 160-meter converter. The 6J6 converter stage is on the left, and the amplifier, which can be either a 6CB6 or a 6AK5 (see the text), is on the right. C_1 is controlled by the knob at the right, and C_2 is adjusted by inserting a screwdriver through the rubber grommet located between the two tubes. Electrical tape is used to cover up unused holes.

with a 5500-kHz. oscillator signal to produce an output on either 80 or 40 meters. One can receive 1.8- to 2.0-MHz. signals by tuning his ham receiver from 3.7 to 3.5 MHz. or from 7.3 to 7.5 MHz.

The converter was built on a $5 \times 7 \times 2$ -inch chassis. A smaller chassis could have been used, but the addition of a self-contained power supply is planned for a later date. As in all converters,

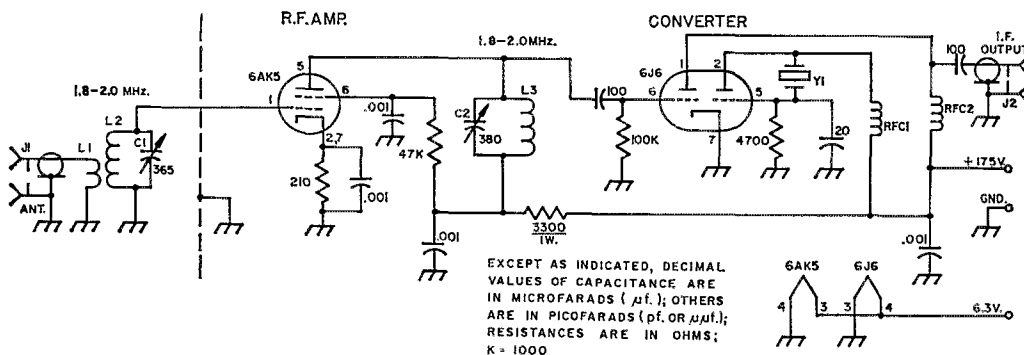


Fig. 1—Circuit diagram of the 160-meter converter. Fixed capacitors are either disk ceramic or mica. Resistors are $\frac{1}{2}$ -watt composition, unless noted otherwise.

C_1 —365-pf. miniature broadcast variable.

C_2 —50-380-pf. trimmer.

J_1, J_2 —Coax chassis connector, SO-239.

L_1 —16 turns No. 30 enam. close-wound $\frac{3}{8}$ inch from ground end of L_2 .

L_2, L_3 —50 turns No. 30 enam. close-wound on 1-inch dia polystyrene form.

RFC₁, RFC₂—2.5-mh. r.f. choke.

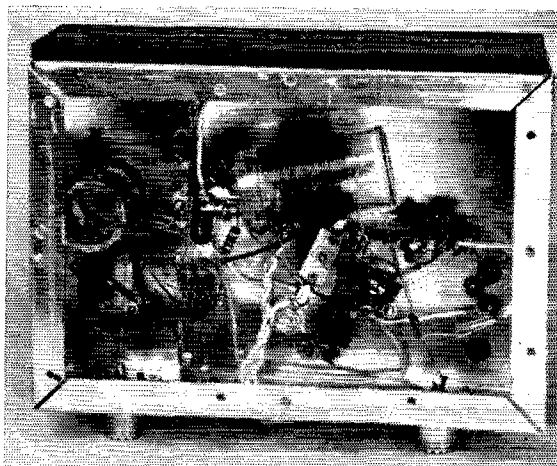
Y_1 —5500-kHz. crystal.

the input and output circuits should be well shielded from each other, and the r.f. leads should be as short as physically feasible. The r.f. amplifier shield shown in the underside-view photograph may be made from flashing copper or a strip of metal cut from a galvanized tin can. It should extend across the chassis from the front to the rear, cross between pins 1 and 7 and 4 and 5 of the 6AK5, and make contact with the top, bottom, front and rear of the enclosure. L_2 and L_3 should be close to their respective tuning capacitors and should be mounted at right angles to each other.

L_1 , L_2 and L_3 were wound on small polystyrene medicine vials available for pennies at most drug stores. Slug-tuned coils are not recommended, as they probably won't have sufficient Q to prevent bleed-through by strong local broadcast stations.

The converter requires from 150 to 175 volts at 20 ma., and 6.3 volts at 0.625 ampere. If a 6CB6 is on hand, it can be used in place of the 6AK5. In this case, the 6CB6 suppressor grid, pin 7, should be connected directly to ground. In addition, the converter will draw slightly more filament current (0.75 ampere).

Alignment is very simple. If you have a v.f.o. with a 1.75- to 2.0-MHz. basic tuning range, merely set the v.f.o. at 1.8 MHz., tune the ham receiver to 3.7 MHz., and peak the signal with C_1 and C_2 . If you do not have a 1.8-MHz. signal source, tune your ham receiver to the 3.9- to 4.0-MHz. range and peak C_1 and C_2 while listening for broadcast stations (1.6 to 1.5 MHz.). Then tune the receiver to the 3.7- to 3.5-MHz. range and slightly reduce the capacitance of



Bottom view of the converter. A shield made from a galvanized tin can divides the chassis about one-third of the way from the left. J_1 , C_1 , L_1 , L_2 , and half of the r.f. amplifier tube socket are located on the left side of this divider. L_3 is the large coil on the right side. Trimmer C_2 is supported by a 1/2-inch high ceramic pillar and one terminal of a five-terminal tie point. RFC_1 and RFC_2 are connected to other contacts of the same terminal strip.

C_1 and C_2 while listening for 160-meter signals. At night you should be able to receive lorán or ham signals loud and clear.

The worth of any piece of gear lies in its performance. The other night I tuned to 1.8 MHz. and heard a KV4 riding in like a local. Who could ask for more? QST

Strays

Licensed radio amateurs who intend to make a career in electronics or related sciences may apply for the seventh John W. Gore Memorial Scholarship for either graduate or under-graduate study. The scholarship for 1969 consists of a \$500 award. It may be applied for more than once. To be eligible, applicants must have completed one year of a course in an accredited college or university leading to a bachelors or higher degree. They must hold a valid FCC license of at least General Class rating. Preference will be given to applicants from District of Columbia, Maryland and Virginia, although those living elsewhere are not excluded. This year's scholarship award will be announced on September 1, 1969. The award is sponsored by The Foundation for Amateur Radio, Inc., a non-profit organization devoted to the advancement of AR. It is composed of trustees representing over 20 radio clubs in the D.C., Maryland, and Virginia Area. Mr. John Gore, W3PRL, was, until his death, the president of the Foundation. Scholarship application should be completed and mailed not later than August 15, 1969, and should be addressed to Chairman, Scholarship Committee, Foundation for AR, Inc., 4449 Greenwich Parkway, N.W., Washington, D.C. 20007.

I would like to get in touch with . . .

- . . . anyone with information about amateur radio activities at Rutgers University before 1950. WB2ERM.
- . . . Francis X. Knott, operator at K5AT in 1941. WN8BPH.
- . . . college students interested in pure physics. Aron Faegre, WA9FJG/7, Box 318, Reed College, Portland, Oregon 97202.
- . . . anyone interested in a teenage net. WB2EXS, WA9VLK, WA1GWS.
- . . . amateurs who are pilots or who work in the field of aircraft communications. WN4IGY.
- . . . members of a police force or a police auxiliary interested in starting a net. K8NKB.
- . . . Novices who want to form a 40-meter ragchew net. WN5TFU.
- . . . hams interested in racing pigeons. WA0VMP.
- . . . those interested in playing chess over the air. WA0NVM, WB4ACQ.
- . . . state governors and mayors of major cities. W4BKO.
- . . . former members of the 86th Signal Co. of the 86th Infantry Division. WN8ATX.
- . . . hams who work on the design and marketing of battery powered equipment. W1YZP.

Technical Correspondence

USING A GROUNDED TOWER ON 160 METERS

Technical Editor, *QST*:

I have been wanting to get back on 160 meters for quite some time, but getting up an antenna of reasonable efficiency was somewhat of a problem for my 150-foot lot, particularly so on account of other antennas already in place. I have a triangular steel tower of welded construction in the front of the lot, near the curb. It is 42 feet high, and well grounded with iron stakes down into the earth some 6 feet. This tower holds up the front end of the 80-meter flat-top antenna.

It appeared to me that a Marconi-type antenna might be feasible. I attached to the upper end of the tower a hundred-foot length of wire, brought it over toward the shack about 42 feet, and then dropped it straight down to a "black box." Inside the box is a parallel tuned tank made of a length of standard coil stock. I tuned 4 or 5 turns off the total length so that a 100-pf. tuning capacitor — shunted by 200 pf. — nicely tuned from about 1.7 to 2.1 MHz. I used a grid-dip meter for this determination. See Fig. 1.

Determining the resonant period of the antenna before attaching it to the tuned circuit was another matter. Wrapping the end of the antenna around the dipper coil was fruitless. The *ARRL Antenna Book* gave a clue, indicating that the end of the wire should go to the dipper through a "very small C." I took a couple of inches of No. 22 enameled

wire, scraped a half inch or so bare, and wrapped the bare end around one of the pins of the dipper coil and then inserted the coil into the dipper socket. The insulated end of the wire was wrapped 4 or 5 times around the antenna end, hopefully forming the "small C." It worked! A very nice dip resulted.

I had used the formula, $l = 234/1.8$, to obtain an indicated length of the overall system of approximately 130 feet. The actual length was arrived at by pruning, using the s.w.r. meter connected to the tuning box by a short piece of coax. Another piece of coax of the length necessary was connected between the s.w.r. meter and the Ranger transmitter at the operating position. The Ranger was first loaded at approximately 1900 kHz. into a dummy 50-ohm load for an input of 50 watts. The antenna tank was then adjusted to frequency, the antenna was pruned a little at a time, and the coax tap was varied. Eventually a combination was reached where the s.w.r. was very close to 1:1, the Ranger settings were the same as with the dummy load, and the end of the antenna was hot! Tapping the antenna down on the hot end of the tank coil seemed to produce little noticeable change.

There is very little 160-meter activity heard here, but a great deal of man-made noise. I formed the habit of listening around 8:00 CST and, hearing a weather net operating in Nebraska, "zeroed" in and gave the net a call on approximately 1.980 MHz. Three stations (about 500 miles away) gave me "nice signal here, old man" reports. A CQ brought a similar report from Houston, Texas, some 400 miles to the south, and another report from Buffalo, Oklahoma, which is about 325 miles to the north. All in all, the antenna seems to be worth the time and trouble. — *Edgar G. Chatterton, W5AVA, 107 Professional Bldg., Tenth at Denver Sts., Wichita Falls, Texas 76301.*

BUILD YOUR OWN EQUIPMENT?

Technical Editor, *QST*:

From what I hear over the air, "I have a complete S-line here," or, "I have a complete Drake line," there are not too many that have a complete "home-brew line" today. From my recent experiences, I think I know why, and thought I'd write and let you know, too. For the first time since 1936, conditions have become just right for me to add to the W6TTS-line. I have retired.

Around 1936, *QST* published an article on how to build a 500-watt plate-modulated r.f. amplifier. It worked fine, but that was the last of the home-brew projects until the May 1967 issue of *QST* arrived. There, on page 19, was the punch line, "Want to soup up that old receiver?" I sure did, as my receiver was of 1935 vintage — an all-wave home receiver.

So the "Bonus FET Converter" was on its way. In fact, it was on its way out. I had never heard so many "birdies" — they were all over the dial. But the sensitivity was good, so I hooked it up through the home-brew electronic t.r. switch and called the gang. But after ten minutes or so the signals disappeared (and so did the birdies). After reading literature on transistors and their care and feeding, I learned I should have done this and that (not mentioned in the original article). It was finally figured out that r.f. had gotten to the FETs somewhere, and that they had gone bye-bye. After finding that the cure would probably cost more than the original, I junked the whole FET converter and built the one for 20-15-10 meters per the 1967 issue of the *ARRL Handbook*. That worked

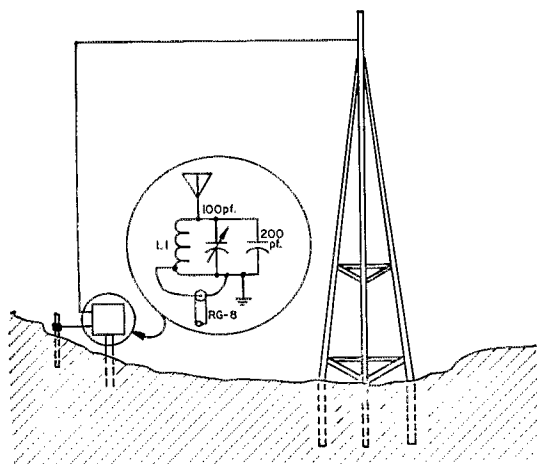


Fig. 1. The grounded tower system for 160 meters. L1—Approx. 29 μ h., to resonate with the capacitors over the 1.7 to 2.1 MHz. range, such as a coil 9 inches long, 3 inches diameter, 4 turns per inch (Ilumitronix Air Dux No. 2404). Tap determined experimentally, see text.

perfectly, and even got rid of the final birdie which hung around the middle of the 15-meter band. And the original tubes are still in it!

Then along came the January 1968 issue of *QST*, and the article on the W5OMX receiver. A look at the circuit indicated no transistors — only a couple of diodes in the rectifier, which are not tricky. After checking over the air with all my old buddies, who had been connected with receiver design in the past, it was agreed that this was a good receiver, and was really something new. So it was decided to go ahead and build it.

An order for the layout, etc., was sent to W5OMX, Col. Dave Curtis. Next an attempt was made to obtain the parts, or some of them, locally, as well as through the mail order houses. But most of the familiar supply houses had folded up. Letters sent to those listed by the good colonel for parts also came back unopened — these places, too, had closed up. Even ARRL Headquarters was consulted for parts location, and the place they suggested had folded up, too!

Every effort was made to use those parts exactly as specified, so that if it didn't work, it would simplify going back to the colonel! It took from June to late September of 1968 to round them all up. During that period, many notes were exchanged between the colonel and myself, and in one of them, Dave said, "They'll crowd us home-brewers out of existence yet."

By August, the parts ordered in June started to come in, and the W5OMX receiver began to take shape. In anticipation, a v.t.v.m. was ordered. It arrived, but turned out to be one that had been shipped back for repairs. A new one was received, and that was found to read 78,000 ohms on a 50,000-ohm 1% resistor, so that was sent back for recalibration. I expected to get it back at the end of November, but meanwhile, I used a friend's v.t.v.m. to line up the 9-Mc. i.f. (This was easy.) Also a set of crystals was ordered for all the bands. None of the higher frequency crystals received would operate on the 3rd overtone, but it took some time to find this out. So new ones were ordered from another firm, and these were so close in frequency that the bands can be calibrated without changing the capacitor in the v.i.o. for each band. There was a misprint in the crystal table in *QST* which threw me off for a while, but soon became obvious what it should have been.¹

A little trouble was experienced with the zeroing of the S-meter. One of the 470-ohm resistors in the bridge circuit was replaced with 500 ohms, and now all is well. All claims by the author in *QST* are true. So thanks to W5OMX and *QST*, I now have a ham receiver which is among the best, and of which I am proud. Why don't you make one? But you had better hurry, before they completely shut off the supply of parts to us home-brewers! — Gene Darlington, W6TTS (ex-W2ALP, 3A1J), 1016 Masonic Ave., Albany, Calif. 94706.

MORE ON THE TRIBAND ONE-LOOP QUAD ELEMENT

Technical Editor, *QST*:

I am sure that many readers would be interested in the following information supplementing my article on page 50 of March 1969 *QST*, describing the triband one-loop cubical quad element. This information describes the principle and some possible applications, besides those shown in the article.

¹ See the feedback note, page 58 of this issue. — Editor.

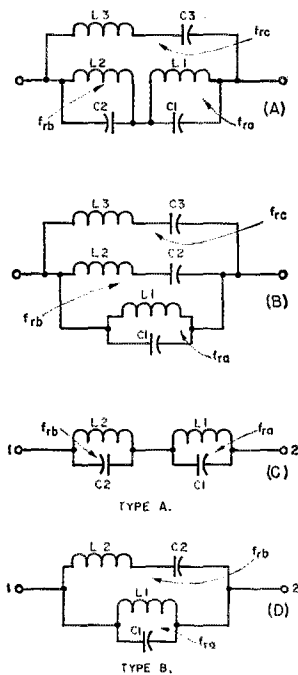


Fig. 2—Three-frequency tuned circuit

There are two forms of three-frequency tuned circuits, as shown in Figs. 2A and 2B. Three simultaneous resonances, f_{ra} , f_{rb} , and f_{rc} , occur for any $L_1 C_1$, $L_2 C_2$, and $L_3 C_3$ value combination. The two versions give similar results. The three resonances are not necessarily harmonically related, nor do they have to be evenly spaced in the spectrum. All resonances may fall within a frequency ratio of less than 1:2, or greater than 1:3.

The series-tuned circuit, $L_3 C_3$, of the Type-A or Type-B version can be replaced by any dipole form, like a simple dipole, the element halves of a Yagi beam, a single loop of a cubical quad, and the radiator and radials of a ground plane antenna. The dipoles are connected to points 1 and 2 of the tuning section, as shown in Figs. 2C or 2D.

Typical conditions are given below.

f_{rb} : Resonant frequency between high-frequency band and medium-frequency band (without dipole).

f_{ra} : Resonant frequency between medium-frequency band and low-frequency band (without dipole).

f_{rc} or dipole: Resonance (without triband tuning section) between medium-frequency band and about 80% of low-frequency band.

Perhaps this information will encourage the experimenter to go on from here. — H. F. Ruckert, VK2AOU, 25 Berrille Rd., Beverly Hills, N.S.W. 2209, Australia.

**SWITCH
TO SAFETY!**



Mobile Whips And Corona

BY B. J. BITTNER,* KØWQX

The increased power levels on 160 meters and the availability of kilowatt-level mobile equipment for other bands brings up the old problem of corona around the mobile whip. Some practical examples and solutions are discussed.

As mobile rigs increase power a point is reached where any additional power is simply pumped into corona because of the limits of antenna size and the voltage breakdown potential of air.

With the increased use of 160 meters for mobile operation, this problem suddenly becomes one of practical importance. For example, on 160 meters, the corona limit for a 1/8-inch diameter whip 10-feet long is about 25 watts. On 75 meters the problem is somewhat relaxed, as a 1/8-inch diameter whip 10-feet long can handle about 200 watts. Amateurs should experience no difficulty on 20 meters as an output power of 7 kw. is required to produce corona.

Fig. 1—A method of effectively increasing power-level capability of a whip antenna. The added trailing wire is wrapped around the whip at both ends. Make smooth joints and cover joints with good electrical tape. Be sure there are no sharp edges or projecting points. Note: this modification will change antenna tuning and unfortunately increase air drag.

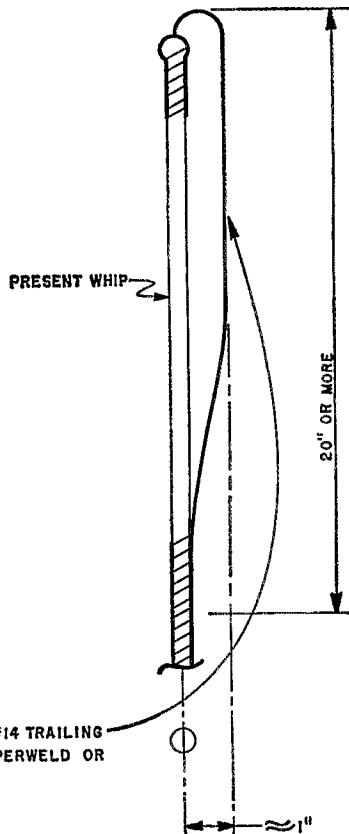
With higher output powers than those specified, it is possible to watch the corona glow on a dark night. Except for the impressive display for the YL or a startled motorist, the producing of corona won't help your signal. The production of corona is actually a waste of power. Not only does the onset of corona detune the antenna, but it also creates significant harmonic radiation. If you do suspect any corona, it is wise not to transmit in an explosive atmosphere.

Other factors also contribute to corona. At typical Colorado 10,000-foot elevations the corona power level decreases to 56% on a hot day and to 58% on a cold day.¹ A cold, snowy day tends to reduce the maximum usable power even more.

W8ULD/Ø has observed corona on his 160-meter center-loaded whip at power levels of less than 50 watts just south of Denver. I have heard (corona isn't visible during the day) my whip's corona in Loveland Pass on 75 meters with about 80 watts output. This latter observation I feel certain was aided by the static gradient which is determined primarily by the existing weather conditions.

*Route 4, Black Forest, Colorado 80908.

¹Watt, A. D., V.L.F. Radio Engineering, Pergamon Press, 1967.



Problems and Answers

(Continued from page 45)

Many times a sluggish crystal can be improved by the simple expedient of washing it. A crystal is held in place by two electrodes and as the crystal oscillates, it vibrates in these electrodes. Remove the crystal and electrodes from the holder and carefully wash them clean in soapy water and carefully dry them. Many crystals that don't oscillate at all have been returned to useful life by a careful washing.

Here is an example of the most frequently asked question: "I have decided to buy a transceiver and my choice has come down to either the Star Stream 300, the Arapahoe, or the Clunker 250. Which of the three would your staff recommend?"

It is easily understood that it can be quite difficult to make a choice from the many varieties of equipment that are offered in the amateur market, particularly for the newcomer. In fairness to all QST advertisers, and for other reasons, we have had to adopt a policy of not recommending one manufacturer over another.

The other reasons are even more valid than the one mentioned above. *What may be my preference may not be yours.* I may like a cabinet that is painted green, while you wouldn't give it house room. I may be a c.w. man, and would desire selectivity in reception that you could care less about, or vice versa. We could go on and on along these lines, but the point should be pretty clear. It may be a cliché but it certainly fits here — what's one man's meat is another man's poison.

The thing to do before choosing a piece of gear is to decide what your preferences and needs will be and then try to fit them in your choice. Generally speaking, the quality of an article is closely reflected in its price. Also, certain features in a product may appeal to one person and not another.

One piece of advice we can offer: Once you have made a decision, don't worry about it. Nearly all hams go through a buying and swapping and changing period before they settle on a more or less semipermanent station. As one ham once said, "After all, you aren't buying a coffin!" QST

Strays

Want up-to-the-minute, on-the-scene dope on Apollo space launches? Listen one hour prior to all Apollo launches, 80 through 10 meters (including the Novice band) for WB4ICJ, the Space Center Amateur Radio Society. The station is located inside the Kennedy Space Center Area. A special certificate is sent to all stations who QSL after contacting the club station during a lunch period. The station usually stays on the air for several hours after a launch.

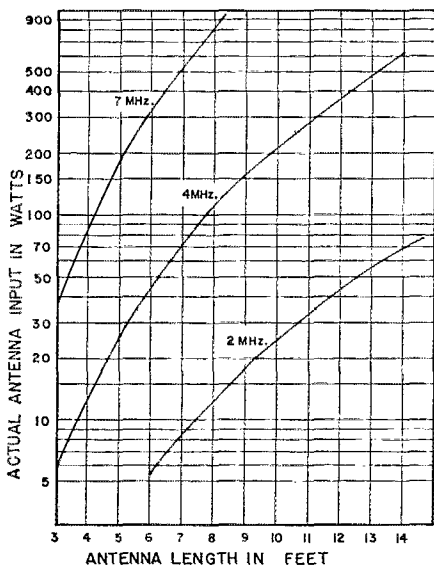


Fig. 2—Acceptable antenna power versus antenna length for a given frequency with a 1/8-inch diameter whip. For a 1/4-inch diameter whip multiply the power scale by 2.8.

You're probably wondering how you can find out if you're having corona difficulties. The easiest technique is to initially tune up your transmitter at a low power level. Then apply full power to the rig. If the transmitter's tank circuit is no longer tuned to resonance, chances are you're probably having corona problems.

Just what can be done about this problem? The easiest way out is simply to learn to live with the problem. A more positive approach is to increase the effective diameter of the whip antenna near its top as is shown in Fig. 1. Another method of increasing the top diameter of the whip is to place a larger conducting ball on the top of the whip than was originally present. In a recent test, when a 1/2-inch diameter ball was placed atop a whip, all corona effects that occurred with a 1/4-inch diameter ball were eliminated. Feeding two or three antennas in parallel would also eliminate the problem but brings up the additional problem of mounting the antenna system as well as matching it to the transmitter. Still an additional alternative is to tape or encase the whip in a good tight dielectric cover which can be replaced every couple of months as a safety measure since even slight corona will create a highly corrosive environment that will attack both the whip and the dielectric.

Fig. 2 represents a simple approximation of power versus antenna length and frequency. Factors such as altitude, rough surfaces and sharp edges on the antenna, or snow all tend to make the graph rather optimistic. On the other hand, such factors as the I^2R losses in the antenna and antenna tuner may reduce the actual power level considerably more on 160 meters than does corona. QST



Hints and Kinks

For the Experimenter



INDUCTIVE ATTENUATOR

A CAPACITIVE attenuator for use between v.h.f. transmitting converters and high power h.f. s.s.b. transmitters is shown on page 89 of *QST* for December 1967. I have seen this circuit and resistive ones many times. However, I use one which costs no money and is adjustable to boot. In fact, it is built inside the transmitting converter itself, needing no enclosure of its own. As shown in Fig. 1, it's essentially an inductive tap. The links are bent together or spread apart until the converter receives the proper amount of drive. — *Roy C. Koeppe, K6KOL*

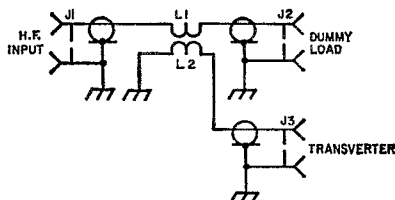


Fig. 1—An adjustable attenuator for use between h. f. exciters and v.h.f. transmitting converters.

J1, J2, J3—Coaxial receptacle (SO-239).

L1, L2—One- or two-turn links of hookup wire, the size of the loops and the spacing of the coils depending on the amount of drive required. See text.

VIKING INVADER-2000

ABOUT six months ago my Viking Invader-2000 blew the fuse in the low-voltage bias supply. After the fuse was replaced, the p.a. meter hit the pin when the p.a. filaments were turned on, and after a few seconds the replacement fuse blew.

The trouble was traced to a grid-to-filament short in one of the PL-175A p.a. tubes. The short did not show up when the tube was tested with an ohmmeter.

To solve the problem, the control grid lead was removed from the socket containing the shorted tube, and filament voltage was applied. Two test leads were then connected to the a.c. line. After the lead going to the ground side of the line was connected to the Invader chassis, the test lead connected to the hot side of the a.c. line was momentarily touched to the grid pin of the tube socket. A large flash occurred; however, when the lead was touched a second time, no flash was noted.

The grid lead was reconnected to the tube socket, and filament voltage applied. This time no short was evident. The tube has now been operating for over six months and appears to be running normally so far.

Incidentally, with no noticeable difference in performance, 4-400A tubes may be substituted for the more expensive PL-175A tubes in the Viking Invader-2000. However, a 4-400A should not be paired with a PL-175A or an unbalance will occur. — *R. F. Herbig, W6ME*

CAPACITANCE MEASUREMENTS

THE measurement of high capacitance, as described in the article "Simple Measurements of High Capacitance" in *QST*, January 1969, may be made even simpler if the multiplying factors given in Table I of the article are multiplied by a factor of $\log_0 0.37 / \log_0 0.50 = 1/0.692 = 1.44$. A revised table is shown below. It gives multiplying factors which may be used with a voltage that is 50 percent of the initial voltage, rather than 37 percent, thereby reducing the required mental arithmetic.

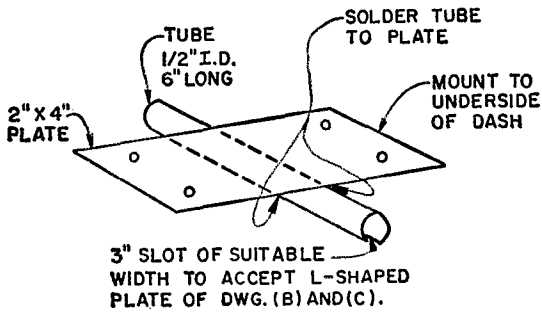
Adopting the author's example, with the switch closed, the meter reads 40 volts. The switch is then opened. It is found that the voltage drops to 20 volts (50 percent of 40) in 17 seconds. From the revised Table I, the multiplying factor is found to be 1.2. Therefore, the capacitance is $17 \times 1.2 = 20$ (approx.) microfarads.

May I also mention that the value given in the original table for a 1.5-volt scale and a 50K-ohm, volt meter resistance is incorrect. The value given is 6.65; it should be 13.3. — *Nathan M. Reiss, W2PVQ*

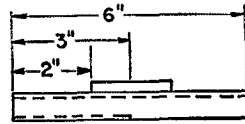
TABLE I

Volt. Scale	Meter Resistance (Ohms/Volt)			
	1K	10K	20K	50K
1.2	1200	120	60	24.05
1.5	960	96	48	19.2
2.5	576	57.6	28.8	11.52
3	480	48	24	9.58
5	288	28.8	14.4	5.76
6	240	24	12	4.8
10	144	14.4	7.2	2.88
12	120	12	6	2.4
15	96	9.6	4.8	1.92
50	28.8	2.88	1.44	0.576
60	24	2.4	1.2	0.48
100	14.4	1.44	0.72	0.288
150	9.6	0.96	0.48	0.192
250	5.76	0.576	0.288	0.115
300	4.8	0.48	0.24	0.096
500	2.88	0.288	0.144	0.058

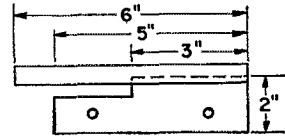
μf. per second



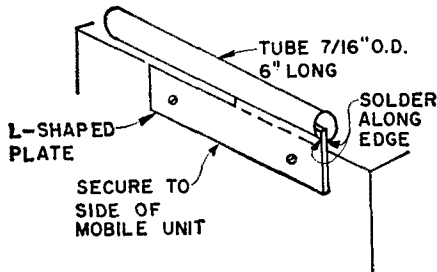
(A)



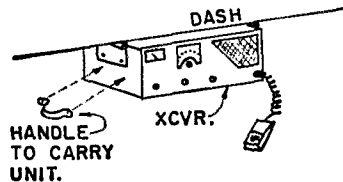
SIDE VIEW OF DASH BRACKET



SIDE VIEW OF XCVR. BRACKET



(B)



(D)

Fig. 2—Details of the mobile mount. Four brackets are needed: two copies of the one shown in drawing A and two copies of the one shown in drawing B. Drawing C shows a side view of the bracket, and drawing D shows how a typical installation looks after a transceiver has been slid in place under the dash. For ease in soldering, copper or brass tubes and plates should be used to construct the mount.

MOBILE MOUNT

I LIKE to use the same transceiver in my car and at home. In order to quickly and easily install the rig in the car or remove it from the vehicle, I devised the mobile mount shown in Fig. 2. With this arrangement, for mobile operation it is only necessary to slide the rig into place once the feed line and power cable have been connected. — *E. McIvor*

NEW GAIN CONTROL FOR THE HW-12

USING a Heath HW-12 transceiver in my car, I found it impossible to communicate with other mobiles that were less than a few blocks away. Even with the r.f. gain control set at minimum, nearby stations overloaded the receiver. Analysis of the circuit showed that extremely strong signals should be handled successfully if the r.f. gain control was moved from the mixer and installed before the grid of the first r.f. stage. The following changes, which were suggested by W6TEE, have proven to be effective, and the modified circuit is not critical to operate.

First remove the existing r.f. gain control from the HW-12. Then tie together the three leads

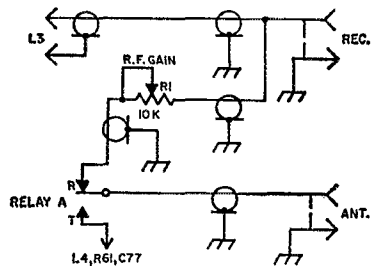
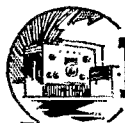


Fig. 3—Modified portion of the HW-12 for greater control of the receiver gain. R₁ is a 10,000-ohm control with a linear taper.

that were removed from the old control. This is the same as turning the old control fully on. Next install a 1000-ohm potentiometer in the location of the former r.f. gain control. Disconnect the coaxial cable from the receive terminal of the antenna relay and, as shown in Fig. 3, connect the new control between this cable and the relay. The difference in overload capabilities will amaze you. — *Jay O'Brien, W6GDO* (The current HW-12A uses a different r.f. gain control circuit and consequently has better overload capabilities. — *Editor*)

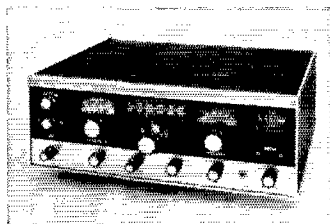


Recent Equipment



To acquaint you with the technical features of current amateur gear.

Galaxy R-530 Receiver



A PRODUCT that seems to have resulted from an extremely "ambitious" engineering effort, the Galaxy Electronics R-530 receiver is designed to give continuous coverage from 0.5 to 30 MHz. in 500-kHz. steps. Each 500-kHz. range is broken down into 1-kHz. increments which are read out on the skirt of the main-tuning dial. Though there are no integrated circuits used in this equipment it does use 52 transistors — bipolar and JFETs — and 35 diodes in its all-solid-state lineup. It is designed to receive upper- and lower-s.s.b., c.w., RTTY, and a.m. signals. Provisions exist for using four crystal filters, switchable from the front panel of the receiver. These filters are available in bandwidths of 0.5, 1.5, 2.1, and 5 kHz.

Though the R-530 could be classed a laboratory-type instrument it is likely to be a strong

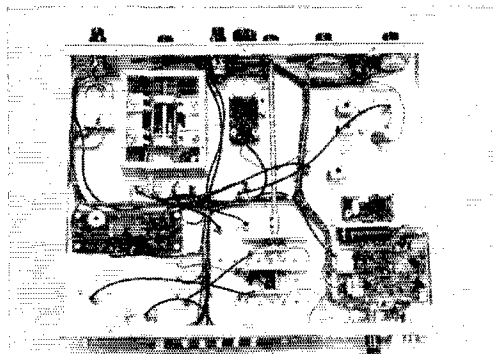
contender in the communications receiver market, both for commercial and ham radio applications. It is ruggedly built, and its cabinet is adaptable to rack-and-panel mounting should this be a requirement. It is supplied for table-top installation unless the rack-and-panel conversion kit, RPA-530, is specified by the purchaser.

Modular construction is used throughout the R-530, making servicing of the ten individual circuit boards a reasonably simple task. A voltage chart for the transistors is included in the operator's manual. If need be, any defective circuit board can be sent to the factory for repair or replacement, thus avoiding the necessity to ship the entire receiver. This feature saves wear and tear on the equipment while greatly reducing the shipping costs. Each module is shielded by its own metal box except for the audio/regulator and calibrate/a.v.c. boards. The signal-carrying leads between the modules are of coaxial cable and the interconnecting power leads are filtered at each subassembly by means of r.f. chokes or decoupling resistors, and feedthrough capacitors. The foregoing measures are important in the reduction of spurious responses.

Specifications

The manufacturer states that no more than 100 Hz. of drift occurs from the time the equipment is turned on, including any change in line voltage under 20 percent. Backlash is rated at less than 100 Hz., and the sensitivity is said to be 0.1 μv . for signal-plus-noise-to-noise ratio for s.s.b. reception. A 0.05- μv . signal is required for c.w. for the same conditions, and a 0.5- μv . signal is required for comparable performance during a.m. reception.

The R-530 comes equipped with a 2.1-kHz. crystal-lattice filter for s.s.b. reception. Its shape factor is 1.8:1. The three additional filters shown on the block diagram are available as accessories. Front-end overload is rated at 0.1 volt for 10 percent distortion on the signal. Third-order intermodulation distortion is suppressed in excess of 50 db. according to the specification chart. In excess of one watt of audio output is available with less than 10 percent distortion



Some of the module covers have been removed to expose the circuit boards in this bottom view of the receiver. The p.t.o. board is at the top center. The small board at the right-center area of the chassis is part of the phase-lock oscillator. Directly below it is the large audio amplifier and power-supply regulator board. It, and the calibrate-a.v.c. board at the left-center of the chassis, do not have shield covers. Coax cable connects the various modules and reduces radiation and spurious responses.

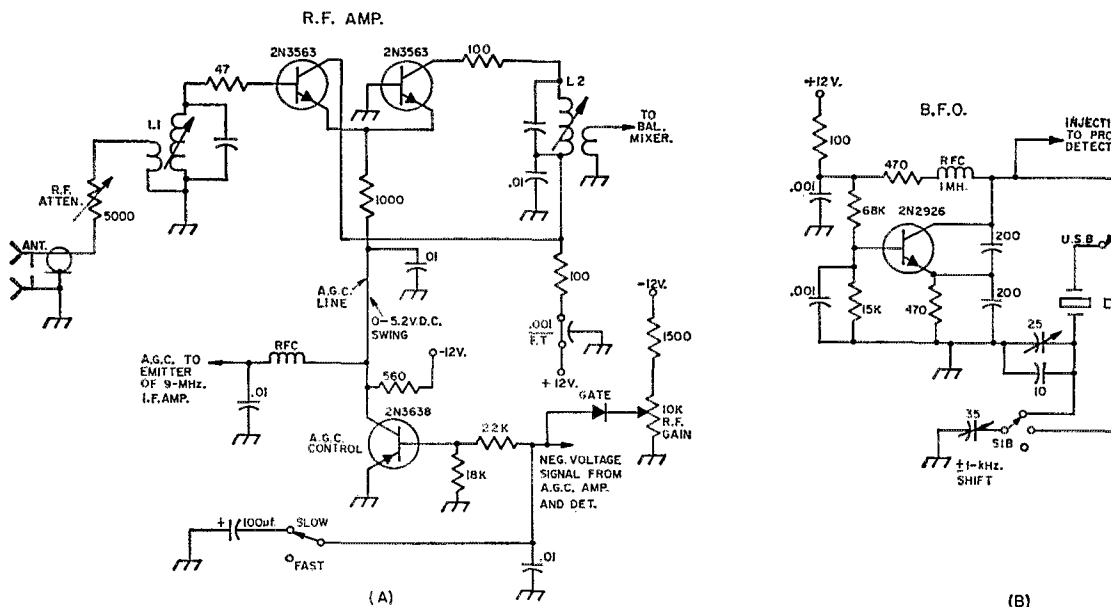


Fig. 1—At A, the r.f. amplifier, its input and output circuits, and the a.g.c. control stage. L_1 and L_2 are selected by a band switch. They are ganged and are permeability-tuned. A 47-ohm base resistor and a 100-ohm collector resistor act as parasitic suppressors to stabilize the amplifier. Slow a.g.c. is made possible by switching a 100- μ f. capacitor in parallel with the bias line to the a.g.c. control transistor. The r.f. gain control varies the bias on the a.g.c. control stage, thus changing the gain of the r.f. amplifier. At B, circuit details for the 9-MHz. b.f.o. A 35-pf. variable capacitor is adjustable from the front panel to permit a ± 1 -kHz. "rubbering" of the b.f.o. crystal in use. This provides passband tuning.

control which is adjustable from the front panel. Under normal conditions the blanker is disabled.

I.f. selectivity is provided by any one of four crystal-lattice filters which follow the h.f. mixer. These filters are selectable from the front panel of the R-530. Each filter is used independently except for the 0.5-kHz. unit. When it is switched into the circuit it is placed in series with the 2.1-kHz. filter, and a filter-amplifier stage is connected in the line also.¹ The amplifier is used to compensate for the insertion loss caused by

¹ Not shown as series-connected on the block diagram for reasons of simplification in the drawing.

the addition of the extra filter. By placing the two filters in series the spurious responses adjacent to the skirt of the response curve of the 0.5-kHz. filter are knocked down to an acceptable level. A three-stage 9-MHz. i.f. amplifier follows the filters, and one stage is a.g.c.-controlled, as mentioned earlier.

A two-diode product detector is used for c.w., RTTY, and s.s.b. reception. It receives its b.f.o. signal from a crystal-controlled 9-MHz. oscillator. The b.f.o., Fig. 1B, has crystals for upper- and lower-sideband reception, plus a variable capacitor which "pulls" either crystal over a

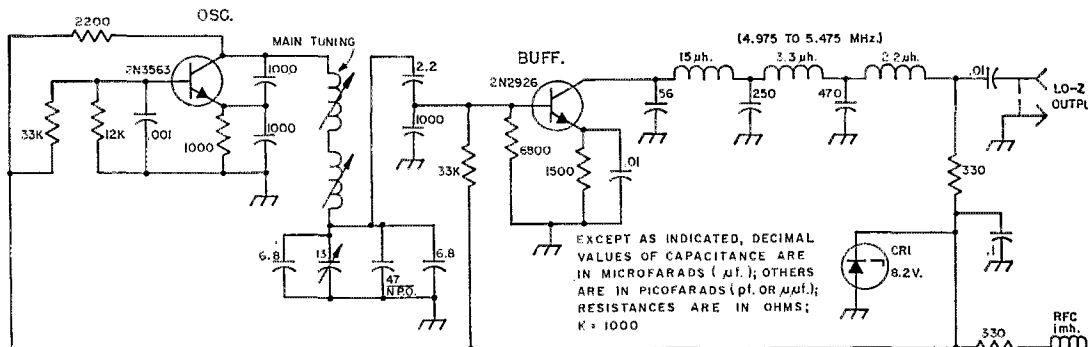


Fig. 2—The circuit shows how Galaxy reduces the spurious output from its p.t.o. The collector tank of the buffer stage consists of a double pi-section tuned circuit which is followed by an L-network. This low-pass filter attenuates harmonic currents by 35 db. or more, providing pure output at the desired frequency. R.m.s. output from this p.t.o. was measured at approximately 0.1 volt using a Heath v.t.v.m. and r.f. probe.

\pm 1-kHz. range to provide passband tuning. This capacitor is adjustable from the front panel of the receiver. During a.m. reception the b.f.o. is disabled, as is one of the detector diodes, to permit normal reception of that type of signal. Output from the detector is amplified by a four-stage RC coupled audio circuit which uses a complementary-symmetry pair in its output. The audio circuit has outputs for 8 ohms, unbalanced, and 600 ohms, balanced.

A db. meter is included in the circuit of the R-530 and is operated by a d.c. amplifier which is controlled by the a.g.c. voltage. The meter is calibrated from 0 to 80 db. in steps of 10 decibels for r.f. purposes. It can be switched to read audio and is calibrated for -6 to +4 dbm.

An a.c.-operated power supply is included in the receiver and delivers a regulated plus and minus 12 volts. For d.c. operation it is necessary to provide a positive and a negative 18-volt supply which can be attached to the receiver at the rear apron of the chassis. The R-530 can be operated from the 230-volt mains by changing the wiring in the power plug.

Physical Characteristics

In this writer's opinion, this receiver reflects a new and significantly improved appearance for the Galaxy line. Housed in all-metal cabinet, this ruggedly-built piece of equipment should be durable enough to withstand many years of normal use. Its removable side panels are made from $\frac{1}{8}$ -inch thick aluminum plate. The top and bottom covers are fashioned from heavy-gauge aluminum sheeting. The main cabinet parts are painted with black wrinkle finish, while the front panel is set off in gloss black with satin-aluminum and gold trim. The knobs are black and have aluminum inserts. All things considered, the equipment has a very professional appearance.

Some Other Features

Fast and slow a.g.c. response can be selected from the front of the receiver. Also adjustable from the front of the equipment is an r.f. attenuator control which is in series with the antenna at the input of the R-530. This provision gives the operator some 0 to 20 db. of control over the input signal *before* it reaches the front end, a most useful feature when dealing with extremely strong local signals.

Accessible from the rear of the receiver are some spare jacks, v.f.o. input and output jacks, a detector output jack, and terminals for receiver muting, a.g.c., and 12 volts d.c., both plus and minus.

Peaking of the front end is accomplished by the PRESELECTOR TUNING control. This is a high-Q, ganged, permeability-tuned system which has a dial presentation calibrated in MHz. A band switch selects the desired tuning range. A very pronounced increase in sensitivity is noted when the tuning control is properly adjusted.

The main tuning dial has a fast and a slow

Galaxy R-530 Receiver

Height: 6 inches.

Width: 17 inches.

Depth: 14 inches.

Weight: 25 pounds.

Power Requirements: 115 or 230 volts a.c., 50-60 Hz., 25 watts, or 18 volts d.c., 600 ma.

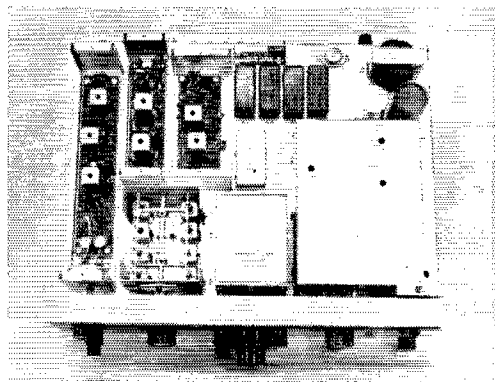
Price Class: \$700.00.

Manufacturer: Galaxy Electronics,
Council Bluffs, Iowa.

tuning rate. The smaller knob is the vernier control. Both knobs are somewhat smaller in size than one would expect if complete ease of tuning were a major consideration. Both knobs turn quite stiffly, which may be somewhat of a deterrent when it is necessary to tune rapidly from one end of a 500-kHz. segment to the other. Also, the fiduciary, which is located above the fast-tuning knob, can easily be bumped out of calibration by the operator's fingers during rapid tuning excursions if the fast-tuning knob is not carefully engaged.

Observations

As might be expected of any communications receiver which employs the multiple-conversion technique, some spurious responses showed up in the tuning range. There are two "birdies" in each 500-kHz. tuning range, both occurring at the same dial settings in each range. Fortunately, they are low enough in amplitude so as



The covers have been removed from some of the modules to expose the circuit boards in this top-chassis view of the R-530. The 9-MHz. i.f. strip can be seen along the left side of the chassis. Immediately to its right, near the front panel, are eight permeability-tuned transformers which are gang-tuned from the front panel for preselector peaking. To the right of the i.f. strip, at the rear of the chassis, is the premixer assembly. The h.f. mixer circuit board is to the immediate right of the premixer. Four crystal-lattice i.f. filters are visible at the rear-center of the chassis. The three modules with their covers still in place are the balanced mixer (center), p.t.o. (front center), and the phase-locked oscillator (lower right of photo).

to pass almost unnoticed in the presence of normal atmospheric noise when the antenna is connected.

On-the-air tests indicated that the manufacturer's performance claims were well justified. Good sensitivity, image rejection, and outstanding frequency stability were noted. Laboratory tests further substantiated the manufacturer's performance specifications.

This receiver should appeal to v.h.f. and u.h.f. operators because of its excellent frequency stability, low-noise characteristics, 500-kHz. tuning ranges, and good sensitivity. The availability of the 5-kHz. i.f. filter should appeal to those operators who are using a.m. Few modern-day receivers have provisions for good a.m. reception, while at the same time providing for c.w. and s.s.b. selectivity. During tests with a 2-meter converter (28-MHz. i.f.), all indications were that this was one of the best receivers for the application to be tried by this writer. The noise blanker, of course, is another major consideration if good v.h.f. reception is to be had.

The instruction book carries a complete set of specifications for the receiver, a troubleshooting/alignment section, and a complete parts list. The explanation of the circuit and how it operates is quite vague, the major discussion being centered around the phase-lock frequency synthesizer. Some difficulty was encountered in trying to identify the various transistors, as to their function, while tracing the circuit on the diagram furnished with the unit. This large blueprint could be made less difficult to decipher if more labels were added to it.

Whether used as a piece of laboratory test equipment, or as a full-fledged communications receiver, this unit should satisfy most requirements set by either type of user. — *WICER*

Strays

Feedback

Unfortunately, a letter disappeared somewhere along the line from the call of a "Silent Key" that ran in the March 1969 issue of *QST*. Edward B. Yorty's call should read K8JQP, not K8QP.

In the article, "The W5OMX Communications Receiver," January 1968 *QST*, the second crystal frequency listed in the table for Y_1 in the 10-meter range, should be 32.5 MHz., instead of 33.5.

The labels on S_1 in Fig. 1 of the article "A 2-Meter Transmatch With S.W.R. Indicator," March 1969 *QST*, were inadvertently reversed. Change FWD. to REF. and vice versa.

If you're having trouble getting enough control range in the gated amplifier of the frequency counter described in October 1968 *QST*, Fig. 7 on page 15, lift the V_{2B} 50K cathode resistor from ground and connect the lower end to pin 3 of V_{2A} . Also, a 6200-ohm 1-watt resistor between the negative terminal of C_2 and the lower end of the 4000-ohm control will "handspread" the control action. These changes are from the author, VE3CUS.

Silent Keys

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

- ex-1CSM, Winthrop R. Martin, Littleton, Mass.
- W1GCF, John F. Howard, Peabody, Mass.
- K1MVA, Julian Rickett, Manchester, N. H.
- W1SEO, Dr. John F. Daly, Richmond, Vermont.
- K2CEM, Kurt Treptau, Palm Harbor, Florida.
- W2CSC, Thomas B. Millsbaugh, Nyack, N. Y.
- W2DH, Haines Lippincott, Morristown, N. J.
- W2EEB, Donald M. Stephens, Rochester, N. Y.
- W2JHF, Stanley P. Bird, Scotch Plains, N. J.
- W2LHN, Harold Dann, Lakewood, N. J.
- W2NWM, Dr. Z. John Vaclavik, Binghamton, N. Y.
- ex-W2UC, 31F, Earle Godfrey, Margate City, N. J.
- W2UYU, Wilbur B. Sommer, Beachwood, N. J.
- W3EEY, D. C. Schattschneider, Bethlehem, Pa.
- W3GBE, J. Curtis Crawford, Rochester, Pa.
- W3HAT, Griffith Seehler, Allentown, Pa.
- W3LNV, Francis N. Kacsmar, Munhall, Pa.
- W4BAM, Jack E. Inman, Sr., Middleboro, Ky.
- WB4DFA, John R. Hanson, Holly Hill, Florida.
- W4DG, Hubert J. Mervin, Knoxville, Tennessee.
- W4ETD, Terrence Biggs, Orlando, Florida.
- K4FH, Tom G. Seese, Sr., Savannah, Georgia.
- K4HKN, Rev. Wallace Lesley, Seneca, S. C.
- W4KWB, Oscar L. Miller, Seneca, S. C.
- K4LC, Glenn W. Curtiss, Holiday, Florida.
- W4LYN, Thomas Lookabill, Thomasville, N. C.
- W5AOX, Clarence W. Standridge, Lexington, Okla.
- W5A5SH, C. R. Sandlin, Harlingen, Texas.
- W5ANDW, Emick J. Lantier, Lafayette, La.
- K5QEE, James Smith, Enid, Oklahoma.
- W5WE, Henry W. Hall, Sr., Beville, Texas.
- W6NAL, Roy E. Butler, San Diego, California.
- W6AZQ, Edward E. Hall, Oildale, California.
- W6BSN, William P. Corbett, Fullerton, Calif.
- W6DSE, Donovan L. Thompson, Corona, California.
- W6JSY, Elwin L. Johnson, Eureka, California.
- K6RAJ, Charles H. Zaverl, Arlington, California.
- WA6YPF, Carlos Swenson, Fresno, California.
- W7ANL, William Cooper, Shelton, Washington.
- W7FCJ, Francis E. Hall, Spokane, Washington.
- W7GBJ, William R. Hirt, Orinda, California.
- W7LUN, Wilbur O. Boswell, Tucson, Arizona.
- K7RYZ, John Givens, Seattle, Washington.
- K7YMB, Howard Pate, Bellingham, Washington.
- W8BVB, Ray Arnold, Sutton, West Virginia.
- W8CSN, Dr. Walter C. Breth, Chillicothe, Ohio.
- W8GXK, Paul Guenther, Canton, Ohio.
- K8JID, Oralace Lavender, Coldwater, Michigan.
- W8SIW, Herbert E. Strong, Brecksville, Ohio.
- W8TIN, Darrell W. Hugan, Clio, Michigan.
- K8UJX, Raymon Hamer, Ovid, Michigan.
- W8VDF, Valentine Breynak, Tiffin, Ohio.
- K8YQB, Grant K. Eaton, Coldwater, Michigan.
- K8YVZ, William Green, Canton, Ohio
- W9AFG, John Sabol, Jr., Calumet City, Ill.
- W9CZN, Harry W. Stingley, Chicago, Ill.
- W9HOV, William Roberts, Dolton, Ill.
- W9REA, John Handel, Plainfield, Ill.
- W9SIE, John J. Mazurkiewicz, Kenosha, Wisc.
- K9ZLQ, Charles E. Mattern, Plymouth, Indiana.
- K9BEC, William Crawford, Cedar Rapids, Iowa.
- W0LYV, Mike T. Harney, Louisville, Colorado.
- G6CL, John Clarricoats, London, England.
- VE3FKH, Rev. C. C. Gilbert, Beamsville, Ontario, Canada.
- KP4BZ, Victor D. Cifuentes, Rio Piedras, San Juan, Puerto Rico.
- VE5CQ, Gerald H. Paul, Melfort, Saskatchewan, Canada.
- VE5FG, Donald L. Shelton, Moose Jaw, Saskatchewan, Canada.
- VE5HW, Raymond Lasco, Yorktown, Saskatchewan, Canada.
- VE5NJ, Joseph Foster, Kerrobert, Saskatchewan, Canada.
- 6Y5GG, Gregory LaGrenade, Kingston, Jamaica.
- VE7AD, J. G. Riley, West Vancouver, B. C., Canada.

RULES For The 1969 ARRL Field Day

Annual Test for Emergency-Powered Stations, June 28-29

TIME to dust off the generator (or find one), stock up on insect repellent, and get your club cracking—it's almost June, and that means Field Day. There is only one significant change in the rules for this year's FD: the limited setup-time proviso is now optional rather than mandatory. If you choose to honor it, then you may operate all 27 hours; if you set up beforehand, however, you may operate no more than 24 consecutive hours of the allotted 27.

Field Day is what you make it. It can be an exercise in emergency preparedness, or a training session for neophyte operators, or a contest pure and simple, or just an excuse to have a lot of fun! But keep the following in mind:

To keep on good terms with ARRL and FCC, logs must be kept in GMT for cross-checking purposes, portables must be logged as such in your entry, do *not* send your original FCC/DOT log as your entry and last (though not least), odds are in favor of Murphy striking, so plan ahead!

ARRL Field Day forms are now available from the Communications Department, ARRL, 225 Main Street, Newington, Connecticut 06111.

All entries must be postmarked no later than July 27 for QST listing. Try to submit your FD photos along with your entry. *GL!*

Rules

1. Eligibility: The Field Day is open competitively to all amateurs in the ARRL Field Organization (plus Yukon and N.W.T.). Foreign stations may be contacted for credit but are not eligible to compete.

2. Object: For portable and mobile stations, to work as many stations as possible. For home stations, to work as many portable and mobile stations as possible.

3. Conditions of Entry: Each entrant agrees to be bound by the intent as well as the provisions of these rules, the regulations of his licensing authority and the decisions of the ARRL Contest and Awards Committee.

4. Entry Classifications: Entries will be classified according to the number of transmitted signals simultaneously on the air at any one time, followed by designation of the nature of the individual or group participation, as follows:

a. *Class A.* Club or non-club group (3 or more licensed amateurs) portable stations set up specifically for operation in the Field Day. Such stations must be located in places which are *not* regular permanent or licensed amateur station locations, operated under one call and under the control of a single licensee or trustee for each entry. All control locations for equipment operated under a single call must lie within a circle whose diameter does not exceed 1000 feet.

b. *Class B.* Non-club portable stations operated by not more than two licensed amateurs. Other provisions same as for Class A.

c. *Class C.* Stations located in vehicles capable of operation while in motion and normally operated in this manner, including antenna. Class C stations may operate stationary, but no stationary equipment or facilities may be used. A Class C station may not be used as a Class A station.

d. *Class D.* Stations operating from permanent or licensed station locations, not portable or mobile.

5. Field Day Period: Field Day operation starts at 1900 GMT the fourth Saturday of June and lasts until 2200 GMT the following Sunday, a period of 27 hours. Entries that do not begin any setting-up operations until 1900 GMT on Saturday may operate the entire duration of the contest; others may operate no more than 24 consecutive hours.

6. Bands: Each phone segment and each c.w. segment is considered as a separate "band." All forms of voice contact will be considered *phone band* contacts, in the voice segments in which they are allowed. C.w. and RTTY will be considered "c.w. band" contacts. The same station may be worked on each band. Cross-band contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited.

7. Exchanges: Stations making contact, in order to count their contact as valid, must exchange ARRL Section (see p. 6, QST) or specific location.

8. Valid Contacts: A valid contact is defined as a two way *exchange* (see Rule 7, above) between stations, Class A, B and C stations may contact *any* other amateur station. Class D stations may contact any Class A, B or C station. Stations may be worked only once in each "band" (see definition, Rule 6).

(do not write above this line)

ARRL Field Day

FIELD DAY CALL USED (Indicate portable), W1CW/A, F.D. LOCATION, Eden's ELEVATION, CONNECTICUT

ENTRY CLASS (check only one)

A. Club or non-club group portable (Club or group name, MURPHY'S MARAUDERS)

B. Non-club portable (1-2 ops.) (NUMBER OF TRANSMITTERS IN SIMULTANEOUS OPERATION) 4

C. Mobile (If Class B, call(s) of operator(s))

D. Home station

The number of people participating at this station, 17

CHECK POWER SOURCE: Generator Commercial mains Battery Other

Description of power source (generator type, etc.), MITSUBISHI GENERATOR

BAND	HR. QST	Independence of Mains multiplier	A.C. INPUT multiplier	Score	Transmitter	D.C. INPUT
30 p.w.	108	x 3	x 2	648	32V3	150
25 ph.	267	x 3	x 2	1602	5B-101	90
20 c.w.	415	x 3	x 1	1245	614G-813	400
10 ph.	93	x 3	x 3	837	5B-34	50
20 c.w.	205	x 3	x 2	1230	RANGER	75
20 ph.	87	x 1	x 1	87	SWAN 500	250
10 ph.	70	x 3	x 3	420	5B-34	50
2. mfrs	32	x 3 x 1.5	x 4	576	HW-30	5
TOTAL	1277	TOTAL QSOs		6645	CLUB SCORE	

Check and attach proof(s) of claimed bonus points, to be added to score at ARRL Hq.

100% Emergency Power (200 pts.) Purity Message Cris. Messages (10 pts/tdg., maximum 200)

This certifies that the station whose call appears above was operated in accordance with the current Field Day rules (see May QST) and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

6/25/68, date S. H. WAXY, signature/call club president

Be sure to attach logs, proof(s) necessary for bonus points, snapshot, photos and send promptly to ARRL Headquarters, 225 Main Street, Newington, Connecticut, U.S.A. 06111.

FD-606 (1968) Printed in U.S.A.

Entries must be accompanied by this summary sheet. You may obtain the summary shown here plus log forms free on request from ARRL, or prepare a facsimile. Attach logs of all Field Day contacts and copies of all messages received and relayed. Furnish publicity proof if applying for Spirit of Field Day bonus as well as a copy of your message origination.

9. Miscellaneous Rules:

a. Operators participating in the FD may not, from any other station, contact the FD portable station of a group with which they participated. This is intended to outlaw any kind of "manufactured" contact.

b. A station used to contact one or more FD stations may not subsequently be used under *any other call* during the FD period. This rule is intended to outlaw multiple contacts on the same band with the same station using different calls.

10. Scoring: Scoring is based on the number of valid contacts times the power multiplier times the independence-of-mains multiplier, times the battery multiplier, plus bonus points. The following are multipliers and bonuses:

a. *Power.* For each contact made using output stage plate (collector) d.c. input power of 10 watts or less, multiply by 4. Over 10 watts up to 50 watts, multiply by 3. Over 50 watts up to 200 watts, multiply by 2. Over 200 watts up to 1000 watts, multiply by 1. Over 1000 watts, multiply by *zero!* Power on s.s.b. phone is considered to be half the peak envelope power: that is, 100 watts p.e.p. would take the 50-watt multiplier. Where various powers are used, each contact must take only the multiplier for that particular contact.

b. *Independence from Mains.*

(1) Contacts made with both transmitter and receiver operating from power source independent of commercial mains take an additional multiplier of 3.

(2) Contacts in Classes B, C, and in 10-watt Class A (see Rule 4), made with battery power, take an additional multiplier of 1.5.

(3) Charging batteries from commercial mains while using them to operate equipment is *not* considered "independence from mains" or battery operation. However, batteries may be charged from an independent source while being used, or they may be charged from commercial mains while *not* being used.

c. *Bonuses.* The following points may be added to the score after all multipliers have been applied:

(1) *100% emergency power.* If all equipment and facilities at the Field Day site were operated during the entire FD period by emergency power independent of commercial mains, add 200 points per transmitter classification (See Rule 4). (Example: Class 1A would get 200 points, Class 2A would get 400, Class 3A would get 600, etc.). This includes *everything*; keyers, refrigerators, lights, monitoring receivers, cooking, battery charging, etc.

(Continued on page 97)

SCORING EXAMPLES

A home station (Class D) uses a generator to power his transceiver. The station runs 120 watts d.c. input and 150 QSOs are made.

$$150 \times 2 \text{ (50-200 watts)} \times 3 \text{ (Independent power)} = 900$$

A one-man portable (Class B) makes 50 QSOs using a battery-powered 5-watt rig. He originates a FD message to his SCM.

$$50 \times 4 \text{ (under 10 watts)} \times 1.5 \text{ (battery multiplier)} \times 3 \text{ (independent power)} = 900$$

Bonus for 100% independence from commercial power (200 × 1)	200
Bonus for message origination	200
	1300

A small club mans one transmitter in the field, runs 40 watts d.c. input and uses commercial power exclusively. 400 stations are worked.

$$400 \times 3 \text{ (10-50 watts)} = 1200$$

A club mans two transmitters simultaneously. One runs 8 watts d.c. input, powered by batteries and makes 70 QSOs. The other station runs at 180 watts input, generator powered, makes 300 QSOs. No commercial power on site. No FD traffic, no publicity.

$$70 \times 4 \text{ (under 10 watts)} \times 1.5 \text{ (battery multiplier)} \times 3 \text{ (independent power)} = 1260$$

$$300 \times 2 \text{ (50-200 watts)} \times 3 \text{ (independent power)} = 1800$$

Bonus for 100% emergency power (200 × 2)	400
	3460

A home station (D) using commercial power and running 30 watts d.c. input works 200 FD portables.

$$200 \times 3 \text{ (10-50 watts)} = 600$$

A mobile (Class C) makes 60 contacts running 30 watts input. He originates a FD message, receives two and relays two.

$$60 \times 3 \text{ (10-50 watts)} \times 1.5 \text{ (battery multiplier)} \times 3 \text{ (independent power)} = 810$$

Bonus for 100% independence from commercial power (200 × 1)	200
Origination bonus	200
Receive/relay bonus	40
	1250

A large group in the field mans 6 transmitters simultaneously (Class 6A). Three setups run 30 watts input and make 350 QSOs, three run 150 watts input and make 600 QSOs. No commercial power on site, publicity supplied, a message originated, 4 received and 2 relayed by ham radio.

$$350 \times 3 \text{ (10-50 watts)} \times 3 \text{ (Independent power)} = 3150$$

$$600 \times 2 \text{ (50-200 watts)} \times 3 \text{ (Independent power)} = 3600$$

Bonus for 100% independence from commercial power (200 × 6)	1200
Publicity bonus	200
Origination bonus	200
6 rec./rel. @ 10/points	60
	8410

1969 Armed Forces Day Communication Tests



EACH year on the third Saturday in May, the Department of Defense sponsors the observance of Armed Forces Day. As a part of this observance the Departments of the Army, Navy and Air Force annually conduct communication tests designed to demonstrate to the world the close partnership and mutual respect enjoyed between U.S. amateur radio operators and the U.S. military. This year's program will be conducted on Saturday, May 17, 1969, and all licensed radio amateurs are encouraged to participate.

The radio amateur's contributions to communication training, international goodwill, military morale and emergency services are recognized by every echelon of the military services. The Armed Forces Day Communication tests are designed to be a tangible demonstration of the firm and long standing Department of Defense policy to encourage and support amateur radio activity. On this twentieth observance of Armed Forces Day, all radio amateurs are invited to participate and demonstrate to the world the close partnership and mutual respect that U.S. amateurs and U.S. military enjoy.

Once again this year, several military radio stations will participate in communication tests which include military-to-amateur crossband operations and receiving contests for both c.w. and RTTY modes of operation.

Special QSL cards confirming crossband communications will be forwarded to those amateurs who establish two-way contact with participating military stations. Certificates will be awarded to those who aptly demonstrate their operating ability and technical skill by receiving a perfect copy of the Secretary of Defense originated c.w. and/or RTTY message(s) transmitted during the receiving contest portion of the communication tests. Interception by short wave listeners will not qualify for a QSL card in confirmation of crossband communications. However, anyone who has the equipment and abilities may copy the Secretary of Defense messages and receive a certificate.

Military to Amateur Crossband Test

Military radio stations WAR, NSS, NPG and AIR will be on the air from 171400Z GMT to 180245Z GMT. During this test of crossband operations, the military stations will transmit on specified military frequencies while amateur stations will transmit in the indicated portion of the amateur bands. Contacts will consist of a brief exchange of locations and signal reports. No traffic handling will be permitted.

Station	Military Frequency kHz, unless otherwise noted	Emission	Appropriate Amateur Band (MHz)
WAR (Army Radio Wash., D.C.)	4001.5	c.w.	3.5-3.65
	4020	c.w.	3.65-3.8
	6992.5	c.w.	7.0-7.1
	7325	c.w.	7.1-7.2
	14405	c.w.	14.0-14.2
NSS (Navy Radio Wash., D.C.)	3385	c.w.	3.5-3.65
	4012.5	RTTY	3.65-3.8
	4040	l.s.b.	3.8-4.0
	7301	c.w.	7.1-7.2
	7336	l.s.b.	7.2-7.3
	7380	RTTY	7.0-7.2
	13940	RTTY	14-14.1
	14385	u.s.b.	14.2-14.35
	14400	c.w.	14.0-14.2
	21500	c.w.	21-21.25
	*143.820 MHz.	a.f.s.k. RTTY/a.m.	144.0-145.0
NPG (Navy Radio - San Francisco, Calif.)	4001.5	l.s.b.	3.8-4
	4005	c.w.	3.5-3.65
	4016.5	RTTY	3.65-3.8
	7301.5	l.s.b.	7.2-7.3
	7347.5	RTTY	7.0-7.2
	7495	c.w.	7.1-7.2
	13922.5	RTTY	14-14.1
	13975.5	c.w.	14.0-14.2
	14356	u.s.b.	14.2-14.35
	20954.5	c.w.	21-21.25
	21600	u.s.b.	21.25-21.4

* Provided it is consistent with operational and training commitments, this frequency will be keyed from a U.S. Navy aircraft flying between Washington, D.C. and Boston, Massachusetts during the major portion of the time allotted for military to amateur crossband contacts. The flight path will be over Baltimore, Philadelphia, New York City and Hartford, Connecticut. The call sign NSSAM will be utilized from the aircraft.

**143.700 MHz. a.m. 144-148
 #148.410 MHz. a.m./f.m./ 144-148
 a.f.s.k.

RTTY Receiving Contest

To be operated from Mt. Diablo.

** Provided it is consistent with operational and training commitments, this frequency will be keyed from a U.S. Navy aircraft flying between Los Angeles and Seattle during the major portion of the time allotted for military to amateur crossband contacts. The call sign NPGAM will be utilized from the aircraft.

Station	Military Frequency KHz, unless other- wise noted	Emission	Appropriate Amateur Band (MHz.)
AIR (Air Force Radio Wash., D.C.)	3347	RTTY	3.5-3.8
	3397.5	c.w.	3.5-3.8
	4025	l.s.b.	3.8-4.0
	6997.5	c.w.	7.0-7.2
	7305	l.s.b.	7.2-7.3
	7315	RTTY	7.0-7.2
	13995	c.w.	14.0-14.2
	14397	u.s.b.	14.2-14.35
	20994	c.w.	21.0-21.1

C.W. Receiving Contest

A. c.w. receiving contest will be conducted for any person capable of copying International Morse Code at 25 words per minute. The c.w. broadcast will consist of a special Armed Forces Day message from the Secretary of Defense addressed to all radio amateurs and other participants. The schedule for this broadcast is as follows:

Time	Transmitting Station	Frequencies (kHz.)
17 May 1969		
180300 GMT	WAR—Army	3347, 6992.5, 14405
172300 EDST	NSS—Navy	3385, 7301, 14400, 21500
171900 PST	NPG—Navy	4005, 7495, 13975.5, 20954.5
	AIR—Air Force	3397.5, 7315, 13995
	A6USA—Army Radio	6997.5
	San Francisco	

A RTTY receiving contest will be conducted for any individual amateur or station possessing the required equipment. This is a test of the operator's technical skill in aligning and adjusting his equipment, and serves to demonstrate the growing number of amateurs becoming skilled in this method of rapid communications. The RTTY broadcast will consist of a special Armed Forces Day message from the Secretary of Defense to all radioteletypewriter enthusiasts. The message will be transmitted at 60 words per minute in accordance with the following schedule:

Time	Transmitting Station	Frequencies (kHz.)
17 May 1969		
180335 GMT	WAR—Army	3347, 6992.5, 14405
172335 EDST	NSS—Navy	4012.5, 7380, 13940
172135 CST	NPG—Navy	4016.5, 7347.5, 13922.5
171935 PST	AIR—Air Force	3397.5, 7315, 13995
	A6USA—Army Radio	6997.5
	San Francisco	
	A5USA—Army Radio	4025
	Fort Houston, Texas	

Submission of Competition Entries

Transcriptions should be submitted "as received." No attempt should be made to correct possible transmission errors.

Time, frequency and call sign of the station copied as well as the name, call sign (if any) and address of the individual submitting the entry must be indicated on the page containing the text. Each year a large number of perfect copies are received with insufficient information, thereby precluding the issuance of a certificate.

Completed entries should be submitted to the Armed Forces Day Contest, Room 5A522, The Pentagon, Washington, D. C. 20315, and post-marked no later than 31 May 1969.

QST



May 1944

... K. B. reminds that thirty years ago this month (now 55 years ago) Hiram Percy Maxim came up with the idea from which stemmed the ARRL. More important, this month marks the centennial of the invention of the Morse Telegraph. It took Morse twelve years to accomplish the first New York-Washington transmission after he first conceived the idea. Up to that point he was an artist and today many of his paintings can be seen and enjoyed in the Museum at Cooperstown, N. Y.

... In another Editorial, the Editor lists the arguments so far set forth in the matter of low vs. high power. There are many specious arguments for both and nothing is settled—nothing was intended to be. The edge appears to be with the high-power boys in terms of numbers of letters received. The low-power proponents have yet to come up with a hard-headed conclusive argument. ... We note the passing of Dr. Eugene C. Woodruff, W8CMP. He was once the League's president as well as a teacher and inventor.

... Fundamentals of Wire and Tape Recording are given by D. W. Pugsley, of General Electric Company. He tells what goes on and how it works, illustrating his article with some diagrams and photos.

... The need for more WERS transceivers focuses attention on how one group put a school shop to good use. This story is well told by C. Irvin Metzger, W8FER, a resourceful instructor in Altoona, Penna. He set up this deal as a laboratory project for his students. The high status thus attained soon attracted additional funds and donations of equipment. He has a standardized two-tube rig and gives detailed instructions and drawings, as well as a photograph.

... Ha—another little bit of simple math, directed toward Bias Calculations. Edward M. Noll, Ex-W3FQJ uses nothing but arithmetic.

... For Portable Power Supplies for WERS, Frederick A. Long, ex-W8NE, makes use of a small motorcycle-storage battery and vibrator pack. This all fits into a carrying case 12 X 8 X 6 inches. Gives 300 volts.

... Some very pleasant reading in a yarn by "Sourdough" who tells what really happened "When Spring Came to Pine Notch."

... Thomas A. Garretson, W2ASB, is already thinking about the post-war antennas and describes some New Antenna Mast Designs.—W1ANA.

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY GEORGE HART,* WINJM

Getting Together

PUBLIC service through amateur radio is a universal aim. The League has always subscribed to it and indeed has been instrumental in effecting it to the extent it has been put into effect. In 1964, the Board of Directors at its annual meeting made it the League's No. 1 objective. Past issues of *QST* have carried hundreds of articles on the subject. Field organization has been set up and given funds to promote public service among the amateur operating fraternity, and considerable progress has been made, generally speaking, throughout the years.

Yet, in all the effort there has always been an undercurrent of division among our own ranks which has been troublesome. This division, boiled down to its essence, has revolved about the question: Is amateur radio a service in its own right (like the so-called common carriers, but restricted to volunteer emergency and backup) or is it merely a pool of raw communicators from which trainees can be recruited to fit into groups of communications specialists serving specific agencies for their communications? A corollary question has been: Should we build our own facility, or should we simply support efforts on the part of to-be-served agencies to recruit amateurs for their various agency purposes, whatever they may be?

Actually, down through the years, we have done both—or tried to. In addition to building our own AREC and NTS eventually into the Amateur Radio Public Service Corps, we have supported or assisted, in their amateur recruiting efforts, the military, civil defense, the Red Cross, the Post Office Department and various other agencies who have paid us the compliment of being interested in what the amateur "pool" had to offer in the way of raw material. In some cases, quite worthwhile functioning special facilities have resulted, each with little or no relation to the other, each reaping the benefits of the association and deriving from it good public relations for amateur radio as well as for the served agency. Perhaps, being the path of least resistance, this is after all the best path to follow. And those amateurs left over, not affiliated with any of these benefactors, could serve in an "experience" pool in one or another of the ARPSC divisions as an interim measure, until or unless they can make such affiliations through competitive wooing with special advantages as incentives.

* Communications Manager, ARRL.

Does the idea shock you? It well might because the other side of the coin shows quite a few amateurs who believe that we ought to put more effort into solidifying our own public service organization to the end that one amateur service facility is recognized as the primary amateur public service communications medium serving the needs (requirements, if you will) of all the above agencies and any others who want the services and are willing to cooperate with the established amateur centralizing agency to get them.

Which way the amateur service goes depends as always, on what you want and how hard you're willing to work for it. We are still living in a democracy, and if we get together we can provide the type of organization required.

This leads to a lot of interesting conjecture on what such a service would look like. Suppose we stop and consider some hypotheses, such as the following:

(a) It should be an amateur service to be implemented by licensed amateurs in the amateur hands.

(b) In its overall concept it should operate as a unit, although parts of it may tend in the direction of meeting specific requirements or performing specific functions.



The Vienna (Va.) Wireless Society put on an exhibit of amateur radio and handled a total of 430 pieces of traffic during the holiday season. The demonstration was housed in a new shopping center in Fairfax. Left to right are WA4HQW, W4JQT and WB4DVR passing some of the traffic to an intermediate relay point. (Photo by Bob Baird)

(c) It should be sponsored, centralized, administered and implemented at the behest of a *civilian* agency of the federal government, under federal government regulations.

(d) Operation of the service at all levels should be conducted under the direction of licensed amateurs with the function of determining how best or to what extent the requirements of served agencies can be met by the *established amateur service*.

(e) The service should be organizationally tight, but operationally flexible.

(f) It should be acceptable to all, or an overwhelming majority, of those concerned.

(g) It should utilize modern, up-to-date equipment, facilities and procedures, embracing all modes of emission and all parts of the amateur spectrum.

(h) It should be all-encompassing as to scope and phases. That is, it should include operation in both natural and man-made emergencies in all phases of gravity: peacetime, grave national crisis, war and post-war rehabilitation so that one amateur service will take care of all requirements, without disruption except as to certain operational details necessitated by transition from one phase to another.

Well, what think? Are we up to it? Can we get together? Are we as a service mature enough, cohesive enough, dedicated enough, serious enough, and can we compromise our divided loyalties enough, to operate as a unit under an *amateur radio* emergency plan to serve our nation both in peace and in war? If not, we had best find it out now so we can stop kidding ourselves and accept the alternative.

What alternative? Why, dividing ourselves up into special-interest groups each with its own aims and objectives and loyalties and scattering ourselves into service to each of the many agencies which have requirements for our services — all too often in the name of that agency as our benefactor instead of in the name of our own service: The Amateur Radio Service — WINJM.

Net Registration

Once annually, in late summer, a new, revised edition of the Net Directory is published. There are very few requirements for inclusion in the directory: (1) frequencies must be inside the amateur bands; (2) primary function must be a public service activity; and (3) for continuous inclusion, each net must be re-registered once each year. To determine if your net needs reregistration, look at the 1968 edition of the directory. If the date under column 9 is Jul 8 or Aug 8, there is no need to submit a CD-85 unless there has been some change in vital information from what is listed in the directory. If your net has been registered since August, 1968, please *do not* submit another CD-85 unless there has been a

NET REGISTRATION	
Name of Net.....	.....
.....
Net Designation (if any).....	Freq.....Mgr..... (Call)
Days.....	Starts.....Ends.....GMT
Direct coverage.....	.....
Purpose of Net.....	.....NTS?.....
Liaisons.....	.....
Previously registered?.....	Submitted by..... (Your call)
CD-85 (R664)	

change in information.

The CD-85 net registration forms (see cut) are available from headquarters, or you may use a facsimile. Fill out the cards according to the following directions:

1. *Name of Net.* Type or print the name of the net exactly as you wish it to appear in the directory. The full name should appear, but common abbreviations such as AREC, RACES, SSB, CD, etc. are acceptable.

2. *Net designation.* Many nets have short letter and number combinations by which they are known. If your net has such a designation please list it. Examples are PAN for Pacific Area Net, M6MTN for Michigan Six Meter Traffic Net, etc.

3. *Frequency.* List the net frequency in kilocycles (or kilohertz). If there is more than one frequency, be sure to correlate days and times.

4. *Net Manager.* Call letters are sufficient. If your net has no manager, list the call of someone who can supply additional information about the net.

5. *Days.* List the days your net meets *according to GMT*. Errors arising from failure to list days by GMT are your own responsibility.

6. *Net starting and ending times.* Enter the time your net begins and ends *in GMT*. If the time is not shown in GMT the net may not be listed. For ending time, use the length of an average session. If the net meeting time shifts an hour by GMT during daylight saving time, denote this by an asterisk (*).

7. *Direct Coverage.* If your net is part of a system, list the assigned coverage area; otherwise, the area covered by regular participants. Don't include coverage provided by liaison with other nets. NTS nets have definite coverage boundaries; don't put your standing as an NTS net in jeopardy by showing coverage contrary to NTS principles.

8. *Purpose of Net.* A word or two showing the service performed is sufficient. If there is a special purpose, describe the public service performed. Nets leaving this space blank or those not showing a public service activity will not be registered.

9. *NTS?* If your net is part of the National Traffic System, so indicate by entering yes. Otherwise, leave blank. NTS nets must indicate the proper liaisons. Failure to do so may result in the net being registered as non-NTS.

10. *Liaisons.* NTS nets must show their proper liaisons. Other nets should show nets with which regular liaison is maintained. Do not show liaisons with MARS, CB, etc.

11. *Previously registered?* Give the year in which your net last appeared in the Net Directory. If it is a new net, enter no. If your net was registered previously, but under a different name, list the old name.

12. *Submitted by.* Enter your call letters. If you have more than one call, enter the one by which you are best known. Unauthenticated and unsigned registrations will be disregarded.

Mail the completed CD-85 to headquarters before July 1, 1969. Tardy registrations will be entered in the card file but not printed until the 1970 edition.—*WA9HHH.*

Traffic Talk

Are telephone numbers necessary on traffic? No, but they are very helpful, *if* they are correct. If they are not correct, they can be an awful pain in the neck and could run up your telephone bill if you are one of those good samaritans who place toll calls once in a while in the interest of prompt delivery.

So, first of all, make sure you have the telephone number correct. Of course we realize you can only make it as correct as the sending operator gives it to you, which is only as correct as he copied it from the station he got it from; but if everybody *makes sure*, it will arrive at the delivering station correctly.

Next, make sure it is written legibly. A large percentage of errors are not copying errors at all, except in the sense of legibility. Some of the henscratching we have seen which is supposed to pass for the written word defies belief. In that connection, we wonder why so few amateurs copy their traffic on a typewriter? It increases legibility greatly. (Of course, there are those whose typing is illegible too!)

And third, if you decide to make a toll call because the message comes from Vietnam or Korea or some place like that, check out the number *first* before you put in the call. You can do this, most places, by dialing 1 followed by the area code (if it's out of your area), then 555-1212. If that doesn't work, dial the operator and she'll connect you with the proper information operator (at no charge).

One more point, which has been mentioned before but bears repeating: Don't argue with the guy who sends you the message because something about it doesn't sound right or you know is wrong. Just make sure you copied it the way he sent it, then QSL. If the message can't be delivered, tell the *originator* (by SVC), not the relaying station.

Oh, and that brings up one more point, about service messages. Most of them are unnecessarily long! There is absolutely no excuse for a service message to be over CK 25, and in most cases it can be kept below 10. You don't have to tell the originator the long, sad story of your noble but abortive attempts to deliver the message. Refer to the message by number (*forget* the precedence, it's *not* part of the number) and date, give the reason for non-delivery. If the reason is the address, give the address; if it's the town, give the town. If the person has moved, just say "removed," never mind adding that he left no address, wasn't in phone book, mail returned or any of that stuff. If you need a better address, just GBA (on c.w.) does it. Let's cut down on the length of those service messages.

Oh yeah, and another thing—but whoa! We're getting off the subject. More about service messages another time.—*W1NJM*

National Traffic System. W2FR has issued a 2RN certificate to WB2FEH. Third Region certificates have been issued to JF3s ATQ CID MPX, K3s OIO SOH, WA3s AKH CTP EXW INC IUW, and W9UCE/3, by net manager K3MVO. W6EJY and W8ELW/6 have received RN6

wallpaper from WA6ROF, who reports conditions better but traffic way down. K7NHL reports issuing a TWN certificate to WA7TSP. K2KIR congratulates the Eastern Area Region Nets, all of which had perfect attendance records on EAN during February. CAN Manager WA9RAK reports nearly a record month for traffic and setting a new record for rate.

February reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
1RN.....	56	618	.408	11.0	92.9
2RN.....	70	1088	.792	15.5	96.8
3RN.....	70	1029	.511	14.7	99.1
4RN.....	49	605	.484	12.4	82.1
RN5.....	56	807	.455	14.4	92.9
RN6.....	56	897	.614	16.4	97.7
RN7.....	56	366	.329	6.5	44.0
8RN.....	56	638	.376	11.4	97.0
9RN.....	69	938	.510	13.6	90.2
TEN.....	56	560	.664	10.0	80.4
ECN.....	56	197	.230	3.5	82.1
TWN.....	44	203	.260	4.6	46.1
EAN.....	28	1886	1.379	66.6	100.0
CAN.....	38	2457	1.200	64.7	100.0
PAN.....	28	1145	1.057	40.9	100.0
Sections*	1791	11678		6.5	
TCC Eastern.112 ³		807			
TCC Central.112					
TCC Pacific.112 ³		917			
Summary.....	2579	26,816	EAN	17.0	---
Record.....	3059	34,238	1.481	16.4	---

¹ Including 1969 SET information.

² Section and local nets reporting (65): BUN (Utah); Franklin County, OSN, OSSR, BN (Ohio); WSSB, M6A1TN (Mich.); HNN, CCN (Colo.); PVTEN, NJEPTN (N.J.); CN, CPN (Conn.); QIN (Ind.); WSBN, WIN, WSSN (Wis.); NAMRTN (N.M.); WSN (Wash.); VSBN, VN, VSN (Va.); KTN (Ky.); NCN, CNN (Cal.); FMTN, VBN, TPTN, FPTN, NIIN, WFPN (Fla.); MDDCTN (Md.-D.C.); NYS, NLI Phone, NLI VHF, NLI (N.Y.); IIN (Ill.); OZK (Ark.); PTN (Me.); TEX (Tex.); OLZ, SSZ (Okla.); RISP (R.I.); NCN(E), NCN(L), THEN (N.C.); GSN (Ga.); LAN (La.); MJN (Minn.); MNN, SMN (Mo.); AENB AEND, AENH, AENM, AENR, AENT (Ala.); RTQ, West Quebec VHF (Que.); EPAEPTN, PTN, EPA (Pa.); WMIN (Mass.); WVN (W. Va.); GBN (Ont.)

³ TCC functions, not counted as net sessions.

Transcontinental Corps. January reports

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern.....	112	94.6	2142	807
Pacific.....	112	93.8	1834	917
Summary.....	224	94.2	3976	1724

The TCC roster: Eastern Area (W3EML, Dir.)—W1s BJG EFW EMG EOB NJM, K1ESG, W2s FR GKZ PU, K2RYH, WA2s BHN BLV OYE UWA, W3EML, K3MVO, W4s NLC UQ ZM K4KNP, WB4DXX, W5s AHZ IXJ UM, K8KMQ, W4s POS ZGC, VE3GT, Pacific Area (W7DZX, Dir.)—W6s BGF BNK IPC IPW VNQ VZT, K6DYX, WA6HVA, W7s KZ ZIW, K7HLR, WA7CLF.

Public Service Diary

On Jan. 13 while mobilizing twenty miles west of Montreal on the TransCanada Highway, VE2ALE came upon an overturned car near the high speed lane of the road. A large number of spectators had gathered, thus creating a hazard to oncoming motorists. VE2ALE called for assistance on the VE2RM repeater. VE2AKM answered and relayed all information to the Quebec Provincial Police.—*VE2ALE, SEC Quebec.*

Participation in the Simulated Emergency Test last January had to be cancelled for the East San Gabriel Valley AREC. They had been in the field

since January 22 providing communications for the American Red Cross in the flood stricken area surrounding Azusa and Glendora, California. All communications utilized wide band f.m. in the two meter band. A total of thirty one amateurs participated in the four day operation, under the direction of EC WA6JXG. — WA6JXG, EC East San Gabriel Valley, Calif.

On the early morning of January 23, a tornado struck the towns of Mendenhall and Hazellhurst, Miss., leaving about twenty dead and hundreds injured. Also damaged as the twister skipped through the area were Sardis and White Oak. W5FYH, WA5UDQ and K5PJY were active from the stricken cities handling traffic. The operation, a combined AREC and RACES effort, lasted for two days, during which K5s FMV ZFM and WA5s JWD QDC FII acted as net control stations. WA5PZI at the University of Southern Mississippi was instrumental in making arrangements for vocational students being sent to the damaged area to aid in clean-up operations. — WA5KEY, SCM Mississippi.

The SET plans of the Lompoc (Calif.) Civil Defense organization were also washed out because of the severe flooding in the area. The control center was activated at 1300 PST on Jan. 25, and liaisons were maintained with the West Coast Amateur Radio Service Net, the Western Public Service System, and NTS. Fortunately, the rains ceased and the flood crested about 1600 before more damage was done. Soon afterward, the control center was moved to the home of W6UJ where traffic was still being handled at 2000. — W6UJ, RO Lompoc, Calif.

California wasn't the only place where "simulated emergencies" turned out to be the real thing. On the evening of Jan. 25 a record snowfall of three feet was registered in the Willamette Valley, Oregon, with more than a foot accumulating at some points along the coast. Most roads and highways were left impassable, power was knocked out in many places, and normal means of communication were completely disrupted. Coos County amateurs went into action handling health and welfare traffic, as well as arranging for aerial food drops to many stranded families. The state RACES net was activated at noon on the 26th, and remained on the air until February 1. More than sixty amateurs were active until the state dug its way out and normal facilities were restored. — K7WWR, SCM Oregon.

The state of Mississippi was again struck by tragedy when, on the heels of the tornado described earlier, Laurel was rocked by a series of explosions from tank cars loaded with butane. Fortunately, the first car to explode did little damage, but it signaled the warning of what was to come. The residential area near the railroad yards was quickly evacuated. As the fire spread and the cars exploded, more and

more damage was done until a two square mile area was completely leveled. K5MOH, in Laurel, was soon assisted with the handling of health and welfare traffic, when K5HYE and WA5BWE arrived from Hattiesburg. — WA5KEY, SCM Mississippi.

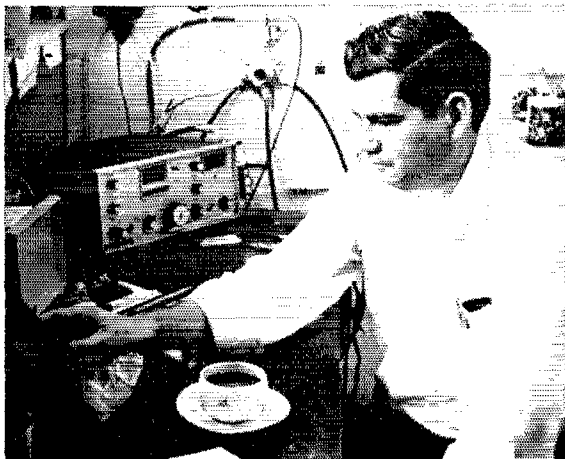
The small college town of Crete, Nebr., was also the victim of a railroad mishap, when, on Feb. 18, a train derailment caused the explosion of a freight car loaded with ammonia gas, resulting in eight deaths and a number of injuries. As news of the disaster was released, telephone lines to the city were immediately jammed with calls. K0LDP at the Red Cross headquarters was activated by W0OWR to aid in the passing of health and welfare messages. W0YOY drove to Crete and set up a second station at a local factory to help with the traffic. WA0PGP, K0SFA, and W0KFE were also active from the site of the disaster. At the peak of activity, one hundred inquiries per hour were being received, which resulted in more than 600 message handlings. Active from the Lincoln Red Cross chapter were WA0OMY, K0QVN, WA0NKZ and several other amateurs. — K0ODP, SEC Nebraska.

Forty-two reports from Section Emergency Coordinators were received for the month of January, 1969. These reports represent 15,318 members of AREC. This is two more reports and 1,414 more AREC members than January, 1968. SECs reporting were those from Alta, Ariz, Ark, BC, Colo, Conn, Del, EFla, EPa, Ga, Ind, Iowa, Kans, Ky, La, Mar, Mich, Mo, Mont, Nebr, Nev, NMex, NLI, NNJ, Ohio, Okla, Que, SDgo, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla, WNY and WPa. Alabama was inadvertently omitted from the list of 100% sections last month.

Independent Net Reports:

Net	Sessions	Checkins	Traffic
Northeast.....	28	386	912
QTC.....	20	181	91
North American SSB.....	21	521	402
Clearing House.....	24	475	730
20 Meter ISSB.....	20	435	9168
III & Bounce.....	28	365	908
7290.....	40	1895	1587
FUS.....	26	63	58
All Service.....	4	93	89
Mike Farad E & T.....	21	407	587

QST



K7OHX. Bob, a member of the Northern California Net, helps to clear some of that often difficult to unload Nevada traffic. (Photo by K6KOL)

Happenings of the Month

MORE AMATEURS CHARGED FOR OBSCENITY

The Federal Communications Commission took action to revoke the operator licenses of three amateur radio service operators on charges of obscene, indecent or profane radio communications. The Commission ordered Steven P. Bowman, WA0HQO, of Sikeston, Missouri; Kenneth C. Henry, WA0KYU/9, of Anderson, Indiana; and Gary Overman, WA9KEA, of New Castle, Indiana to show cause why their licenses should not be revoked. The three operator licenses were also ordered to be suspended.

In addition to the obscenity charges, other violations included transmission of false or deceptive signals or communications, failure to identify stations properly, transmission of unidentified communications or signals and willful or malicious interference to radio communications of other amateur stations.

The Commission said that the three amateur licensees had repeatedly and willfully violated the Rules. The enforcement actions followed investigations carried out by the FCC Field Engineering Bureau and the Federal Bureau of Investigation after complaints were received from other amateur radio operators.

The actions were taken March 14, 1969 by the Chief, Safety and Special Radio Services Bureau. — *From FCC News Release, March 14, 1969.*

MARS PROGRAM FORMALIZED

After some twenty years of service, the Military Affiliate Radio System has been formally adopted as an official program by a Department of Defense Directive, Number 4650.2, November 30, 1968:

I. PURPOSE: This Directive formalizes the composition, mission and functions, and the organization of the Military Affiliate Radio System (MARS), and sets forth policies concerning Department of Defense support of both MARS and civil Amateur Radio activities.

II. APPLICABILITY: The provisions of this Directive apply to all DoD Components.

III. COMPOSITION: MARS shall be composed of military unit radio stations and individual United States volunteer and military radio operators, licensed by the Federal Communications Commission or otherwise authorized by United States competent authority, who have reached their sixteenth birthday and either possess a radio station capable of operating on radio frequencies assigned to MARS, or are affiliated with a civilian or military radio club with an operational radio station capable of operating on specified radio frequencies assigned to MARS.

IV. ORGANIZATION: There shall be an organized MARS entity within each of the Military Depart-

ments. (The Marine Corps will function under the jurisdiction of the Department of the Navy.)

A. Each Military Department entity will function under the direction of a "Chief, MARS," who will be appointed by the sponsoring Military Departments.

B. The Office of the Secretary of Defense, the Defense Agencies, and appropriate Executive Agencies of the Federal Government may affiliate in a program of a Military Department.

V. MISSION AND FUNCTIONS: A. The mission of MARS is to provide DoD sponsored emergency communications on a local, national, and international basis as an adjunct to normal communications.

B. MARS will:

1. provide auxiliary communications for military, civil and/or disaster officials during periods of emergency;
2. assist in effecting normal communications under emergency conditions;
3. handle morale and quasi-official record and voice communications traffic for armed forces and authorized U. S. Government civilian personnel stationed throughout the world;
4. create interest, and furnish a means of training members in military communications procedures;
5. provide a potential reserve of trained radio communications personnel for military duty when needed;
6. maintain and operate an Army—Navy—Marine Corps—Air Force MARS facility on the main concourse of the Pentagon Building; and
7. conduct an appropriate Amateur Radio program as a part of the annual celebration of Armed Forces Day (see referenced Directive 5400.5).



Indiana governor Edgar D. Whitcomb and Centre Convention chairman Joe Poston, K9GCE with the Indiana Amateur Radio Week proclamation.

Behind the Diamond Number 15 in a Series



A dozen columns ago we mentioned Gil Crossley as a young college instructor having to take the keys to WSYA away from one of his top student brass pounders. Now it's time to shine the spotlight on that young squirt of 35 years ago — **George Hart, WINJM/W3AMR, ARRL Communications Manager.**

George got his license in 1930, and his fame at Penn State in 1933-1936, handling traffic from the college station — and, almost incidentally, acquiring a B.A. and later adding an M.A. in English. George came to Newington in September 1938 to operate the shiny new Hiram Percy Maxim Memorial Station, WIAW, just dedicated. In 1942, as chief operator, he put the station in mothballs for “the duration” and moved over to the West Hartford offices where, by the end of the year he was acting communications manager. In 1944 he joined the Army, survived Officer Candidate School and spent the next two years as a lieutenant in the Army Airways Communications System. Back at ARRL, he set up the Training Aids program and then organized the National Traffic System of local, state, regional and area nets, the latter tied together by the crack ops of the Transcon-

tinental Corps — in which, incidentally, George is still active. He spent 1949 to 1967 as National Emergency Coordinator, overseeing the efforts of 74 section emergency coordinators, 1300 local ECs and 35,000 Amateur Radio Emergency Corps members. When Ed Handy retired as communications manager, George became head of the department.

Rare is the SCM who has not received a five-page letter from George, carefully spelling out the reasons why something is done as it is. And George has a deserved reputation for going straight to the point, especially with those of his correspondents whom he counts as friends. In a headquarters letter-writing seminar a couple of years ago, Public Relations Consultant Don Waters made frequent reference to “sandpaper phrases,” those frequently-used words capable of irritating the guy at the other end. In WINJM's office hangs a nicely framed “Sandpaper Award with Don Waters' Clusters,” a memento from his state of his occasional bluntness.

In addition to his own two calls (W3AMR is located on the family farm in Raubsville, Pa.), George is trustee for WIAW; W1INF — *It's Never Finished* — the station in the ARRL Club and W1EIA, club station of the Connecticut Wireless Association, known for its 15 to 65 w.p.m. code practice sessions each Sunday night at 0130 GMT (Monday morning, Greenwich) on 3637 and 7120 kHz. A hangover from George's too-eager youth is a “glass arm” which won't tolerate a bug or automatic keying lever — WINJM operates with two straight keys side by side, hitting them alternately with his index fingers!

Our comms manager and his quiet, patient wife Louise have two sons, Fred and Dennis, and one granddaughter, Kimberley — who is well on her way to being spoiled rotten by grandpa!

VI. POLICY: It shall be the policy of the Department of Defense to:

A. Support and encourage MARS and Amateur Radio activities and avoid, within the limitations imposed by military exigencies, any action which would tend to jeopardize the independent prerogatives of the individual Amateur Radio operator.

B. Encourage and cooperate in the development of amateur and private communications activities to enhance their military and civil value.

C. Recognize demonstrated technical and operating qualifications of personnel, as evidenced by possession of a valid Amateur Radio License issued by the Federal Communications Commission.

D. Maintain liaison with all recognized U. S. Amateur Radio organizations and the Federal Communications Commission.

AMATEUR RADIO WEEKS AGAIN

In Indiana and Indianapolis, amateur radio week is May 24 to May 31, 1969, the dates coinciding with the ARRL Central Division Convention in the capital city on the 24th. Both proclamations mention, “. . . the inventive genius of hams, . . . the instant mobilization of communications by the hams . . . in a disaster area; . . . the intuitiveness of hams in conquering malfunctions . . . the friendliness and helpfulness of the hams throughout the world . . .”

In Massachusetts, the state chapter of the National Awards Hunters Club secured a declaration of amateur radio week June 15 to June 21, 1969. Governor Francis W. Sargent's proclama-

WHO THE DEVIL IS WHO?

Thirteenth in a Series of Call Conversion Charts

Here are additional calls of amateurs taking advantage of new rules which allow Extra Class licensees licensed 25 years ago or longer to acquire two-letter calls. If you should be listed here, let us know by post card right away.

Now	Was	Now	Was	Now	Was	Now	Was
W1KU	W1DYY	W3SG	W3MRZ	W5MW	W5OYE	W8GI	W8DUD
W1LG	K1OXU	W3WC	K3VOZ	K6DC	W8ULS	W8IU	W8TJM
W1LL	W1POY	W3WF	W3LVU	K6MU	W8FJJ	W8JC	W8GSE
W1MM	W1AEW	W3WS	W3CLP	K6OD	W6JAI	W9DY	W9GFF
KZAC	K2GDP	K4KM	WB1HVQ	K6OE	K6TYQ	W9FC	W9DGA
KZAI	W2POC	K4KP	W4DIJ	K6OH	WB6IAQ	W9FT	W9VZ
W2PL	WA2WNR	K4KQ	W4LVV	K6OI	WA6TMK	W9FU	W9VFE
W2ZO	W2GKW	W5LK	W5MMT	K6OL	K6YIW	W9GA	W9HMO
W2ZS	W2SWG	W5MB	W5GXP	W6NP	W7HNS	W9JK	W9OSX
W3ML	W2QZG	W5MQ	W5ERR	W7OK	W9AMP	W9KC	W9SLW
	W3CKN					W9KE	W9DOP

tion cited contributions of the amateur to development of electronics in war and peace, disaster communications, and civil defense work. The club will give a special recognition certificate to amateurs working Massachusetts stations during the week; details from Steven Rich, 31 Arlington Avenue, Revere, Mass. 02151; s.a.s.e. please.

Walter Peterson, Governor of New Hampshire, set aside June 22-28 as amateur radio week, in recognition of amateurs' service in emergencies, international goodwill, and training through such activities as the ARRL Field Day.

The same week was picked by the mayor of Englewood, New Jersey for his city's observance. Mayor Robert I. Miller mentioned specifically "The Englewood Amateur Radio Association, Inc. during their Field Day exercises each year

since 1963 have brought honor and recognition to themselves and to the city by placing first in their transmitter category . . ." and linked Field Day to FCC's basis and purpose of the amateur service.

CANADIAN FEES STAY AT \$10

In spite of strong pleas to the contrary by the League, the Canadian Amateur Radio Federation, provincial societies, local clubs and individual amateurs, the Canadian government has decided to keep the amateur license fees at \$10 per year. The measure is part of an overall government drive to make all special services self-supporting, and it applies to fields other than radio as well.

Happily, the "amendment fee" of \$6 will not apply to amateurs after April 1, 1969. QST

ARRL QSL Bureau

The function of the ARRL QSL Bureau System is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4½ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below.

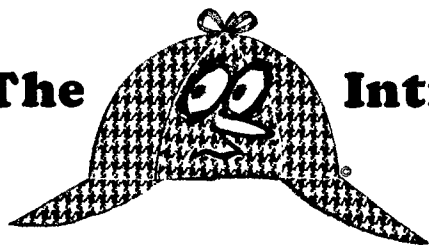
- W1, K1, WA1, WN1 — Hampden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108.
- W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505 Ridgewood, New Jersey 07451.
- W3, K3, WA3, WN3 — Jesse Bieberman, W3KTT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.
- W4, K4 — H. L. Parish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.
- WA4, WB4, WN4 — J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.
- W5, K5, WA5, WN5 — Hurley O. Saxon, K5QVH, P.O. Box 9915, El Paso, Texas 79989.
- W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 6029, San Diego, California 92106.
- W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.
- W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.
- W9, K9, WA9, WN9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.

- W6, K6, WA6, WN6 — Alva Smith, W6DMA, 238 East Main St., Caledonia, Minnesota 55921.
- KP4 — Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, P.R. 00902.
- KZ5 — Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.
- KI6, WI6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.
- KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
- VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.
- VE2 — John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.
- VE3 — H. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.
- VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
- VE5 — A. Lloyd Jones, VE5JI, 2323 Grant Rd., Regina, Saskatchewan.
- VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.
- VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.
- VE8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.
- VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.
- VO2 — Goose Bay Amateur Radio Club, P.O. Box 232 Goose Bay, Labrador.
- SWL — Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

1 These bureaus prefer 5 × 8 inch or #50 manila envelopes.

ARRL

The Intruder Watch



How You Can Help to Preserve the Amateur Frequency Allocations

BY RICHARD L. BALDWIN,* W1IKE

OFTENTIMES changes take place so slowly that the casual observer doesn't notice what is happening. Were the change to take place overnight, it would be dramatic. Spread over two or three years, it makes little impact except among the people who spend so many hours bringing the change to pass.

That's how it's been with the amateur bands since the ARRL Intruder Watch went into operation about three years ago. A group of dedicated amateurs have spent uncounted hours of their personal time in reporting the presence of interference to the amateur service. These interference complaints have been coordinated by Hq. and filed with the FCC, where they have been diligently and aggressively processed. Signs of success have been slow in coming, but there has resulted a gradual cleansing of the amateur bands, and in some segments the change has been very noticeable.

What we should have done three years ago was to record, for example, the conditions existing in the band 7000-7100 kHz. Then, comparing the 1965 recording with a 1969 recording, we would have had that dramatic impact that we mentioned. But, not having the comparative recording tapes, and in any event having no way of playing the tapes for you here in the pages of *QST*, we'll have to rely on statistics.

What Are Intruders?

To understand why we need an Intruder Watch, it is necessary to back up a bit and get some background on international radio regulation. First of all, our amateur band assignments are based on international agreements which are worked out at conferences held by the International Telecommunication Union. Because radio waves know no political boundaries, it is essential to have universal agreements on how the radio spectrum is to be used — otherwise there would be chaos. And so the spectrum is chopped up

into segments, with different bands of frequencies allocated to the broadcasting service, to the aeronautical service, to the maritime service — indeed, to more than two dozen different services, including the amateur service.

This would all be very neat, except for a couple of problems. In the first place, there are not enough frequencies available so that each service can always have its own private allocation, and so we have shared bands. Thus, the 3.5-MHz. band is shared, even in North and South America, between the amateur service, the fixed service, and the mobile service. In other areas of the world there's also some broadcasting permitted in that band. That's why, on the 80-meter band, you hear so much other stuff on a cold winter night.

The second problem is that there's a loophole in the international regulations. So that there will be as little misunderstanding as possible, let's quote from the Radio Regulations, Geneva 1959, which is the currently effective international document:

"Article 3, Section 3. Administrations of the Members and Associate Members of the Union shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations given in this Chapter or the other provisions of these Regulations, except on the express condition that harmful interference shall

The ARRL Intruder Watch is a part of the League's continuing work to protect and preserve the amateur frequency bands. About a hundred League members are participating in this activity by reporting non-amateur stations in the amateur bands causing harmful interference to the amateur service.

*Assistant General Manager, ARRL.

not be caused to services carried on by stations operating in accordance with the provisions of the Convention and of these Regulations."

This loophole makes it possible for Country X to assign, let's say, 7050 kHz. to one of its broadcasting stations, and to continue using that frequency, contrary to the allocations table, as long as no interference is caused to the amateur service. But since we know that such interference is inescapable, the real crux of the matter is to get amateurs to report the interference, rather than simply to accept it as mere QRM.

Besides those cases of deliberate use of the amateur bands by other administrations and by other services, we also have many instances of inadvertent interference. Spurious transmissions caused by faulty equipment or by faulty tune-up procedures, together with harmonics, can also wreak havoc to amateur communications.

How Much Interference Is Reported?

Since now we all know that cases of interference do exist on the amateur bands, our problem is in getting amateurs to report the interference, with suitable specifics so that we can furnish sufficient factual data to FCC. In the days prior to the formal organization of the ARRL Intruder Watch, which took place in 1965, at the urging of WØDX, Hq. was getting only a very small number of interference/intruder complaints each month — never more than half a dozen. Since that time, complaints have come in at a rate as high as a thousand per month.

Here's another comparative statistic. In the three-year period prior to August of 1965, amateurs filed complaints on 124 different non-amateur stations operating in the amateur bands. In the three-year period after the establishment of the ARRL Intruder Watch, amateurs filed complaints of interference on 1258 such stations. This doesn't mean that beginning in 1965 the amateur bands were suddenly full of intruders. It means that beginning in 1965 we began to do a much better job of reporting the interference.

Who's Doing the Work?

Hidden behind the impersonal title of "Intruder Watch" are a multitude of League members who have devoted many, many hours to this work, in order that you and I and those who follow will continue to be able to enjoy the amateur bands. Any success that the Intruder Watch has had is due almost entirely to the devotion of these individuals.

It is usually difficult, in an effort such as this, to single out one or two people who have been outstanding contributors. But in this case we must mention the contributions of W1NF and K6KA. Art Ericson, W1NF, has been an ARRL Official Observer for years, and when the Intruder Watch opportunity came along he jumped in. He has the distinction of having submitted a report every week for over three years, and if his reports were lined up end to end, they would surely form a line of paper extending from Connecticut to Washington, D. C. Art has done an

outstanding job for the Intruder Watch, in both quantity and quality of reports. Not far behind is Bill Conklin, K6KA, who has done yeoman service from the other coast, and who has been a prolific source of ideas on how the operation of the Intruder Watch could be improved.

We've mentioned two outstanding contributors by name — there are another dozen who stand extra high on our list of appreciation. For instance, each of the following has submitted at least 50 weekly reports: K1CLM, W2MZZ, W2VAQ, W4OPM, WA5SKI, WA7BSG, W8BU, W8DHIJ, W8MSG, W9AZP, W9DY, and KH6AHZ.

Here's a complete list of those who are currently active in the Intruder Watch: K1CLM, WA1EIG, W1ETU, WA1FFB, K1HIS, W1NF, W1WEE, W2CNQ, WA2CRW, W2CUC, WA2CUR, WB2DYB, W2EHD, WB2FEH, WN2GZE, WA2HIU, WB2MBU, W2MZZ, W2NSZ, W2ODC, WB2TFN, W2VAQ, W2WHB, W3BUO, W3FU, W3LIE, K3ZKD, WB4CAP, K4CG, W4FY, WB4GTS, W4MLE, W4OPM, W4OYI, K4UDP, K4YBE, WA5SKI, WN5TVO, W6APF, WA6COE, W6JF, K6KA, WB6LNS, WB6SXY, K6ZFI, K6ZTK, WA7BSG, WA7KQS, W8BU, K8DIJ, W8LQB, W8LZE, W8MSG, K8QKT, W8QXQ, W8SSL, W8ZCQ, WN9AHM, W9AZP, W9DY, W9IHN, K9LJQ, WA9TSG, WN9ZJI, WØCVZ, WØDX, WAØFLL, KØORB, WAØPRI, WØSIN, KØSPH, KH6AHZ, KH6AN, KH6BZF, KH6GPP, KH6GRO and VE3FCH/W1.

In addition, we have had the help in the past of a number of other amateurs whose contributions have been greatly appreciated but who could not continue with us for the whole three-year period. These include: K1ACL, W1AGB, W1ASW, W1BGD, W1CFW, WA1DBM, W1DFS, W1DRA, K1DYG, W1ECH, WA1FAV, W1FEC, WA1FGN, K1FNU, WA1GGY, WA1HOD, W1KC, W1MO, W1NEB, W1NZV, K1RSK, W1TS, K1UNQ, W1YNE, WB2ALF, K2AYQ, W2COT, WB2DLW, W2ETS, WB2EZZ, WB2FJE, W2GTZ, WB2HWB, WB2IJE, W2NEP, WB2OFC, WA2OJD, WB2OYE, WA2PJL, WB2PYZ,



This is W1NF. From this operating position he has turned in thousands of individual interference complaints.



Merle Glunt (l.) W3OKN and Saul Meyers, ex-WØHPL, Chief Engineer, put their heads together over a tabulation Assistant FCC of interference reports.

helped in providing identifications that could not be handled by our Intruder Watchers. The cooperation between the monitoring stations and the individual Intruder Watchers has been invaluable in conducting the program.

Where the work of the Intruder Watch finally begins to pay off is when the complaints of interference arrive in the office of the Chief Engineer of the Commission, William Watkins, and get routed to the Treaty Branch of the Frequency Allocation and Treaty Division of the Commission. There, Branch Chief Merle Glunt, W3OKN, an expert in diplomatically getting another country to move its interfering stations, has processed the flood of complaints turned in by the Intruder Watchers. Sometimes he deals directly with the station involved, sometimes with the administration of the country where the station is located, and sometimes he has to work through the headquarters of the International Telecommunication Union in Geneva. Which course he takes depends entirely upon the individual circumstances. Presumably he got to be Branch Chief because he is smart enough to pick the right course most of the time!

What Can You Do?

This Intruder Watching, even though it is contributing a great deal to the protection of the amateur frequency bands, and even though it represents a great deal of total effort, doesn't need to occupy the time of an individual for more than a couple of hours a week. If you can spare that sort of time, we can surely use your help.

We provide detailed instructions on what to look for on which bands, we provide a special manifold reporting form which makes your job and that of the Commission easier, and we provide monthly bulletins on current information and priorities.

A postcard to Hq. will get you started, and you will become a participant in the League's program to preserve our amateur frequency bands.

QST

W2PZI, WB2RSC, WB2SBR, WB2TBV, WB2TDK, WB2TOM, WB2UHZ, WB2UYD, W2VIR, W2VP, WB2VUC, WN2YKB, WN2YOJ, W2ZCZ, WN2ZXQ, W3AEQ, W3BI, WA3CTJ, WN3DWQ, W3DYX, WA3FHM, K3FNS, W3KDF, W3KO, W3NET, K3OJX, W3OY, W3UXW, K3WKJ, W3ZLP, W4AFM, WB4APN, K4AT, W4BJD, W4BMM, W4BNU, K4BQP, W4BUW, WB4CLY, K4HJM, W4LQE, W4LRN, W4LVV, W4MSH, W4MXF, K4NJS, W4ROC, WA4TBM, WA4TJS, WA4VNV, WA4WHX, WA4WV, W5ACL, WA5FGC, W5FGO, W5FJZ, W5LXG, W5MSG, W5MXC, K5OLU, W5PKK, W5PQY, W5SAW, W6EGN, W6GMC, W6GQA, K6HPR, W6LD, WB6KPR, WB6LPN, WB6MLB, WB6MOC, WA6MWC, WB6NXX, K6OZL, WB6PGK, WB6QCJ, W6RDB, W6RW, K6ROR, W6SAW, WN6SLU, WA6SRT, WN6TAO, WB6UDH, K7BON, WA7DRC, K7DVK, W7EAM, WN7FEP, W7FNS, W7NXJ, K7ONF, K7TCL, W7UVR, W7UXZ, W7VCB, K8ACC, K8BFH, W8CHT, W8EDL, W8ELE, W8IV, W8JM, WA8NDY, K8OAG, WA8PVR, W8SAX, WN8TGO, WA8UDG, K8VEX, W8VUV, W8WS, K8YSO, W9ALZ, K9AQJ, WA9BIH, K9CHZ, K9FXW, W9MCJ, WA9MNC, K9OFA, WA9TCR, W9TV, KØAZJ, KØBPW, WAØEFN, WAØHLQ, WAØJNF, WAØNLN, WNØOFS, WØPAN, WAØPFC, WNØPVR, KH6IJ, KH6KS, KL7FEF, KL7DR, and KL7PI.

Who's Processing the Interference Complaints?

Getting all these complaints of non-amateur operation in the amateur hands does us no good if they are simply collected but not acted on. The U.S. amateur service has been particularly fortunate to have the unstinting cooperation of the Federal Communications Commission. The FCC Monitoring stations, under the direction of Field Engineering Bureau Chief Curtis Plummer (ex-W1IUA and ex-W3KRK) have



Last February, Dale Norton, W1JI/MM, operating near the top of Northern Luzon, P. I., contacted another maritime mobile, W4DWD/MM, who was off the coast of East Africa. W4DWD mentioned that he had sailed the seas in 1928. "This beats me by one year," said W1JI. "My first job was the *Yorba Linda*, a tanker, which I joined on February 11, 1929, in Providence, R. I." "How did the 2 kw. arc and the 1/2-kw. spark work," asked W4DWD? This question was a surprise to W1JI, since that was the gear used on the *Yorba Linda*! It turned out that W4DWD had quit the job and W1JI had replaced him. Forty years later, over a distance of 7000 miles, they finally met via ham radio.

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

John Clarricoats, O.B.E., G6CL

It is with deepest regret that we record the passing on March 14 of John Clarricoats, O.B.E., G6CL, a long-time leader in international amateur affairs principally through 33 years as secretary of the *Radio Society of Great Britain*. But even in retirement, "old Jack" provided both his meticulous skills and his wise counsel as volunteer secretary of the Region I Division of IARU and editor/producer of its bulletin. He also served the London Borough of Enfield as its Mayor.



G6CL

G6CL became active in *RSGB* circles in the 1920s. In 1927 he was appointed Social Manager of the society's T&R Committee (the strictly amateur communications branch) and in 1930 became *RSGB* secretary, a post held until his retirement in 1963. During his tenure, the society membership grew from 2000 to 12,000.

In 1967 *RSGB* published "World At Their Fingertips" a detailed history of U.K. amateur radio compiled by Clarricoats—probably the only person who could write it so authoritatively. It is a fitting and lasting tribute to his memory.

Leon Deloy, 8AB

Through the *Reseau des Emetteurs Francais* we have sad news of the passing on January 21, 1969, of radio pioneer Leon Deloy, 8AB. Deloy was the European end of the first transatlantic two-way amateur communication, which took place in November 1923, on about 100 meters, with Fred Schnell, 1MO (now W4CF) and the late John Reinartz, 1XAM. The contacts were the culmination of months of intensive advance planning.

During 1925, Deloy served as co-president of the *REF*, and attended the First International Amateur Congress in Paris—an organizational meeting of IARU.

LX1JW RETIRES

Jean Bernard Wolff, LX1JW, recently retired as Deputy Director-General of the Posts and Telecommunication Administration of the Grand Duchy of Luxembourg. Jean joined the PTT as an electrical engineer in 1933; he became Chief Engineer of the Technical Division in 1959 and, in 1963 was promoted to the Deputy post. Being also Director-General of Telecommunications, he represented his country regularly at international conferences. Jean has long been active in affairs of the *Reseau Luxembourgeois des Amateurs d'Ondes Courtes*.

U.S. — INDONESIA RECIPROCITY

The United States and Indonesia signed a reciprocal operating agreement on December 10, 1968 to permit amateurs of one country to operate in the other. The United States now has 40 such agreements with countries around the world; a list appears in last month's column.

BAN LIFTED FOR W/HS

The Royal Thai Government some time ago notified the International Telecommunications Union that communications between Thai amateurs (HS) and stations in other countries are prohibited. This ban is still in effect, and it remains illegal for U.S. amateurs to contact HS stations. However, the government of Thailand has permitted the operation of a number of amateur stations by FCC-licensed operators signing U.S. call signs /HS. With Thai concurrence, FCC has now lifted the restrictions on contacts with such stations.

CONTESTS

The *Radio Sport Federation of the USSR* invites amateurs to participate in their "CQ-M DX Contest, 1969." The contest period is from 0900 GMT, May 3, to 2100 GMT, May 4, using c.w. in the 80, 40, 20, 15, and 10 meter bands. Participants should call "CQ-M;" an exchange consists of signal report and contact number (USSR stations will substitute a district number for contact number). Submit logs within 15 days

after the contest ends to: *RSSF*, Box 88, Moscow, USSR.

Experimenterende Danske Radioamatorer announces that the 18th "OZ-CCA" contest will be held from 1200 GMT, May 3, to 2400 GMT, May 4. Contest rules appeared on page 101 May 1968 *QST*. Logs should be mailed not later than June 15 to *EDR* Contest Committee, P. O. Box 335, Aalborg, Denmark.

QST

U.S. — Europe Two-Way Slow-Scan TV QSO

THE first two-way amateur television between the U.S. and Europe became a reality on February 22, 1969, when W8SH, the Michigan State ARC station, worked SMØBUO in Stockholm, Sweden. Contact was made on ten meters by Art Backman in Sweden and Dave Sumner (K1ZND) and Ralph Taggart (WA2EMC) in the U.S. Pictures of call signs, operators, and station gear at both ends were exchanged for over an hour. The slow-scan equipment at the U.S. end was constructed by WA2EMC and included a monitor (MacDonald, *QST*, March 1964) and a live Vidicon camera (Taggart, "Technical Correspondence," *QST*, December 1968). Both a Vidicon camera and flying spot scanner were used as picture sources at SMØBUO. Despite the fact that the contact was between areas of 60 Hz. and 50 Hz. power-line frequencies, reliable synchronization was possible at all times.

Slow-scan activity in Europe is presently increasing at a rapid rate and Art may be found on 28.7 MHz. every Saturday at 1500 GMT looking for s.s.t.v. contacts. — *Ralph E. Taggart, WA2EMC*



SMØBUO sent a tape of W8SH's signals as received in Sweden. This picture was obtained by playing the tape back through a monitor and photographing it.

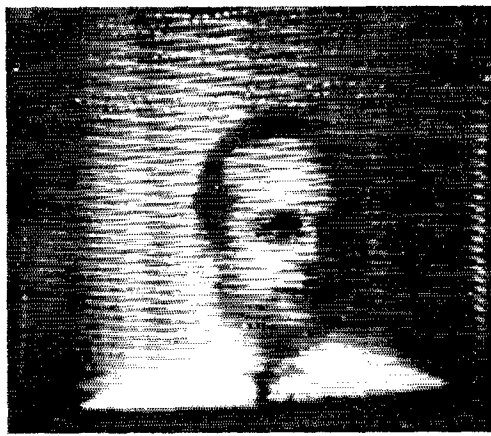


Fig. 1—A QSL card (Plumbicon camera used) and Art, SMØBUO (flying spot scanner used) as received from Sweden via slow-scan TV on 10 meters.



Correspondence From Members -

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

STIMULANT

☛ I went down and passed my Extra Class on the 27th of December 1968. I studied for six hours total the day before, reviewing basic theory and the License Manual. I found it not difficult at all—I don't feel any smarter now than I did before!

Also a very good friend of mine from Liberal, Kansas, went wild with the idea of getting licenses. He previously had a Conditional Class ticket, but on 7 January 1969 he went into Dallas and took the General, Advanced, Extra Class, 3rd Class, 2nd Class, and 1st Phone—all in one day. He said he was mighty tired after the day was over.

And he and I don't give a . . . [hoot] about the incentive licensing program unless you can really make it an incentive—for instance, have the FCC open up 3700-3800 for A3 transmission, 7150 to 7200 for A3 transmission. Now that would be an incentive!

By the way, his hotel bill in Dallas was \$55, you should get it shortly—thanks for nothing!—*Dennis J. Alexander, W4RNG, Niantic, Connecticut.*

☛ Some time ago I registered a strong protest both with ARRL and the FCC concerning incentive licensing. However, it became a reality this fall.

What to do? Give up ham radio and sulk or get to work. Well, after two months of hard study and a lot of code practice, yesterday I passed the Advanced and Extra Class exams and my objections seem to have evaporated.

Frankly, I feel I know a great deal more about ham radio and will be a better operator. My code speed is up to 25 w.p.m., and being retired the concentrated studying was an excellent stimulant for me.

Thanks to the ARRL for the always good *License Manual* and the Monday, Wednesday and Friday code practice.—*Grant Fitch, W9DZE, Milwaukee, Wisconsin.*

EXTRA "EXPERIENCE" REQUIREMENT

☛ Why doesn't the ARRL draft a recommendation to eliminate the so-called two-year "experience period" presently required for the Extra? This waiting period is simply a seniority clause in an otherwise incentive-based licensing system. It makes no difference to me if this clause is a "hangover" from before the Class A days or the crystal-set era—it still deprives hundreds of amateurs of important frequency subbands, while "tying their hands" for a 730-day waiting period. Removal of this clause is in the best interest of amateur radio. Let's do something about it!—*Philip J. Schmitt, W8SXE, Benton Harbor, Michigan.*

☛ I have had my Advanced Class license for about three months now, and after some extensive studying for my 1st Class Radiotelephone license exam, I feel I am eligible for my Extra Class exam. I strongly feel that the two-year waiting period for the Extra

Class is not only unnecessary, but an injustice to the amateur who has the knowledge, code speed, and the desire, but not the "experience" to qualify for the Extra Class. I wish to urge all amateurs who agree with me to write to the ARRL and ask them to petition the FCC until this unjustified requirement is eliminated.—*Ron Dagavarian, WA2FLO, Syosset, New York.*

☛ Now that the lowest 25 kHz. of most bands have been taken from the General and Advanced licensees, we are faced, more than ever, with that old ruling that one cannot take his Extra Class exam until two years after the General has been achieved. I have had my General one year. I now have my Advanced; but the Extra Class privileges and frequencies—which used to be our own—remain off limits for another year.—*Jeff Kramer, WB4IPC, Mt. Dora, Florida.*

☛ Now that incentive licensing has started going into effect, the ideal thing for all hams to do would be to go for their higher class licenses. For the time being, I have gone as far as I can by getting the Advanced Class license. I would like to go for my Extra but, under the present ruling, the earliest I can go up for it is in August, 1970. If the purpose of incentive licensing is to encourage amateurs to advance themselves, why is this roadblock left in our way? During the time when the Extra license conveyed no privileges that a General didn't have, the two-year wait was unimportant; but now that we lose very substantial parts of the best c.w. bands if we don't get the Extra, this two-year wait becomes a major stumbling block for the new ham who wants to advance to the higher privileges as fast as possible.

I, and a number of others who feel the same way, think that anyone who is competent enough and cares enough about ham radio to get his Extra before the two years are up, should be able to go after the "big" ticket. The enthusiasm of new comers is generally high, so why discourage them by making them wait for full privileges if they are competent enough to get them soon after entering ham radio?—*John Ashburne, WA1JMR, Wellesley, Mass.*

STRANGE HOBBY

☛ Amateur Radio. Just what is this strange hobby of ours? It's two raw Novices, fumbling with words, learning to speak with their fingers, finding the old Morse code is a lot of fun after all. It's a couple of two-letter men on the low end of the band talking of their grandchildren and roses, keeping off old age. Or perhaps one of each, bridging the age old generation gap.

It's two people speaking, not knowing they are of different races and not really caring. It's a boy fighting in a foreign hand phone-patching to his weeping wife back home. It's hundreds of people helping others in a time of need and disaster. It's

the thrill of working a new state or country, not for personal gain but for pure pleasure.

It's the agony of waiting for the band to open and then the ecstasy of hearing your own signal come back to you by way of the moon.

It's the smell of melting solder and the feeling of accomplishment from getting that home brew rig on the air for the first time and finding it really works.

Amateur radio is an American and a Russian, speaking together, acting as the first real line of international trust and respect and mutual admiration.

Amateur Radio . . . it's what you make of it. — *John C. Atmberg, WN2IEM, Smithtown, New York*

NEW LAW

☐ While ruminating this morning following two DX contacts before my first cup of coffee, I hit on a new basic law which your readers may not be familiar with, at least in the following quantitative sense.

Actual code speed = $(S-3) \frac{(1-RQ)}{100}$, where:

S = That speed which you think you can copy, w.p.m.

Q = Amount of QRM — 1 if it's a clear channel,
5 if moderate QRM
10 if heavy QRM

R = Rarity of DX — 1 if it's a local buddy
2 if a new station
5 if a new country
10 if it's a really rare one.

As you can see, and as we all have experienced, the speed is never what you think it ought to be, and drops to zero under trying conditions. I hope this will give added confidence to new operators like myself. — *Charles H. Gould, WA3LVV, Washington, D.C.*

NEW HANDBOOK COVER

☐ I was happy to find that the new *Handbook* upholds the tradition of annual improvement. It was particularly pleasing to find the addition of a comic section right on the cover, where there is shown an OM in his shack, hard at work on his latest project, having tea brought in by the smiling, devoted NYL. (. . . !)— *F. M. Simowitz, WA5YUS, Ann Arbor, Michigan*

CHART FOR 97.119

☐ Because of various problems, I've been unable to exercise my hobby in amateur radio of late. A yard and a tree were acquired recently along with time to erect a simple dipole. After several hours of listening on 40 meters, I was shocked by the four-letter words flowing through the air. What's going on? It's rather clearly written in the rules that "No licensed radio operator or other person shall transmit communications containing obscene, indecent, or profane words, language, or meaning." But perhaps it isn't clearly written or if you will, defined. Maybe the FCC needs a little chart.

Word	Penalty
"Damn"	\$ 25.00 fine
"Hell"	\$ 100.00 fine
"****"	\$1000.00 fine

Sure it's weird, but one of these days it might come to pass if old rule nr. 97.119 is progressively violated. I mean, how come a good Christian on 75 meters tells a brother amateur that believes prayers shouldn't be transmitted to the moon, to "Go to Hell". I may disagree also, but it's not necessary

to express a desire that he travel to such a location. Leastwise, not on 75 meters.

After pulling the plug on the receiver I almost decided to give it all up and spend what spare time was available in the lucrative profession of mass producing Super Megawatt Linears for 11 meters. But instead, I think I'll study twice as hard for the Extra, continue good amateur practices, and pay strict attention to the rules. Who knows, it might rub off on somebody. — *Charles A. Haynes, K5VQF, Brenham, Texas.*

EXCLAMATION

☐ Although I think ham radio to be the best hobby in a long time and I reap much enjoyment from it, I do encounter my share of mild frustrations. One of the most irritating, which I think could be most easily alleviated, is the frustration which arises when, after making some clever, funny or even turgid c.w. statement, I find myself helpless to add the proper punctuation mark, probably because in this, the language of the ham, it doesn't exist! I am speaking, of course, of the exclamation point. Do other hams share my feeling of need for this very useful piece of punctuation? If so, why can't the ARRL, the voice of the amateur in need, recommend the addition of this symbol to the list of Continental Code characters (perhaps the Morse Code's dahdahdhit would be suitable)?

I'm sure we all agree that "Hi Hi" is being used a little too frequently and, might I add, presumptuously where there should be an exclamation point! — *Paul Traverse, WN3KZY, State College, Pa.*

6 METERS

☐ I have a Technician license and have read with interest the results of your latest effort to keep six meters fully opened to holders of renewable amateur licenses in the February 1969 *QST* issue on pages 64-65.

The Technicians have large sums of money as well as great interest in this matter. A big investment in six-meter equipment and plans to reinvest in more modern equipment or improve present gear for us only to lose some of our frequencies seems most unfair.

Subsequently, you cannot win them all, but I have faith that you have not struck out and believe if we bring out additional facts we may still bring back these frequencies as you feel they should be used. — *William H. Boyer, W3AMQ, York, Pa.*

7 HOURS — 1 QSO

☐ I am sure you have heard or read about some fantastic feat accomplished by a Novice: 20 states with 125 QSOs on 40 with 10 watts on a 6AG7. Humbug! After having had a ticket for four months, I finally finished and ironed out the bugs in my rig. I was anxious for all that beautiful DX waiting for me. I found out something quite different. After logging 502 transmissions I had 21 QSOs, 11 of which were destroyed by QRM. I did everything under the sun to find out why. One Sunday, I was on the air for seven, count 'em, seven hours and had 1, count 'em, 1 QSO, 1 QSO! I even got up at 5 A.M. to beat the QRM on 40 and for some dawn DX but to no avail. But then it happened — 2 days after my last QSO, I boringly sent out a CQ and a guy answered. It was like a first QSO all over again. To a 15-year old Novice, ham radio is frustrating, but it still is tops. I wouldn't give it up for all the kilowatts in the world, contacts or not, I am hooked! — *Jack Robertson, WN2HOP, Copiague, N. Y.*

QST

COMING ARRL CONVENTIONS

May 9-10 — Michigan State, Grand Rapids.

May 24-25 — New England Division, Swampscott, Massachusetts.

May 24 — Central Division, Indianapolis, Indiana.

June 13-15 — Pacific Division, Sacramento, California.

June 20-22 — NATIONAL, Des Moines, Iowa.

July 4-6 — Rocky Mountain Division, Salt Lake City, Utah.

July 5-6 — West Virginia State, Jackson's Mill.

August 16-17 — West Gulf Division, Amarillo, Texas.

August 29-30 — Great Lakes Division, Louisville, Kentucky.

October 11-12 — Roanoke Division, Huntington, West Virginia.

October 17-19 — Southwestern Division, San Diego, California.

Note: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL for up to two years in advance.

NEW ENGLAND DIVISION CONVENTION

Swampscott, Massachusetts

May 24-25, 1969

The 1969 New England Division ARRL convention will be held May 24 & 25 at Swampscott, Massachusetts, and is again sponsored by the Federation of Eastern Massachusetts Amateur Radio Associations. The speakers program will include talks on DX, RTTY, repeaters, construction, public service, contests, MARS, etc., plus special feature talks on subjects such as radio astronomy, setting up a commercial broadcast station, seismology, film and talk about Apollo 8, the FCC and an "on the air" demonstration of matching Yagi antennas. Members of the League Staff will be in attendance and will talk on their special fields. The ARRL forum will be held Sunday at 11 A.M. YL programs are scheduled for both days. A night-club style show and banquet will start at 6 P.M. Saturday. A new feature this year will be a "flea-market" where buyer and seller can get together on good used ham gear. The first district QSL bureau will have cards available and there will be a "new" antique wireless exhibit by the New England Wireless Museum. A grand prize of a transceiver will be awarded Sunday — everyone is eligible and there is nothing to buy. W1EED/1 will be on the air giving mobile stations directions both mornings on 75, 40, 20 & 10 meters. Early-bird tickets for both banquet and registration are \$10.50 per person (\$3.50 registration only — \$4.50 at the door) and are available from John McCormick, W1KCO,

Berkley Street, Taunton, Mass. 02780. Hotel reservations should be sent directly to the New Ocean House Hotel, Swampscott, Mass. 01907 or to the Lynn Charter House Motor Hotel, Lynn, Mass. 01903. **QST**

ARRL MICHIGAN STATE CONVENTION

Grand Rapids

May 9-10, 1969

The 20th ARRL Michigan State Convention will be held in Grand Rapids on May 9-10 at the Grand Rapids Civic Auditorium and in the Pantlind Hotel. Saturday's activities will begin at 9 A.M. with a swap and shop and distributors displays. The featured speaker this year will be Dr. Paul Fuller, Chief Staff Scientist for Leasiegler, Inc. In addition NASA will provide color films on the flight of Apollo 8. Also, meetings on various traffic nets, MARS operations, and technical discussions will highlight the day. Friday evening, May 9 will be the beginning of the early bird entertainment at 8 P.M. followed by an initiation into the Royal Order of the Wouff Hong at midnight. The pre-registration fee is still only \$2; \$2.50 at the door. For further information contact Glenn Ricketson, K8LOY, 23 Morning Glory SW, Grand Rapids, Michigan 49508.

CENTRAL DIVISION CONVENTION

Indianapolis, Indiana

May 24, 1969

The 1969 ARRL Central Division convention will begin with a gathering of DXers Friday evening May 23, at the Stouffers Indianapolis Inn. A "hospitality" hour begins at 9 P.M. highlighted by a diving demonstration, soft-combo music, DX slides, and eyeball QSOs.

Lafayette Square Mall will be the focal point for Saturday's activities starting at 9 A.M. Several technical discussions will be held concerning such "hot" subjects as "The Legal and Technical Aspects of Phone Patching" by George P. Schleicher, W9NLT, "The State of the Art Doesn't Mean Solid State" by Dick Ehrhorn, W4ETO, of Signal/One, and "Problems of DXing from Navassa" by the U.S. Coast Guard. Additionally, topics on f.m., traffic, DX, and amateur TV will be covered by experts in the field. Among those attending will be J. I. Wathen, III, W4BAZ, ARRL, Central Division Director Phil Haller, W9HPG, and Bill Durkerly, WA2INB/KL7ELA, from ARRL Hq.

Saturday evening festivities include a banquet featuring U.S. Senator Barry Goldwater, K7UGA, as guest speaker with Stu Meyer, W2GHK, of Aerotron acting as MC. Indianapolis Motor Speedway owner, Tony Hulman, planning to be there and will be inviting a banquet guests to visit the speedway for the final "500" time qualifications on Sunday the 25th.

While the fee at the door will be \$2.00, family preregistration for the OM, XYL, and Jr. Ops. can be made prior to May 12. \$1.00 should be sent to Joe Poston, 309 Benton Drive, Indianapolis, Indiana 46227. Registration includes XYL entrance to the Shopping Mall for fashion shows and demonstrations, and of course rides and snacks for the kids. Banquet reservations and tickets can be obtained at a cost of \$10.00 each or \$18.00 per couple. For tickets or information, you can contact the Chairman at the above address any time. If you wish, Joe's telephone number is 317-881-9771.

Hamfest Calendar

Alabama — The Birmingham Hamfest will be held at the National Guard Armory on Opporto Street in Birmingham on May 3 and 4. For further information contact the Birmingham ARC, W4CUE, P.O. Box 603, Birmingham, Alabama 35206.

Alabama — The Annual Hamfest sponsored by the Mobile ARC will be held on May 24 and 25 at Mobile, Alabama. For entertainment, swap table, eye-ball QSOs, and fun for the whole family, plan to attend. For further information and reservations call or write Ham Wentworth, W1LZX, P.O. Box 7232, Mobile, Alabama 36601. Tel.: (205) 473-8561.

California — The Lockheed ARC, W6LS, is holding its Burbank Hamfest on May 17 and 18. There will be displays, good program, free parking, and food at reasonable cost. \$2.00 donation per ticket. Pre-registration tickets or further information from LERC, 2814 Empire, Burbank, Cal. 91504.

Florida — The St. Petersburg ARC, Inc. will hold its annual Hamfest at Lake Maggiore Park, entrance gate at 9th St. and 38th Ave. South, St. Petersburg, Fla., Sunday May 18. All hams and guests cordially invited. This is an old fashioned hamfest with picnic lunch, swap table and fun for all.

Illinois — The Kishwaukee ARC will hold its annual Swapfest on Sunday May 4 at the Hopkins Park Shelter House in DeKalb, Ill. No charge for buying, selling or swapping but a \$1.00 donation will be expected. Come one, come all and meet your ham friends.

Illinois — The Rock River Radio Club Ham Vention will be held on May 18 at the Lee County 4H Center, 6 miles South of Dixon, Ill. Technical lectures, plenty of parking, new equipment display and XYL program. Contact W9SON for further details.

Indiana — The Wabash County ARC is sponsoring their First Annual Hamfest on May 25 at the 4H Fairground at Wabash, Indiana. For more information contact Dick Webster, K9ULW, 1165 N. Cass St., Wabash, Ind. 46992.

Indiana — The Indianapolis Ham Association is having their first Convention at Indianapolis, May 24.

Kansas — The Hi-Plains ARC will hold its Annual Hamfest, May 18 at Plains, Kansas. No pre-registration. Featuring basket dinner, swap table and eye-ball QSOs. Parking space will be available at the City Park shelter house for campers and trailers. Hook-ups are not available. Saturday night rag chew open to all.

Michigan — The Hazel Park ARC Swap/Shop will be held at Hazel Park High School on May 18.

Nebraska — The Pine Ridge ARC will hold their Annual Hamfest on June 1 at Chadron State Park, ten miles South of Chadron, Neb. Each family bring a covered dish and own utensils. The club will furnish coffee and soda pop. There will be contests and awards including mobile judging, transmitter hunts, and code speed. Don't forget the swap table.

New York — Rochester is the location for the 36th Annual Western N. Y. Hamfest and V.H.F. Conference, the weekend of May 10. Same location as last year at 50 Acres, Rte. 15 just South of Thruway Exit 46. Advance registration and banquet only \$5.75. Advance sale closes May 2nd. Send check or request for information to Western N. Y. Hamfest, P.O. Box 1388, Rochester, N. Y. 14603. Activities start Friday night followed by full day of techni-

cal programming with outstanding speakers. Special activities include Navy MARS, ARBC and QCWA meetings, YL program, code contests and huge flea market. See you there.

New York — The Rome Radio Club presents the 16th consecutive Ham Family Day on Sunday, June 1 at Beck's Grove, ten miles West of Rome, N. Y. Features include technical talks, a mobile DX contests, and a technical quiz. Also, participants in the flea market are invited. An afternoon of entertainment for the ladies and children is planned. Registration starts at noon with that famous chicken and steak dinner at 5:00 p.m. Advance adult reservations \$5.00, at the gate, \$5.50. Children under 12 \$2.00, under 6 free. Send reservations to Rome Radio Club, Box 721, Rome, N. Y. 13440.

Ohio — The Ashtabula ARC will hold an auction on May 3 at the K of P Hall, Fargo Drive, Ashtabula, Ohio. Doors will open at 7:00 p.m. with the auction starting at 8:00 p.m. Free refreshments will be served to everyone attending.

Ontario — On May 16, 17, and 18, the Ontario Trilliums will be hosting the Mid-Western Convention for women amateur radio operators at the Canadiana Motor Hotel, Kennedy Rd. and 401 Scarboro, Ont. For more information write Doreen Aston, VE3EUR.

Pennsylvania — The Foothills RC Inc. of Greensburg, is having a Hamfest Sunday June 8. This event will be held at Wendel Park, Route 30, Irwin, Penn.

Pennsylvania — The 15th Annual Breeze Shooters Hamfest is to be held at White Swan Park near Pittsburgh, Penna. on May 18.

South Carolina — The Palmetto ARC announces its Second Annual Hamfest to be held indoors at the State Fair Grounds, Columbia, S. C. on June 1. A Dutch supper is in the planning for the night before. The Hamfest will feature swapping, a transmitter building contest, home brew contest, antique radio display, f.m. and MARS Forums, and bingo for the XYLs. More information from C. W. Moorer, K4FNT, 227 Castle Dr., West Columbia, S. C. 29169.

South Carolina — The Blue Ridge Radio Society will hold their seventh Annual Hamfest Sunday May 4 at Cleveland Park, Greenville, South Carolina.

Wisconsin — The Ozaukee Radio Club will have its Annual Hamfest at the Belgium Community Center at Belgium, Wis. on May 25. For further information write Ozaukee RC, Box 13, Port Washington, Wis. 53074

QST

Strays



K7UGA's volunteer crew, with Barry Goldwater holding a plaque, responsible for many thousands of MARS phone patches last year. Young lady in the center is Doris Counts, who handles the station paperwork, QSLs, scheduling, etc., especially while the Senator is busy again in the nation's capital.



CONDUCTED BY ROD NEWKIRK,* W9BRD

Whoa!

Long Hall sounded like Gus's 14-MHz. VQS slots under fire during short-skip conditions. QRM almost drove our ears to cut-off as we elbowed through to the relative safety of gallery seats for the umpteenth May meeting of the DX Hoggerly & Poetry Depreciation Society. Lots of ex-Gs in attendance this year.

O. U. Sakitumi, chairman very *pro tem*, grabbed his gavel to introduce our guest of honor, a sickening specimen indeed. After a few more kegs of Old Haywire we jarred the place with the Wouff Hong Song, DXHPDS anthem, and settled back to do our annual thing. From the stage that freakish visitor greeted us in a mushy voice that sounded like tortured audio emitted by the undersized 'speakers of those bargain-basement midget TV sets now glutting the market. The clown wore dark thick-lensed glasses, a pin-striped herringbone-twill suit and appeared undernourished enough to be subsisting on TV dinners. YLs first, so Wanda Grabbim started off the program:

Hot-sender Bugsy McGlee
Brought home an electronic key.
He tried and tried
But finally cried,
"This doggone fool thing's sending me."

A lead-based rabbit-ears TV antenna bounced off our guest as Sue Perpower yelled her offering above the din:

There was a DX hound named Shmuv
Who scoffed at the hot lines above.
He went hoppin' past
With a high metal mast—
Yes, there was a DX hound named Shmuv.

Several Channel Two Yagis with needle-sharp elements ripped off our myopic visitor's vest, wrist watch and charm beads while Vera Uptight took her turn from the floor:

A great engineer is O'Skree,
An audio expert, you see.
Just stand by some more
While he tries three or four
Microphones alternate-ly.

The flinching fink next presented an abortive tech speech on linear amplification of ITV birdies and the proper matching of TV-set horizontal oscillators to the a.c. line. Val E. Indristing pierced the ensuing uproar:

One rover with high sense of mission
Embarked on his DXpedition
With plans far too vague.
He returned with the ague
And a case of severe malnutrition.

Our seedy guest then discussed "progress" in the development of ultrasensitive nonlinear devices for installation in rooftop TV receiving antennas. The resulting barrage of old CRTs

almost finished him off as Kenny Spreadmore delivered

Von Jurk with a micro-sized brain
Slowly drives all the locals insane,
Making hideous noise
As he roars at the boys
With his gain past the threshold of pain.

The rowdy audience grew dangerously belligerent as our creepy visitor bragged about having transmitted the original brainwave causing establishment of lower-v.h.f. TV channels. Obie Quayet hollered:

A C.B. with mind full of static
Thinks Uncle is undemocratic.
He daily demands
A dozen more bands

For his secret black box in the attic.

It was clearly time for the award presentation, so our messy guest was abruptly seized by a flying committee of DXHPDS operatives garbed in white. Before you could say "in a moment, but first this message," a micro-sized multichannel TV set with no off-switch was surgically implanted in the emptiness of the goof's cranium.

When he regained consciousness in a few moments there must have been two or three cheap off-color kook-studded panel shows and an early-early-oldie movie running simultaneously, for he raced madly screaming out the backstage exit. When last we saw our unanimously elected DX Dog of the Year he had already turned negative and was beginning to tear horizontally.



*7862-B West Lawrence Ave., Chicago, Ill. 60656

--Reprinted from August 1955 QST



Radio Society of Iran's January meeting at Tehran included (left to right) DL2WB, EP2JP, W4GUS, WA5AUA, EP2BF, EP2BI, EP2HL, RSI QSL manager T. Libershall, WA9EHZ, WB4DSF, EP2DA, HC5HC and EP2CB. Members gather on the last Thursday of each month, and EP2CB at the United States Embassy welcomes attendance inquiries from amateurs passing through the region.

What:

Twenty's the band where 5B-DXCC skeds are made for other bands, so 14-MHz. DX biz is still brisk. There's a noticeable thinning out in the evenings, though, when the boys make their move on 40 and 80. Anyway, time to sample stuff lately worked, heard, called, heard worked or heard called on

20 c.w., and we'll leave out all the ZAs and Biatrans and ZK2AU. **Ws** 1VAH 21CO 2KSK 2LJF 3HNK 4YOK 6YKS 7BE 8BOV 8LXB/2 8YGR. **Ks** 3CUI 3UXY 4TWJ 5YUR 8DHT 9SR/2 0GVA. **WAs** 1FHU 1GGN 1DDP 1JKZ 1MAI 2APG 2BHH 3GVP 3HMIR 3HRV 3IDJ 3JRY 3KOS 5PPZ 5SOX 8MCQ 8VBY 8YXE 9MQL 9SQQ 9TFM. **WAs** 2RNL 2UOO 4GSS 4GTI and IER account for radiotelegraphers **A2s** CAQ 1700 GMIT, CAU (14.018 kHz.) 18-20. **AFs** 2AR (30) 12-13, 2SG 16, 5CP (65) 12, 5HQ (5) 22, **BV2A** (28) 12-13, **BY1C** (20) 2, **CEs** 2CN (50) 23, 2DI 2ID (24), 2PN (11), 2Q1D (33), 2RI (21) 0, 3CF (27), 3EX 3RY (46) 23, 3ZK (31), 6EF 9AT (50) 4, **CM2s** 0N (10) 21, ZU, CN8BK (10) 22, **COs** 1AR (12) 23, 2AP (21), 2CG (50) 22-2, 2CN (2) 23, 2DR (10) 15, 2FC (64), 2KG (50) 3, 2PY (15) 22, 6PP (12), 8VT (30), **CP8AM** (55) 0, **CRs** 3KD (4) 23, 6AI (27) 18, 6BN 6BX (40) 6-20, 6CA (86) 10, 6EI (9) 18, 6IV (80) 18, 7BN 7HU (50) 18, 7IZ 15, **CTs** 1BQ (19) 22, 1GD (25), 1IT (56) 21, 1MK 1MO 1TT (10) 2, 1VB (40) 22, 2AK (20) 0, 2BO (24) 22, 3AS (28) 22, **CXs** 1AAD (50) 23, 20J (46) 22, 4CO (27) 22, **DMs** 2ATD 2BDD (83), 24KI (36) 20, 2BLJ 2BOB 2BOG 2. 2BTO 2BZN (25) 19, 3CZM (19) 20, 2DDN (11), 4YEL 6MAO 8ROS, **DUs** 10R (35) 13, 1UP 2EN (21) 23, **DX1AAV** (30) 16, **EAs** 6BH (64) 19, 8FF 21, 8FJ (43) 8, 8FO (24) 1-2, 8FS (23) 1, 9AQ (35) 17, 9EO (8) 1, **ELs** 4Z (72) 23, 5HH (50) 13, 5F 9AR (4) 21, 9J (25), **ELs** 2D (36) 23-1, 2BE (26) 22, 2Y (41), 2Z (71) 23-0, 8L (16) 23, 8R (42) 22, **EPs** 2BQ (57) 14, 2EE 3AM (30) 17, **ET3s** RN 23, USA 22-23, **Fs** 8TT/FC 13-14, 9UC/FC 13-14, 9VN/FC (20) 16, **FBs** 8Ws WW 17, XX (70) 23, YY 16-18, ZZ (5) 11, **FG7s** YG (48) 22, TX (33) 23, XC (50) 20, XT (57) 21, XX (40) 21, **FL8s** AU HM (31) 19, MB (37) 20, **FM7s** WH (75) 21, WO (13) 19-21, **FO8s** AA (45) 5, AU (81), BO (33) 16, BV (50) 16, **FP8s** AP (20) 12, CW (26) 11, **FR7s** ZD 18, ZF ZS (15) 12, **FY7s** YK (76) 18, YAI (75), YN (15) 0, **GCs** 2LU 3AAU 3EML (5) 21, 3IEW 30BM (53) 20, 3UJE 19, 3ULZ (19) 22, **GD3s** AIM (33) 21, FBS (26) 14, **PXN** (21), **HAs** 1KSA 1KSS 1KZB 1SQ 1SVI 3GA 3MB 3MJ 4KYB 4KYF 4KYH 5AF 5AK 5KFZ 7KPH 7KPN 7LD 7LU 7PS 7FB 8OC 8KCC 8KCP 8KUC 8UD 9HF 0LG, **HCS** 1RR 2HAM (69) 23, **HH9D** (20) 18-19, **HPs** 3PC 7MC (58) 0, 8PN, **HKs** 3AMJ 3AV 3RQ 4ALE (39) 0, 5YC (64) 2, 6IC (20), 7AHM 0AI, **HL9s** KH (25) 12, TW US (9) 12, **HM5s** 1DH 5CL (6) 23, **HP1s** AD (10) 3, BR (32) 3, FEE (11) 2, XHG (53) 18, XYZ (53) 23, **HS1EL**, **IS1BD** (62) 20, **II7s** AGA (32) 15-16, AB (25), AI (47) 18, AQ (81) 5, AUA (73) 21, PST SBT ZGY (28) 3, **JAs** 1AH 1BGR 1BNW 1BZR 1CJF 1CWZ 1FGB 1JAN 1OHD 1OJE 1YL 2EG 2EKR 2HJX 2HSE 2LC 2WB 3DYU 4CX 5BIC (55) 12, 6AD 6AOC 6YCW 7AYW 7RWV 7CDV 7FS (8AE) 8AQX 0/AZE 0/VBB, **JH7s** EPS SEX, **JT1s** AG (15) 2-4, KAA (30) 3, **JXs** 2BH (6) 23, 5CL (29) 23, **KA2N** (35), **KC4s** USB (50) 21, USF USM (25) 1-5, **KG6s** AAY (12) 12-13, AGY (28) 8, ALV, **KJ6BZ** (49) 9, **KL7s** AZN EWA PPA FSW 2, FSV (50) 6, GGN (57), GLS (100) 3, MF (21), IR 1, **KRs** 6AW (38) 14, 6KQ (72) 8-11, 8BL 8DE (50) 12, **KSs** 4CZ (39) 20, 6CX (30) 3, **KV4s** AA (79) 23, CI (2) 21,

EU (66) 23, FZ (8) 21, **KX6s** BQ (11) 10, GD 11-12, **KZs** EM (80) 22, NC (18) 1, NG (3) 1, RP (70) 22, SF 21, LAQAD, **LG6LG**, **LJ2T** (43) 11, **LUs** 1DI 1SE 2DAW 2EN 3EP 4ECO 6ABX 6AX 6FBR 7AU 7BH 7BN 8DSJ 9DAV 9DTQ, **LX1s** AU (25) 14, RG (22) 19, RM (40) 16, **LZs** 1FP 1KBG 1KKZ 1KPG 1KSF 1KSM 1KSZ 1LW 1SS 2EA 2KAF 2KPG 2KRO 2KRS 2ZZ **M1s** B (96) 16, 1, **MP4s** BBA (32) 15, BEU 2, BGN MBJ (30) 7, TAF (18) 23, TCE (87) 7, **OAs** 4ACF (13), 4KF (16) 22, 4QN 4VE 4XK (6) 23, 0LS, **OD5LX** (26) 6, **OEs** 2PZL (36), 3SGA (23), 4SZW 5XPL (28) 23, 6GC 6HZG (20), 9, 9SKI (18), **OH0s** AA (30) 0, NF (7) 7, RJ (23) 22, **OK7UTB** (23) 8-9, **OXs** 3FD (16) 18, 3MB (51) 23, 3UD (4) 23, 3ZO (77) 1, 5AA 5AC 5AO, **OYs** 1F 1IR 1R (8) 20, 2H (26) 15, 2X 2Z 23, 3H (37) 1, 3HP (60) 16, 4OV (3) 9, 5R 6FRA 7JD 7TM 7Z (12) 22, 9LM, **PJs** 1CV 2CB 2CK (110), 2VB (50) 22, 2VD (56) 13, 7VL (19) 23, **PYs** 1BQI 1CKZ 1DB 1FK 1MB 1PK 2CLX 2DBU 2DLK 2DSE 2GLJ 2NE 2NX 2RZ 2SO 3AXN 4BCX 4UG 4ZG 5ARX 5ASN 5YC 6ABD 6JD 7AH 7AN 7AW 7AHO 7SR 7VNO 8FI 8FK 8FM 9HL 0EP (53) 23, **PZ1s** AV (47) 20, BD (48), BI (22) 23, BL 22, DJ (23) DE (73), RAEM/mm (50) 4-5, **SKs** 2AU 2ZA 3BG 5AA 6AB, **SLs** 4SA (26), 6CY (25) 23, 7AC 20, **SM2s** COL (30) 23, PZE ME, SPs a-plenty, **SU1IM** (25) 8, **SVs** 1CA 0DD (25) 1, 0SV (36) 21, 0WH 0WB (27) 13, 0WN 0WOO (31), 0WP (22) 19, **TAs** 1AV (70) 12, 1IB 1KT (11) 21, 1NC (45), 1SK 2DX (29) 11, 2E (26) 3, 2EI 2EK 2EM (27) 18, 2SC (28) 10, **Tfs** 2WLI (20) 13, 30J (45) 19, **TG9EP**, **TJ2LA**, **TJ1QQ** (5), **UAs** 1KAE (20) 0 of antarctic wastes, 1KED (40) 2 of F.J.L., 2AC 2DO 2DVI 2KAP 2KAQ 2KAS (46) 15, 2KBD 2KCC (11) 3, 9AB (30) 9CV 9FV (43), 9IB (13) 0, 9JL (14), 9KHB (28), 9KOA (5), 9KOG (10), 9KSA (47) 4, 9KUK 9NN (18), 9OS (37), 9PF 9PG (41) 4, 9VK (68), 9YW (68), 9XN 9YG (28), 0AF 0BL (43) 1, 0EH 6, 0EQ (40), 0EX 0FS (12), 0IW (10), 0KAE (23) 12, 0KAH 0KBS (20), 0KCC (40) 6, 0KFG (21), 0KKK 11, 0KOD (15) 7, 0KQU (27) 6, 0KZB 11, 0KZD (55) 2, 0LE (2), 0LI (6), 0LL (55) 9, 0SL (15), 0TW (25) 2, 0YD (10) 2-4, 0YF 3, 0YT (15) 1-2, 0C (13) A (36), **KMZ** (26) 19, **KNU** (33) 0, **KSB** (30), **OCs** BA (4), TA (32) 22, **UBs** EC EH EO (27), ES (28) 2, JR (4), JN (28) 15, KAA (20), KCD KDS 23, KKA KKD KKO KQO A (24), RN (27), TL (25), TR (25), **UD6s** AR (73), BW (40) 15, **UF6s** AM CR (3) 2, CX (12) 3, DZ (65) 2, HS (47), **UG6s** AB (15) 2, AD (30) 15-16, EA (15), KAA (40) 13, **UH8s** AB (15) 13, AE CI CS (4) 16, 1DH (19), LI DT 13-15, KBC (55) 16, **UI8s** CY (38) 3, EK IZ (7), KAA (44) 7, KBA (55) 11, KNA (28) 15, **OJ**, **UJ8s** AC (51) 15, AH (36), AI (65) 2, BS (7) 8, KAA (25) 12-13, SX (48) 16, **UL7s** BG CG CA DLJ FU (32), FG (18) 2, GW (40) 13, JA (45) 15, KAA KBA (33), KAR (58) 13, KKB (35), KDW (62), KFD (50) 7, KFB (40) 11, KKB (32) 11, KKG (18) 8-9, OE PH (45) 11, QO RL (45), RQ XF (9) 11, **UM8s** AP (30) 3, IE (42), PAL (84) 13, KAA (49) 13, KAI (72) 4, **UN1s** AB BR (45) 15-16, CQ (80) 3, KAL (11) 12, **UO5s** AP 16, AS AV (19) 19, BM (5) 20, KAA 17, PK (26), SM (75) 22, **UP2s** KBA (80) 11, KBC (17) 18, KBI (62) 5, KDB (42) 14, KMU (8), KMW (41), KNP (27), NA YS 23, **UQ2s** AF (20) 21, AN (2) 21, CC (18) 20, KAE (30) 13, **UR2s** BU (17) 13, KAX PP (61), PY (13), PZ (8), **UR2s** BU (17), HX (19), JW (75), KAD (15), LO (19) 6, **UT5s** BF 21, HP (59), KCU (41), KDP (25), KKM (47) 18, LF (34), MD (27) 2, QE (81) 21, SY (40), UV (16) 19, XB (21) 15, XJ (18),

UVs 9CU (17) 14, 9CU 9DI (28), 9DR (13), 9KAG (21) 13, 9UA (45), 9AB 12, 9JZ, UWs 9AI (11), 9ER (48) 4, 9JF (29), 9HJ (29), 9KDH (26), 9PJ (41) 2, 9SA (6), 9VC (20), 9AJ 9AZ (21), 9BA 9BX 9BQ (24) 23, 9FL (30) 11, 9IF (2) 3, 9IG (20) 6, 9OU 9TB (16), 9TH (50), 9V5s EI (30), 9U QE (45), TE (8), 9U (UW) (5), 9NH (46), 9H (26), 9Vs 8RX 8YQ (36) 15, 8YX 8ZZ 9MD (25) 1, 9Ks 6HJ (80) 13, 6IZ (30) 23-0, 6OV (10) 11, 6RU 16, 6SA (72) 0, 6US (28) 18, 7OM (32), 7SM (47), 8HA (49) 21, 9KS 9TG (14) 11, 9XL, 9V0s AF DU (22) 16, 9F 1, 9Ps 2AZ (60), 2DAJ (45) 2, 2DAP (26) 2, 2GBR (15) 21, 2GLE (43), 2MK (80) 23, 2MO (30) 4, 2VW (2) 19, 7EB (69) 23, 7NF (15) 21, 7NP (20) 22, 8BJ (29) 0, 8DJ (10) 13, 8HO (67) 22, 9B 9BK (5) 1, 9EC 9FC 9GD 9GG (45) 3, 9GI 23, 9WB (14) 23, 9Qs 8CC 8CJ (70) 2, 8CF (41) 14, 9B 9MK (50) 18, 9R4CR, 9Vs 5PH (10) 10, 6AA (25) 14, 6AE 6AF 6FX (36) 15, 6WR (50) 15, 9V2s CP (58) 18, 6GB (22) 15, 6W (35) 13, JA (65) 0-1, JN (40) 1, KQZ LE (51) 2, LN (40) 13, LO MD (49) 13-14, NO (31), OLK (54) 15, QQ (55) 18, QV (65) 1, RQ (27), SL 18, SN 1, VZ (41) 1, WP (26) 16, XEs 1AAG (3) 23, 1AX 1BN (80) 3, ICE (4) 7, IDDM (78) 4, 1RM (12) 21, 1TQ (30) 23, 1YX (10) 14, 2AAG (14) 18, 2CCI 2SSL 9DUS 9GEN 17, XPIAA (14), XW8s RP (26) 12, CD (10) 17, CR (50) 0-1, CS (40) 1, YAs 1CW (44) 20-0, 2HWI (31) 3, YN1s AA (13) 12, CM (17) 23, CW (20) 21, RAMP (27) 3, YO 2ABW 2AFB (20), 2BC (17) 17, 2KAQ 3RF (27), 4CT (47) 0, 8KAE 9EM 6, YSs 1AG (14), 2RC (33), 9Vs galore, YVs 1ACH (72), 1KA 1ZE (38) 12, 2LL 4AQ (58), 4OY 4SA (20), 5ANT 5BFQ 5BNR 5CL, ZB2s A (25) 22, AZ BG (15), ZC4JH (6) 8, ZDs 5-M (37) 16-19, 5X (17) 13, 7DI (37) 1, 7GS 8J (41) 22-23, 8JW (15) 21, 8Z (30) 23-1, 9BK (18) 19, ZEs 1AE 1BF 18-19, 1BH 1BT (44) 19, 1CY (58), 1DG 2JS (44) 19, 2KV 3JO (21), 3XJ 3JJ (63) 21, 8JN (35) 20, 7P5s CE (30) 22, KA (75) 23, OQ (30) 0, ZS3s AW (10) 20, E LU (10) 21, XO 21, XQ (78), 3AZMJC, 3V8VA (15), 4S7s AB (40) 13, EC (39) 18, NE (34) 2, 4U1TU (40) 16, 4WIADO (15) 16, 4X4s BG (35) 1, FU (62) 5, HD WN (40) 0, 4Z4BG (30) 2, 5As 1TA (20) 18, 1TY (75) 7, 2TQ (14) 18, 2TV (5) 13-14, 3TW 9, 5H3s KJ (41) 20, 1V (59) 18-19, 5N2AAK (7) 18, 5R8s AM (74) 3, BB 5U7AK, 5W1AR, 5Z4s JS (8) 1, LW (46) 1, 6W8s AW (30) 21, BL (38) 20, DQ (39) 22, DY XX (40) 23, 6Y5s SR (25) 22, UC (43) 0, 7P8s AB (40) 19, AR (48) 19, 7Q7s AR (24) 17, GB, 7Xs 2AI (21) 21, 2FO (48) 18, 9WV, 7Z3AB (35) 14, 8P6s AE (30) 22, AG (30) 23, AO (25) 0, AU (31) 0, AY (50), BU (13) 21, BX (44) 22, CF (42) 21, 8QALK, 8R1s J (10) 21, H, 9E3USA (10) 15, 9F3USA (10) 15, 9G1s FN (10) 8, GM (85) 20, 9H1BL (15) 23, 9J2s AB IE (75) 4, MX 21, RA (36) 18, WR (8) 19, 9K2s BJ BV (26) 19-20, 9M2s LN (61) 10, ON (19) 13, US (44) 23, 9Q5s FH (44) 0, SS, 9Z5s AB CR, 9V1s LK OC (21) 10, OJ (54) 13, OK 23, ON OS (39) 1, OT (22) 13, PA (35) 15, PF (35) 16, PI and 9Y4DS (30) 3. Fishin's fine!

Next month we'll check another band or more thanks to dispatches from (15 phone) Ws 2DY 2LJF 2VOZ 3HNK 4UF 4YOK 5BZK 8HQV 8YGR, Ks 5YUR 6TWT, WAs 1IDP 2BHJ 9MQJ 9SQY 9TFM 9URY, WB2DZZ, P. Kilroy, B. Tindall; (15 c.w.) Ws 1BGD/2 1EGM 2LJF 3BBO 3HMR 3HNK 4YOK 7BE 8BQV 8YGR, Ks 5MHG/6 5YUR 9EJZ, WAs 1FHU 1JKZ 1KEX 2APG 2DQE 2FOR 3GVP 3JRY 5SOX 7BOA 8VBY 8YXE, WAs 2DZZ 2RNL 2UOO 4IGL, WNs 2DRS 2FEL 2GMC 9WLF 9ZRV 9WEP, IER, VE7-BST, B. Tindall; (10 phone) Ws 1EGM 2VOZ 3HNK 4UF 4YOK 5OJZ 8BQV 8YGR, Ks 1HDO 5YUR,

WAs 8MCO 8YXE 9TFM, WB2DZZ; (10 c.w.) W 3HNK 4YOK 7BE 8BQV 8YGR, Ks 1HDO 3CU 3UXY 5YUR 9GVA, WAs 1FHU 1JKZ 3ATX 5FPZ WB2s RNL UOO, IER; (40 c.w.) Ws 1ARR 3HNK 4YOK 7BE 8YGR, Ks 8DHT BSRR/2 9YRA 9GVA WAs 1FHU 2FOR 5SOX 7BOA 8MCO, WBAGT, VE3GHO; (40 phone) W8YGR, W8SMCO, P. Kilroy (80 c.w.) Ws 1BGD/2 1SWX 7BE, K8DHT, WAs 1FHU 2DQE 2FOR 8MCO; (75 phone) WAs 8MCO 9SQY, P. Kilroy; (160) Ws 1BB 2RAA, K8DHT, WA1FHU (20 phone) Ws 2VOZ 3HNK 8YGR, WAs 1JMR 5PP 8YXE, IICTL and Mr. Kilroy. Indications are that W1BB has passed the 1.8-MHz, 100-mark by a comfortable margin now. If SteW can do it all over again in a hurry he'll have a dandy start on 5B-DXCC!

Where:

OCEANIA—Cocos-Keeling newcomer VK9KY's QSO chores are undertaken by VK2SG. The latter remarks, "As mail service to Cocos island is once every three weeks there might be some delay in delivery of cards, but it is hoped that this will be kept to a minimum. The usual arrangements will apply—self-addressed envelopes and five International Reply Coupons will receive answer by air, less than five IRC will be answered by surface mail, and no IRCs will be answered if credit permits." Everybody's been looking for VK7KJ's address re VK0KJ QSLs. Try VK7ZKJ According to West Coast DX Bulletin it complicates things for QSL manager V6EAA when you ship him more than one QSL per envelope, also that adding "via Darwin, Australia" to your direct mail to CR8 amateurs FO8AA hunts a French-speaking VE2 for on-the-air success and QSL managerial duties, says DX News-Sheet.

EUROPE—International Short Wave League's Monitor somewhat clarifies HV3SJ QSL confusion. Cards from stations in (1) Europe, Africa and Asia go direct or via the Italian bureau; (2) in "the Americas continent" go via WB2ETI; and (3) U.S. and Canadian west coast go via W6KNH when the latter acts. HV3SJ's net control during QSOs Ex-DL4Z advises, "QSLs for contacts made with DL4ZS from May, 1968, to March of '69 can be obtained by sending cards to Capt. P. R. McKeely, WB4IGX, Tucker Trailer Co., Lot 19, Radcliff, Ky." SVOS (WB2AWQ) writes, "I previously held the call KG4D. Anyone still needing my Guantanamo QSL please contact. I'm still working on them between W/K/V patient."

ASIA—"QSLs for all EP stations may be sent direct to Callbook addresses or via the Amateur Radio Society of Iran QSL bureau," assures EP2CB (WA6GZZ) Effective January 25, 1969, DL7FT became my QSL manager," notifies KR6JT. "Franz receives my logs monthly." K6CAG/1 points out that the term Arabian Gulf is in disfavor in certain mid-east areas. For higher QSL returns use Persian Gulf where required "I no longer serve QSL manager for 4X4s SK and SO," reminds W4TKK now stationed in Lima as OA4DX West Coast DX Bulletin understands that J12AJC brings a thin Japanese prefix into play, also that QSLs might reach BY stations if sent via Radio Peking with International Reply Coupons. (Well, got a better route "All VS6s guarantee 100-percent QSL," guarantees HKARTS secretary VS6AA concerning this month's planned Hong Kong Amateur Radio Transmitting Society DX party.

HB9AAA files a photo of QSLs confirming QSOs with ARRL DX Century Club members in 100 or more countries, most of them visible here. It's "DXCC-squared" No. 59 and the second from Switzerland after HB9J. No, this isn't an "award", just a little game some of the lads have enjoyed playing for more than a decade. How many of these pretties are on your wall?



AFRICA—3V8AC tells WIWQC he had to leave 9Q5CZ hurriedly sans logs, hence Bob can't confirm his Congo QSOs Ws 2FAR 3BQ 3EVW 3TV 5LLB 6CBP 6GP, Ks 2KUR 4THA 5HTM 6VW 9COS, WAs DXA and QIY may have 7Q7AM QSLs awaiting arrival of self-addressed stamped envelopes at WB2BJJ ZS2OB tells WA3ATX she has only 68 pastboards to show for 600 QSLs sent State-side. Fellas! West Coast DX Bulletin has it that the Liberian field day label, 5L, is being used to commemorate the 25th anniversary of President Tubman's office. Suffixes remain unchanged in most cases; 5L8J equals EL8J, for example Geoff Watt's DX News-Sheet gives Michael Dort, F2MO, Maison Heldu, 64 St. Pierre d'Irube, Basses-Pyrenees, France, as FB8XX's QSL address for QSOs after January 6, 1969. FR7ZD holds earlier logs of former FB8XX operator Maurice. FB8ZZ now has his confirmations handled by F3LO and/or F8US The same organ hears that ZS6N shoots ZSIANT's antarctic QSLs out via bureaus after receiving log transcripts on the air For Impressive QSL of the Month KARON nominates the three-dimensional artpiece of ZS6AYI CR6GO, not a member of his local radio society, tells W5BZK he wants his QSLs via England's RSGB. All DXers should keep in mind that some overseas societies relay QSLs on a members-only basis. QSL via the ZZ bureau only if ZZIA tells you to.

HEREABOUTS—"I'm QSL manager for HR2HHP as of February 27, 1969," declares WA9RAT "I signed VP2MJ for ten days in February of '65," recalls K3HGX in lines to WISWX. "Now I'm receiving QSLs for some operator named Monty using that call." Somebody digging obsolete QTH data from old DX notes? Failure to include s.a.s.e., or s.a.e. plus IRCs if appropriate, will slow your VP2VY reply to a crawl, says W3HNK in behalf of the former "I find Russians and Africans the hardest to get QSLs out of," reports K3AC, making a DX comeback. "I'm beginning to catch on again with a 90/50 worked/confirmed total. To me QSLing is the final courtesy of a QSO, and when a guy puts a price on his card I don't want it, even if he should be on the moon's backside." Amen, brother Mac West Coast DX Bulletin comments, "Some countries do not honor International Reply Coupons but amateurs in those countries will accept them for trading purposes. In other countries where IRCs are supposed to be good there sometimes is difficulty due to unfamiliarity at local post office levels." W3DJZ observes that VPs HZ IA JB and JC have G3NMH handling QSLs for British QSOs only. Others should go direct VK3APN, in Long Island DX Association's DX Bulletin, claims that KV4CI does so QSL in response to s.a.s.e. Ws ISWX 3BBO 3KJ 5IB, K1HDO, WAs 1JKZ 2BHI 8YXE 9SQY and listener P. Kilroy nominate our "QSLers of the Month" this time, namely CRs 6ML 7IX CT2AC, EL2AS, F8DP, FYTYK, G3s SM VJH/8RI, HG5GG, HK0TU, HV8SJ, KH6GPM, KJ6CD, KS6CX, KV4YE, LX1DT, PZ1V, SM0CB, SV0WM, TA2E, TG9CD, T12NA, UV3-ADG, VE7BG, VP2VY, WHST/8RI, XE1WS, YN1-GLB, YV8CCX, 8P6AE, 9J2XZ, 9K2CF, 9L1AC, 9Y4s DS PHO and RS, plus QSL aides W5HM, Ks 4ADU 9CSM 9KLR, WB2ETI, VE3s ABG EUU IG and DJ1-Q, all specifically commended for QSL promptitude beyond the call of duty. Any fast fellers in your file lately? "Elp! These italicized brethren hunt hints toward prying QSLs from reluctant mentioned: W8VMB, VQ9FX; WA4CZM, PJ0CC; WA4ZLP, 8Q4YL; WA5PZX, CN8FN, F8Ps, CG DZ, JX2BH, KP4DDB, VE0MB; WB2JBJ, 3V8RG; WB4GL, EL2BJ and 9Y4KK. Ideas? QSL managerial service for DX ops in need is offered by WAs 1JMR 8YXE 9SQY, Ws 2RLK 8YNK and WN6QQE Good supply of individual suggestions this month but remember that each datum is necessarily neither "official," complete nor accurate. . . .

AP5CP, Tiger ARC, Dacca Signals, Dacca 6, E. Pakistan
E8AGM, Box 860, Las Palmas, Canary Islands
EI9Is SI SR (via IRTS)
EL2AS, Box 1529, Monrovia, Liberia
FC6ABT, B P. 44, Ile Rousse, Corsica
FM7WR, Box 287, Fort de France, Martinique
HA8KUX, Radio Club, Vorosmarty utca 1, Jaszszent-laszlo, Hungary
HC1TH, Box 583, Quito, Ecuador
HR2RRD, Aptdo. 112, San Pedro Sula, Honduras
IS1BDO, T. Barraccini, P.O. Box 2, Oristano, Sardinia
JX4XM, c/o Norwegian Embassy, Reykjavik, Iceland
ex-KA2TP, T. Paul, W2BTQ/4, 10108 Glenmere Rd., Fairfax, Va., 22030
ex-KA7RF, R. Follett, WA7FCU, 1101 N. 12th., Apt. 7, Tacoma, Wash., 98403

KC6CS, M. Bennett, c/o Peace Corps, Truk, Carolines, 96942
OA4DX, C. Bethel, jr., (W4TKN), Aptdo 6, Manuel Bomilla 125, Miraflores, Lima, Peru
OK1AOW, V. Zdenek, Stod, J. Fucika 596/23, Czechoslovakia
PIILS/mm (via PA0WSS)
PX1s JB PY (to F5JB)
PY0BLR, D. de Barros, PY4BLR, P.O. Box 2590, Belo Horizonte, Brazil
SM5WL/OY, H. Akesson, Vitmaragatan 2, Vaesteras, Sweden
TA2E, c/o Box 35, Station S, Toronto 20, Ontario, Canada
TI2EVA, Box 2817, San Jose, C.R.
TJ1AT, Box 173, Garoua, Cameroon
TT8AE, J. Fremont (F2HF), P.O. Box 444, Ft. Lamy, Chad
VK0WR, KC4USF Opns. Ofcr., USCG Cutter South Wind, FPO, New York, N.Y., 09501
VP2GRN, c/o P.O. Box 1909, Hendersonville, N.C.
VP8s KI KM, Port Stanley, Falkland Islands
W7HST/8RI, O. Moellner, M.D., Peace Corps, P.O. Box 337, Georgetown, B.G.
WA1DYR/mm (to WA1DYR)
WA4DMC/mm, USS America (CVA-66), FPO, New York, N.Y., 09501
WA4DOU/mm, USS Charles R. Ware (DD-865), FPO, New York, N.Y., 09501
WB2TFH/VOI, RM2 G. Hall, USCG Radio Station, Box 49, FPO, New York, N.Y., 09597
WB4JSV/KS6 (to WB4JSV)
YA1EXZ, C. Green, USAID-SIU, U.S. Embassy Mail Rm., Kabul, Afghanistan
YA1GNT, E. Popko, Pan-American P.O. Box 76, Kabul, Afghanistan
YA1YB, W. Baldwin, USET/USAID, U.S. Embassy Mail Rm., Kabul, Afghanistan
YA1ZA, G. Craig, R. Nathan Associates, USAID, U.S. Embassy Mail Rm., Kabul, Afghanistan
YA1ZC, J. Wallace, U.S. Eng. Team, USAID, U.S. Embassy Mail Rm., Kabul, Afghanistan
YB0AAC, c/o U.S. Embassy, APO, San Francisco, Calif., 96356
YO7NA, C. Cristea, P.O. Box 108, Craiova 1, Roumania
ZS1s AMB ANT (via SARL)
ZS3HF, Box 5011, Windhoek, Southwest Africa
3V8AC, Box 323, Tunis, Tunisia
4X4s SK SO (see text)
5A4TY, Sgt. W. Maxwell (WA2ETP), Box 2634, APO, New York, N.Y., 09231 (or via W2DU)
6W/W4BPD (via W4ECF)
9G1YG, P.O. Box 1639, Accra, Ghana
9J2BR, Box 1186, Lusaka, Zambia
9Y4CR, Box 1083, Trinidad
9Y4DX, P.O. Box 4187, Patrick AFB, Fla.
9Y4RP, P.O. Box 862, Port of Spain, Trinidad
CO2KG (via FRC)
CR6BX (via CT1REP)
CR6GO (via RSGB)
ex-DL4ZS (see text)
DU1DBT (via I1CTL)
EA8AU (via DJ2YJ)
EL8J (via LA80J)
F3KVV (via WB2QXX)
F03JP (via DL3FR)
FB8XX (see text)
GB2NI (via G3UGF)
GB3NEW (via GW3VKL)
GCSUJE (via RSGB)
H18RXM (via WA2RSX)
HL9UX (to K0LCB)
HR2HHP (via WA9RAT)
HS3RB (via DL7FT)
JX5CI (via W2CTN)
KC6BW (via WA3HUP)
ex-KG4DF (see text)
KG6ARQ (via WA8DBI)
KR6JT (via DL7FT)
MP4TAF (via DL6AA)
MP4JK (to DL7JK)
OX3MB (via OZ6MI)
SV0DD (via WN1JMH)
SV0SV (via VE3GCO)
T1ZCAP (via YV4QZ)
VK9KY (via VK2SG)
VK0KJ (to VK7ZKJ)
VP2DAR (to W7PHO)
VP2MJ (see text)
VP8KF (via G3LDA)
YA1YL (to DJ9DZ)
ZF1WP (to W4YKH)
ZS2MI (via ZS60B)
ZS3BS (via WB2RLK)
5R8AO (via G13PLL)
5R8CJ (to WA0RZB)
5W1AS (via WB6KKB)
6Y0A (to 8Y5CB)
7X2AI (via ARA)
9H1BL (via G3VPS)
9Q5JV (via DL8MZ)

Samaritans Ws 1ARR 1SWX 1VQC 2DY 2V0Z 3BBO 3DJZ 3KJ 5BZK 5IB 8YGR, Ks 3CUI 3UXY 4KI 8DHT 8RXD 9EUZ, WAs 1FHU 2BHJ 5PPZ 8YXE 9SQY, Ws 2AWQ 4IGL, VE3ABG, VK2SG, P. Kilroy, R. Ettysnitch, Canadian DX Association Long Ship (VE3EJ), Columbus Amateur Radio Association CARA-scope (W8ZCQ), DARC's DX-MB (DL3RK), DX News-Sheet (G. Watts, 62 Bellmore Rd., Norwich, Nor. 72 T., England), Far East Auxiliary Radio League (M) News (KA2LL), Florida DX Club DX Report (K4GRD), International Short Wave League Monitor (A. Miller, 62 Wardlaw Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club Bulletin (A. DM), Long Island DX Association DX Bulletin (W2-GKZ), Newark News Radio Club Bulletin (L. Waite, 39 Hannum St., Ballston Spa, N.Y., 12020), Northern California DX Club DXer (Box 608, Menlo Park,

Calif. 94025). Southern California DX Club *Bulletin* (WA6GLD), Utah DX Association *Bulletin* (W7LEB), VERON's *DX press* (PAØs FX LOU TO VDV WWP) and last, but by no means least, West Coast DX *Bulletin* (WA6AUD) supplied most of the foregoing information as well as much of the material to follow.

Whence:

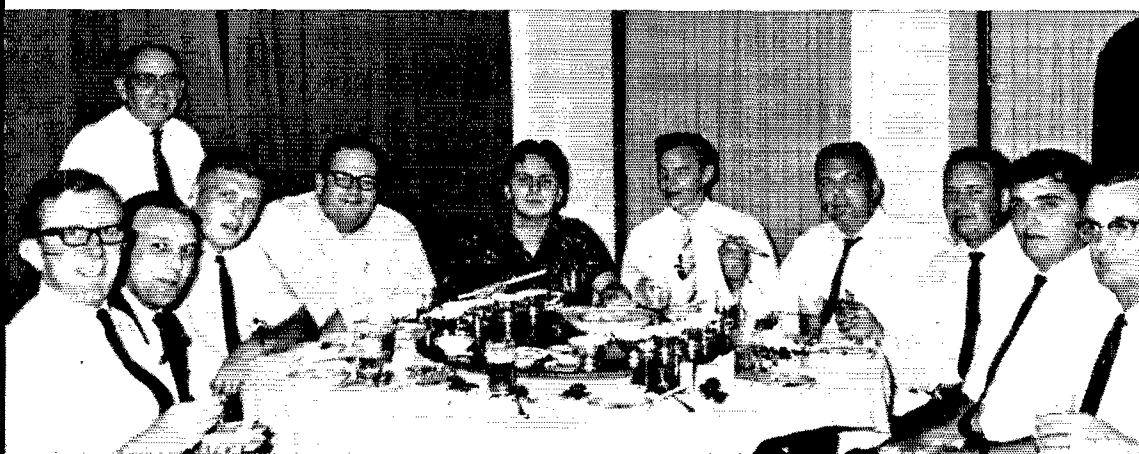
ASIA—Got your Firecracker award? Hong Kong Amateur Radio Transmitting Society, VS6AA secretary, announces a special opportunity to attain same from 1000 GMT on the 17th of this month to 1000 the 18th when the HKARTS gang will take to the airwaves in force. S.s.b. enthusiasts VS6s AL BS CO DR EF and FK will concentrate 170, 270 and 370 kHz. above lower 20-, 15- and 10-meter band edges; c.w. fans VS6s AA AF BA DL FV and FX may be found about 25, 50 and 75 kHz. inside each h.f. band. Suggestions for schedules at other times will be welcomed by HKARTS at P.O. Box 541, Hong Kong. . . . "It's a great feeling to be on the far end of the pile-ups!" exclaims KOLCB, now signing HL9UX. "My first session of operation netted almost 100 DX stations." "Hmm-mm—according to a New York *Times* dispatch forwarded by W8LIX/2. "An agreement between Sheikh Rashid bin Saud of Dibaj and Sheikh Zaid bin Sultan of Abu Dhabi, signed February 18, 1969, was brought about by the mediation of Sheikh Ahmed bin Thani of Qatar. It established a neutral zone a kilometer wide and 18 kilometers long between the two states." "TAZE is active on c.w. using 3527, 7001, 14,030, 21,027 and 28,005 kHz." specifies VE3ABG. "Haci is polite but has been annoyed by fellows who practically demand an immediate QSO on another band even though conditions may be very good on the frequency being used." Easy on those 5B-DXCC pressures, men. "URIZ, on 14,028 kHz., switched to a one-watt 14,083-kHz. rig and was still RST 549." testifies K3UXY. "Juri is very happy with his QRP results." EP2CB writes, "Iran stations are active on all bands with 20 meters the ruling favorite. Several EPs can be found nightly around 14,225 and 14,235 kHz. at 1230-1830 GMT. During the past few months 20 has been best around 1330 on long path to North America." Far East miledenda courtesy literature of aforementioned clubs and groups: TA1RF, with three parallel 807s, a dipole and 518-3, likes 14,205, 14,213, 14,245 or 21,355 kHz. at 1300-1645 GMT. Nar plans a bigger linear. Somebody beat XW8AX to 80 c.w. with his own call but the real one should be on there soon. KH6IJ will be KA2IJ again this summer. JA3AA skeds K86CN on 160, of all bands. Far East Auxiliary Radio League president KA2FLP and secretary K3FUR took office in January. New or renewed FEARL memberships are

claimed by KAs 2JB (WB6JCX), 2JP (W4FRU), 2PX (WA4PXX), 2RC (WA3ION), 7GD (W2KEQ), 7Y (K8SIY), 7RF (WA7FCU), 8YD (WAØUYD), 9AK (K6EGX-WOUMH), 9CG (WB2JPD), 9EE (WA7-KPN), W6WFP, Ks 1FUW 7GH and WA4FLR of club station KA9MF.

AFRICA—W2DU-W8KHK remarks, "My son W2-ETP is in the USAF at Wheelus Air Base, Tripoli, operating as 5A4TY. Bill is quite active on c.w. and phone in the lower portions of 15 meters after 1500 GMT week days and Saturdays, also beginning 1000 GMT on Sundays. 5A4TY appreciates the fact that he is one of a small number of active Libyan stations and is anxious to help as many as possible make contacts with that country." W4NQM dates VQ9GA's shutdown as March 21st, a fresh DX assignment pending. "ZS6AYI runs an FL-100B and homebuilt 813 amplifier," finds K4RON. "Gerald works 20 sideband at 0300-0500 regularly." "February 14th was 3V8AC's first day on the air," comments W1WQC. "Bob expects to be active in Tunisia for about a year. He runs 100 watts s.s.b. to a ground-plane on 14 MHz. at present but has permission to use 10 and 400 meters." W1WQC noted 3V8AC on 14,213 kHz. at 1800-1900 GMT. More Africa items via the clubs press: 7P8AB hunts Ariz., Miss., Nev., R.I., S. Dak., Utah, Vt., Wyo. and Alaska on 14,250 or 21,300 kHz., Tuesdays and Fridays at 1800-2000 GMT, while neighbors 7P8s AR and YL spread 5B-DXCC cheer on five bands. Ramblin' W4BPD started things off from Dakar and ZD3A using c.w. spots 20 kHz. inside the low band edges, s.s.b. on 3795, 7073, 14,195, 21,395 and 28,495 kHz. ZS1ANT's Queen Maud Land showing should improve with a new HW-100 and TA-33 around 14,150-14,170 kHz. at 1500-1600 GMT or so. ZS1AMB is also thereabouts. Marion islander ZS2MI may have a new op with single-sideband by now if early description of Ron's replacement bears out. W2LGU reportedly mediates for 9U5s CR DS and HJ on 21,310 kHz. at 1730 GMT. VQ8CF credits VQ8s AD AP CC CJ and VQ9HB for prime encouragement and assistance toward obtaining his own ham ticket in 1966 after the ham bug first bit him in '63. Jacky affirms that scarcity of electronics gear and components stifles Mauritius hamming.

OCEANIA—"VK9KY will be operating from Cocos (Keeling) for about twelve months," enlightens VK28G. "Keneth, who works with the ionospheric prediction station on Cocos, is a new operator so it is requested that the boys treat him gently for a start. VK9KY's operating times are not certain but it is anticipated he will be on at 1000-1400 and 2300-2400 GMT, which times will vary according to conditions, etc. Ken will use 7050, 14,050, 14,150, 14,195, 21,050 and 21,350 kHz., plus or minus QRM. VK9KY's ionospheric

Hong Kong Amateur Radio Transmitting Society's recent dinner meeting produced appearances by (seated, l. to r.) VS6AA, s.w.l. associate Roy, KR6NR, VS6DR, s.w.l. Digger, VS6DX, VS6AL, VS6AB, VS6DO and VS6BE, with VS6EK standing. DX activity by the HKARTS gang always is in outstanding proportion to their limited number. By the way, you're invited to join a special VS6 QSO party this month—see "Whence".



work should enable him to pick the best frequencies and times for distances concerned." ZLIAH, formerly G3AH, is understandably drawn to his suffix. John has QSLs from his "AH cousins" bearing prefixes C07 CR9 DL7 FK3 FO8 FP8 F7 F8 G8 HA5 HK3 JA1 JA3 JA4 JA8 KM6 KR6 KX6 LU5 OH3 PZI UA3 UA0 UD6 UH8 UQ2 UW3 VS9 W1 W2 W4 W7 YV2 XW8 ZBI 4X4 and ZX0. AH, so! "Outstanding hospitality was received from ZLIKG, VKs 3TE 4DV 4OF 4ZW and other amateurs during our vacation down under," acknowledges K6PET who made the trip with son WB6WFP, wife and daughter. "Our FWS8DY DXpedition with VE6AJT went off as planned," recounts KH6GLU. "We began operation February 2nd just in time to pass out a hundred contest QSOs on 10 meters. Two thousand QSOs later, February 8th, we packed up and departed Wallis. FWS8DY used Yaesu and Swan rigs with external v.f.o., a Zeus generator, a TA-33 jr. and dipoles for 40 and 80." ICTL finds his QSL client DUIDBT available week ends around 14,106 kHz, from 1500 to 1700 GMT. Pacific potpourri from publications of DX clubs and groups: Heard island's rarity may go the way of Easter if rumors of a tracking-station installation pan out. Meanwhile hit-and-run activities like WZFYF's March VK0WR effort will keep things interesting. VE6AJT hopes to get on with his Manihiki maneuver a.s.a.p. after visiting the home front. Some U.S. sevens may join Don's ZM7 fun. VK0MI is supposed to carry on from Macquarie in the wake of VK0s IA and KJ. ZLs 3ABJ (3803 kHz, at 0800 GMT) and 4AF, in the Chathams and Campbell respectively, are expected to move upward from present 75-meter limitations. F0SGC (F5PE) signed FB8XX in '65. KW6EJ's QRT and QSY Statesward sacrifices Wake. KX6BQ enjoys a c.w. resurgence near 14,010 kHz, at 1000 GMT while other KX6s continue to concentrate on phone traffic. Christmas VK9s AD DR MV and XI, under VK6RU's guidance, may congregate Mondays on 14,240 kHz, at 1300-1500 GMT. G3NRA brings a KW-2000A, rhombic and long-wire to Tarawa and could be signing his new VR1 tag on 10 through 160 as you scan this copy.

EUROPE—Notes from sunny Italy: "We of the Feltre Radio Club offer a special certification for QSOs since September 15, 1967, with certain numbers of IIs in the Dolomiti zone," announces ICTL. Check with Gianni for Dolomiti Award details. "IIMOI, wants me to relay word of Italian DX limitations on 75 and 80 meters," writes WB2OW. "IIs can use only 3613-3627 kHz, on c.w. and 3647-3667 kHz, on phone." IIAWX says, "After I finish high school here I'll be in Oakland, California, this September hoping to meet many on-the-air friends. I work 15 meters almost daily." IJZ managed 175 countries though heavily beset by TVI problems. "I suggest 3B-DXCC endorsements along with 5R-DXCC because 100 countries on five bands seems too formidable a goal for too many DXers." "Our Region Four (Limerick Radio Club) of the Irish Radio Transmitters Society for many years past has highlighted its activities with annual DXpeditions to some of the many islands on the south coast of Ireland," states E9AD. "The tradition is being maintained this year by a similar trip to Sherkin, an isle some six miles southeast of Baltimore, Co. Cork. The venture is planned for the week end of May 31st, June 1st and 2nd. We will use the call EI0SI on sideband, a.m. and c.w., from 10 through 160 meters. At the same time we will sign EI0SR from the vessel *Shure Return* on 10 and 40 meters." W. Geddes of London's Science Museum says the new GB2SM RTTY exhibit is still popular with visitors. "Our normal demonstration times are Mondays through Fridays at 1030-1100 and 1500-1530 GMT. We welcome reasonably short QSOs during these periods on 3.5 through 28 MHz., and it may also be possible to operate week ends and evenings." Math professor YO7NA, also chief op at YO7KAJ, likes the c.w. DX chase on 80, 40 and 10 meters. Cristea tells W1VG he'd like to try s.s.b. but gear is unavailable. Anyone with sideband suggestions for YO7NA can reach him via the address listed in "Where." W1AFHU identifies OZ5CK as another fellow ex-HA. K3CUI observes, "It's sometimes interesting to learn what's behind the other fellow's signal. DL1JT, for example, has a 15-watt c.w./10-watt phone transmitter once used in a Panzer tank." A social note from ex-YO2BO discloses that HB9TE's daughter vacationed pleasantly in the Bahamas with VP7NQ's family, the happy result of a chance DX contact. DL4ZS (WB4IGX) departs Germany for Stateside leave and then a year in Vietnam. "I'll sadly miss my ham radio." "We use 700 watts and a TH-6 on 20- or 10-meter s.s.b. and c.w.," describes

SV0SV (WB2AWQ), operating from Makri with SV0S DD and WH. "The evening pile-ups from the States are terrific but W/Ks are very cooperative and we manage to work a lot of them with minimal interference. Earlier in the day we do well into Asia and Africa." WA9SQY ran into F5GV's ham family. "Chief op Gerard likes 15 c.w. 'where the Russians aren't so strong', 2nd op son Serge works both phone and c.w., and 3rd op son Alain is a bug for v.h.f.'" DL7FT, YU3TXT and others diligently strive for Albanian DXpeditioner credentials. SV0WE still offers Rhodes on week ends, 23,650 kHz, at 1300 GMT.

SOUTH AMERICA—"W7HST/8R1 is with the Peace Corps," notes W3BBO, "using a TR-4 and 4BDQ on 21,070-kHz c.w. around 0100 GMT." From W3HNK: "PZICF is back on the air after clearing up rig problems. He goes back to the States shortly." "I'm working as a telecommunications consultant to the Peruvian government," explains W4TKN, now greeting DX friends as O4ADX. More from the south through club newshawks: Volcanic outbursts in the Deception area may curtail South Shetlands V8 possibilities. YV1YC can put you in line for a 21,200-kHz. HC8RS contact at 1300 GMT or so. PY0EP kept doing his spring Trindade thing, 20 c.w. preferred. The HK0TU combine was worked by some 5B-DXCC fans on five or six bands apiece during the hectic February 23rd-26th invasion of Malpelo isle. Nigh impossible docking, voracious ants, birds, crabs, treacherous topography, high winds and a few injuries plagued the operation, plus the rock's well known westward radiation shortcomings. QSOs from the moon should be easier.

HEREABOUTS—"I'll be signing ZF1WF sometime between mid-April and May 10," confirms W4YKH who signed ZF1CF down that way last year. "My operation will be primarily on 15- and 40-meter s.s.b. with an SBE-34 and TA-32." "Four days before the ARRL Test a snowstorm destroyed my vertical and heavily damaged my beam," bemoans W1AFHU. WIBB lost his big 160-meter weapon around the same time. "Twas a rugged winter for our coastal DX men. "I don't have a ham ticket yet but hope to take the exam soon," writes s.w.I. Bruce Tindall, enjoyable practicing his code on 21-Mhz. DX with a Zenith Transoceanic. "I work ten phone exclusively with a 150-watt HT-46," comments W5OJZ. "The way DX has been calling me lately makes me wonder where all the competition went." KIHD0 seconds the motion for 10-meter straight-a.m. with a fast 99/72 record on 80 watts and a 4-element spinner. WA2RSX says H18RXM is a Baptist missionary at Santo Domingo, and K9SRR/2, just returning to the "How's" team after college absence, is an assistant Methodist minister in New Jersey. "I'm with the Coast Guard in Newfoundland," reveals WB2TFH/VOL, busy with an SR-500 and dipole on 20 c.w. W2DY claims a 158/146 worked/confirmed total since the sideband bug first nipped him three years ago. "Adak island is well represented DXwise by KLTs AIZ GOM, W6BU/KL7, WA5WNA/KL7, WB2OIF/KL7 and myself," writes WA2ZOF/KL7. "Club station KL7AIZ can be worked almost daily on 21.310 kHz, at 2300-0100 GMT. We like to hook Europeans and Africans over the pole around 1900 GMT." "An Advanced ticket sure helps the DX total," avers WA8YXE. "Back in the DX game after several gap-chewing years," reports WB4IGL, formerly W9FLH, having a gay old time on 15 c.w. K3UXY gloats, "Moved to Pennsylvania's hills from Maryland and now have a location with fine ground conductivity, high water table and a clear shot in all directions." WB2OZW figures, "5B-DXCC will only load the overloaded bureaus still more. Why not start all over with DXCC, count only real countries and real 15-minute-or-longer QSOs?" W3KJ suggests that contest exchanges from DX stations include name of country rather than power input as an added helpful identification factor in pile-ups. Guvs in Peru would have too much advantage over those in Afghanistan, perhaps—how about just the prefix in lieu of power? "Too many good c.w. men have gone from clean bug sending to bad keyer sending," opines K3AC. "It's pitiful to hear 'em trying to get their own calls right." W3HNK warns, "KV4EY-VP2VY plans trips to other spots including possible VP2K work." Florida DX Club stalwarts hang out on 7230 kHz, at 10 AM local time of a Sunday. A few fat Five-Band-DXCC scores we've heard of at this writing include (80 through 10 meters) W8GZ 47/77/100/100/100, W6-ANN 38/71/100/97/100, W6NJU 38/66/100/99/81 and K6-KA 25/71/96/100/62. QSL managers and printers, battle stations!

The World Above 50 Mc.

3219-1500 2300-2450 144-148 220-225 410-420 2100-2200 50,000-7

CONDUCTED BY BILL SMITH,* K4AYO

World's 144-MHz. DX Record

New Zealand to Sweden

THERE is a new DX record on 144 MHz. — and for the first time a U.S. station is not involved. John Morgan, ZL1AZR, of near Auckland, New Zealand, and Kjell Rasmusson, SM7BAE of Nordana, in southern Sweden, turned the trick using moonbounce (e.m.e.) and e.w. on March 4, 1969. The distance appears to be 11,055 miles, subject to a slight adjustment when the coordinates are available. The previous record, 10,417 miles, was set by VK3ATN and K2MWA/2 in November, 1966.

For ZL1AZR the contact was his first on e.m.e. John had previously run schedules with K6MQS and K6MYC, and while close to a successful contact on several occasions, had lacked completing a contact to the satisfaction of the parties involved. ZL1AZR developed his e.m.e. station working essentially alone, except for the stateside assistance of K6MYC. John's grounded-grid final delivers a measured 520 watts to an array of six 8-over-8 J-slot Yagis.

SM7BAE has worked on his e.m.e. station for about one year and had four previous e.m.e. contacts with K6MYC. Kjell's station includes the Swedish maximum input power of 1500 watts and an array of sixteen 10-element Yagis stacked four wide and four high. K6MYC has also assisted Kjell.

ZL1AZR and SM7BAE began their schedules on March 3. Signals were heard both ways. However, because of the distance between the stations, there was limited available moon-time; that is the amount of time while both stations can see the moon. In e.m.e. the actual earth distance between stations means nothing, as long as the moon can be seen from both locations. On March 4, the contact was made quickly with good signals each way. I have heard the audio tape of SM7BAE's signal, as received in New Zealand—no doubt about it, the signals were very good!

Not only is the ZL1AZR — SM7BAE contact a new world DX record for 144 MHz. and the first e.m.e. record not involving a U.S. station, the contact is also the first e.m.e. two-way with a U.S. station not on at least one end. That record is going to be difficult to return to the U.S., if for no other reason than geographical.

* Send reports and correspondence to Bill Smith K4AYO, ARRL, 225 Main St., Newington, Conn. 06111.

Where do you look for an e.m.e. prospect more than 11,000 miles from this country?

I'm sure there will be satisfaction that the record is now held by two operators using entirely amateur-constructed stations. The previous record, between VK3ATN and K2MWA/2, had involved a commercial-type antenna on the U.S. end. One of the operators of K2MWA, Dick Turrin, W2IMU, wrote three months ago suggesting that I consider the VK3ATN—KØ1J 9405-mile contact in February, 1968, as the record. Dick reasoned this would remove the commercial stigma from the record, but still leave one end of the record with VK3ATN. I had not made a decision on Dick's suggestion, not being sure that a record should be adjusted to fit the situation. Now ZL1AZR and SM7BAE have made the decision for us, and I'm certain all parties concerned are pleased that it was strictly amateur.

Congratulations to both John and Kjell!

Swan 250 Notes

The Swan 250 is perhaps the most popular piece of commercial equipment available for 5 MHz. However, tuning the transmitter gives many operators trouble, as attested to by listening to comments heard on the band. For that reason here are s.s.b. mode tuning suggestions permitting maximum output with minimum carrier.



The shack of W9NAU with Al seated in front of camera while in duplex TV-to-TV contact with W9VRV. See Operating News section for further details.

Turn the set on and allow the tubes to heat for about 2 minutes. While waiting for the tubes to heat, *READ* the transmitter tuning instructions in the 250 manual. Under *Transmitter Tuning*, step 5, note that the manual says *move the meter switch to the OUTPUT position*. Be sure to do this after the manual's steps 1 through 4 have been properly completed. In step 8 the manual says *move the meter switch to CATH position in order to observe PA cathode current*. The manual says the proper loading is achieved when the current reads 200 to 250 ma. But don't worry if it reads as high as 300 ma. You will not damage the tubes, if your antenna system s.w.r. is proper. Note the manual *DOES NOT* say to retune the transmitter while reading cathode current. *DO NOT* tune the transmitter while reading cathode current. This is where many Swan 250 owners get into trouble blowing fuses and 6146Bs. Tune the transmitter *only* with the meter switch in the *OUTPUT* position and adjust the p.a. plate, load and grid controls for *maximum* output indication on the 250 meter.

The Swan 250 series transmitter, or any other transmitter, may be tuned by observing forward power on a wattmeter or s.w.r. meter. The initial cost of a good wattmeter may seem high but one is a worthwhile investment. Commercial meters are available for \$80 and up. It is reassuring to know your transmitter power output, and the meter also shows how much power is being reflected due to improper antenna matching. Wattmeters provide also a means of observing transmitter operation. Voltage and output problems may quickly be detected.

The Swan 250 transmitter may be peaked for maximum output by placing the *REC TUNE CW* switch in the *TUNE CW* position and reading forward power on the wattmeter. Except for proper adjustment of the bias voltage, the Swan's meter may be disregarded. Adjust the *PA PLATE*, *PA LOAD* and *PA GRID* controls for maximum output on the wattmeter. The controls interact, so adjustment of one will affect the others. Each should be peaked for maximum output. Properly tuned, the Swan will give 110 to 140 watts output.

An s.w.r. meter reading *relative* forward power may also be used. Set the pot control so the s.w.r. meter reads about one-third scale with the Swan's *REC TUNE CW* switch in the *TUNE CW* position. The tuning procedure is same as with the wattmeter.

Many Swan 250 operators have difficulty nulling the carrier from the s.s.b. signal. This may be done three ways. The *REC TUNE CW* switch is placed in the normal *REC* position for each example. If you have a wattmeter, set it to read forward power on its lowest wattage range. Depress the microphone button and adjust the *CAR BAL* (carrier balance) control for minimum reading. If you are using an s.w.r. meter, set it to read forward power and advance the pot control fully clockwise. Depress the microphone button and adjust the *CAR BAL* for minimum reading. You may also use the meter in the Swan. Set it to read *OUTPUT*, depress the microphone button and adjust the *CAR BAL* control for minimum reading. In each example the carrier null will be very sharp. This is where the carrier is best suppressed. A word of caution: *Do not* allow sound pickup in the microphone while making carrier-null adjustments. If you do, you may damage the meter and you will surely get incorrect meter readings.

One final suggestion that may help six-meter operators living in metropolitan areas to clear up cross modulation and other "garbage" from television transmitters. This may be caused by the



This is the shack of W9VRV. (Photos by W9NAU's XYL)

television transmitter, poor receiver front-end selectivity, or a combination of both. The use of a commercial low pass filter, such as the Drake TV-1000-LP or a homebrewed coaxial or strip-line filter will add to your receiver's selectivity and clean-up most reception problems of this type. Designs for suitable filters may be found in either edition of the ARRL *V.H.F. Manual*.

Install the filter at the converter input, or transceiver output, connector. Placing the filter at these locations will eliminate unwanted signal pickup from a connecting cable. The filter should also be bonded to the converter or transceiver by physically bolting it on, or with a *short* length of copper strap. A flattened and solder-tinned shield from a piece of RG-8 coax will work fine.

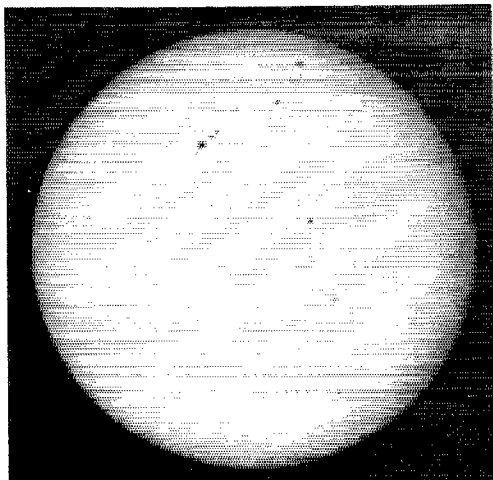
The use of a filter will not only aid in cleaning up reception, but when used in the transmitting line also, may lessen TVI problems arising from harmonic radiation. It will *not* cure fundamental overloading, the most common cause of 50-MHz. TVI.

Preliminary Report — March 23rd Aurora

A sky-filling aurora of a beauty and intensity not seen in years enlivened the v.h.f. scene March 23. Its effects were observed on the v.h.f. bands from early afternoon on, and after darkness fell the display gave the bands strong competition for the attention of v.h.f. operators. From soon after dark until about 2145 EST there was no point in the heavens where either the greenish-white streamers or the strong red glow were not visible. Streamers shot up to the zenith from all parts of the horizon, in the Northeast, and sightings were reported as far south as Lake Charles, La.

As might be expected, this was a great night for southerners, and it may have been the best ever for the 432 gang. K4QIF, Chesapeake, Va., worked K8DEO and K8REG, near Dayton, Ohio, on 432, with signals almost identical to the best on 144 at the time. WA2EMB, W4FJ and K2UYH also worked these fellows on 432, and were heard by K4QIF, along with several radars coming in via the aurora.

At WIHDQ (following an alerting call from WISUZ) the 4's almost seemed to dominate the 2- and 6-meter bands. W4HJZ, Raleigh, N. C., was as strong as any 2-meter aurora signal ever heard, and was one of the last to go out, just before



Aurora coming up! W1CNY aimed his Questar at the sun, showing a bad case of spotted fever, at 1630 GMT, March 23. A few hours later one of the wildest auroras on record was going strong.

2200 EST. K1HTV worked K4GL, Pickens, S. C., around 2000 EST, and his tape of the QSO show's Jack's 2-meter signal at a fantastic level. Signals seemed to come from all directions at times, and auroral distortion could be heard almost regardless of beam heading.

At times the reflecting qualities of the aurora were exceptional. WA2INB/1 heard readable 2-meter a.m. from W4JFU. The sidebanders made out better than usual, and particularly on 50-MHz. s.s.b. results were very good. The Dakotas and Minnesota were heard in East Coast states at times, along with the usual nearer areas, on 6.

The Northwest, often left out of auroras, got into this one well. K7BBO, Tacoma, Wash., worked VE6, VE7, Oregon, North Dakota, Idaho, Utah and Iowa on 50 MHz., between 1430 and midnight. PST. It doesn't pay to quit early; Dave worked KL7GLL, Sitka, Alaska, just after midnight. W7FN also worked KL7GLL. Signals were in from as far south as the Bay Area. W6DOR, Sacramento, who learned about aurora as W8NAF, reports working W7FN on 6.

The periods just before and after the aurora were good for 50-MHz. DX. HI8XDS heard the ZK1AA 50.1-MHz. beacon March 17, 18, 20, 21 and 22, mostly between 1900 and 2100 GMT. Californians worked into South America the afternoon of March 22. K4AYO worked LU3DCA around 2300 GMT, March 23. A somewhat garbled radiogram from KH6BZF indicates that KH6NS worked Texas, Louisiana, Utah, Idaho and the West Coast States on the 24th. K7BBO reports 50 MHz. open to Hawaii between 1115 and 1341 PST. Dave worked KH6NS KH6GHC and KH6EQF, and the ZK1AA beacon was heard by W6ABN and K6GJD.

The aurora was a shot in the arm for the 220-MHz. fraternity. Known to have been active are W2JKI K2CBA W2CRS K2RTH K2DNR K1JIX K1AGB W3UJG and K8ANU. As with the 432-MHz. reports, the 220 operators say that this was the best aurora ever on this frequency. K4AYO should have more details on the big event next month. — W1HDQ.

50-MHz. DX this solar cycle hasn't been what it was during the last one, but there have been some interesting days. Some of the following reports are supplementary to last month's column.

On February 1, 4, 5, 6, 10 and 11, KV4FU, now back in the United States, observed *TE* from the Virgin Islands to South America. VP2MJ, on Montserrat, also noted *TE* to South America every night in February but two. HI8XDS reports *TE* from the Dominican Republic to South America almost every night during February. Swany had contacts with 14 different Argentina stations, 7 in Uruguay and CE3BQ and QG!

Additions to the previously-reported February 2 *F*-layer come from WA0JYK, K6RNQ and K7ICW. WA0JYK, Kansas, worked K6TYW at 2204 GMT on backscatter while aurora was being heard in Kansas from the east. Both stations pointed their beams south for maximum signal strength. Between 2226 and 2257 GMT, K6RNQ worked 7 W6s and W7s beaming 180 degrees. Bob says, however, that the beam headings were exceptionally broad, indicating a large, highly ionized layer. In Las Vegas, K7ICW heard Puerto Rico between 2200 and 2245 GMT, along with backscatter from northern California and W5s.

Aside from the normal Caribbean-to-South American *TE*, nothing special was reported until Feb. 20 when CE3QG heard Hawaii, but no contact was made. The next day, VP2MJ copied the ZK1AA, Cook Island in the Pacific, beacon on 50.1 from 2100 to 2120 GMT.

On Feb. 24, KX6HK (ex WA5IOD), on Kwajalein in the Marshall Islands, heard Japanese stations. KX6HK tells friend K9AQP/1 that most of the JAs run 25-watt a.m. transmitters and 4- to 7-element Yagis.

VP2MJ says South American *TE* was exceptionally good the night of Feb. 26. Monty worked four countries, Chile, Uruguay, Argentina and Brazil. On the same evening, LU3DCA heard Mexican XE1P, and LU3EX heard a Hawaiian beacon.

What appears to have been a *TE*-to-*Es* hook-up on Feb. 28 allowed the ZK1AA beacon to be heard in at least two widely-separated states. W5RCT and K5WVX, Dallas, heard the beacon from 0133 to 0232 GMT, and again from 0250 to 0315 GMT. There was *Es* after 0015 as W5RCT worked XE1AAN and heard California and Arizona. The ZK1AA signal was likewise copied in Knoxville Tennessee from 0130 to 0215 GMT by W4s ASD, LTJ, K4KYL, WA4YKN and WB4DZF. At the same time, the Tennessee stations were hearing *Es* from the San Antonio area. HI8XDS heard the beacon from 1945 to 2030 GMT.

As predicted, March proved very good for DX. VP2MJ heard the ZK1AA beacon on March 1, 3, 4 and 8, each day between 2100 and 2125 GMT. On March 8, LU3EX was hearing ZK1AA at the same time.

March 2, WB6UYG found CE3QG on *TE* at 0200 GMT. The Chilean was working Arizona, New Mexico and Texas.

K7HIX/KG6, Guam, says 50 MHz. was open March 1-7 from Guam to Japan, but that the 3rd was the best. Ken worked 16 JAs that evening on *TE*, 13 on 50.11 s.s.b. Ken says JA2AC has a new Swan and has been working Australians above 52 MHz. Ken also worked VK6ZGH and VK6ZGE above 52 MHz. on March 3.

Also on that date, KX6HK worked JA2OAW, JA2MGE and JH1DAM between 0721 and 074

GMT. CE3QG's beacon was copied by K4AYO, Miami, beginning at 0145 GMT. CE3QG listened for replies at 0220 and was worked by WB4BND and K4AYO. The South American signals faded in Florida at 0235 but were being heard and worked in California and Arizona until 0440. K6RNQ and WB6UYG were successful in working CE3QG.

March 8 was another big day. K6RNQ reports F_2 -layer backscatter from 1940 to 2300 GMT. Bob worked many W5s, 6s and 7s with a beam heading of 150 degrees. He also heard, but could not raise, H18XDS. H18XDS says he was able to work only WB6UYG because of terrific interference.

Here is where transceiver operation falls down. A separate receiver, or receive v.f.o., is a must for serious DXing so that separate transmitting and receiving frequencies may be utilized. It is impossible for a DX station to separate several dozen 100-watt signals all piled onto one frequency! The separate tuning is also a must if the DX is below 50.1, on voice.

The backscatter was heard only briefly in Florida, from 2120 to 2140 GMT. W4UWH and K4QKR worked W6ABN and K6RNQ was heard calling CQ. Beam headings for the Florida stations were 225 degrees!

The band also opened for F_2 to Hawaii from California north to Tacoma, Washington. K7BBO and K7OFT heard the KH6EQF beacon at 2320 GMT, and worked KH6NS at 2240.

Apparently conditions returned to normal until March 13 when a series of F_2 openings from Florida to South America began at 2100 GMT. W4VCI worked CX9AJ and LU3EX until 2200 GMT.

On March 16, K4RBR, Miami, heard LU6EAM working W6s between 2100 and 2145 GMT, but couldn't work the Argentina station or another heard in Chile. The next day, LU3EX worked W4VCI and other W4s between 2130 and 2200 GMT. These three openings came on the heels of high solar activity and auroral openings, but there was no stateside-to-South America TE reported during the evening hours of those days.

Just before this reporting period ended, KH6EEM heard the beacon of CE3QG and worked CXs 1AAV, 3AA, 9AJ and LUs 3DQO, 3BX and 6EA from 0033 to 0100 GMT, March 16.

Now these 50 MHz. notes. WB6UYG says CE3QG has activated a 24-hour 50-watt beacon. It runs 50 watts c.w. on 50.05 with a 3-element Yagi pointed towards the central U.S.A.

On Guam, Ken, K7HIX/KG6 has a SB-110 and 4-element Yagi. K9PYV/KG6 has 50 watts of a.m. on 50.35 and a 4-element Yagi. Ken says he frequently hears military f.m. stations in Vietnam on 50.0 and 50.3. He and the other chap will be on Guam until January, 1970.

Gene, KL7GLL, is disappointed in DXing from Alaska this winter. He says KL7GGZ (W7CNK) reports having a kw. and 6-element Yagi on s.s.b., but Gene's requests for schedules have gone unanswered. KL7GGZ reportedly has kw. rigs available for 144, 220 and 432. His address is Lucky Whitaker, Box 921, Wrangell, Alaska 99929.

Watch for ZF1DT (K4AYO operating) on Grand Cayman Island, 500 miles south of Miami, May 17-24. QSL to WB4BND, 11120 W. Biscayne Canal Rd., Miami, Fl. 33161. Please include a stamped self-addressed envelope.

144 MHz. was slow the first quarter of the new year. Except for the ZL1AZR—SM7BAE c.m.e. contact and a handful of auroral openings, DXers have contented themselves with plans for the fast-approaching condition improvements in tropo

and meteor scatter.

K4RCV, Fort Lauderdale, says the annual spring inversion season began March 18 with strong tropo signals throughout Florida. Bill says a combination of hot days, rapid evening cooling and high humidity set the stage for those terrific Gulf Coast inversions. Contacts over distances of up to 1000 miles are made each spring from Florida to Texas and north to North Carolina, but go unreported because they are relatively common in the southeast. K4RCV recommends 145.08 for s.s.b. in southern Florida. Bill says several stations, including W4VTJ, who is also an a.t.v. buff, are active nightly with good power and decent antennas.

The now available Swan 2-meter transverter is causing a boom in 144 s.s.b. activity. Heath will soon be marketing a 6146 transverter for 2 meters. But it seems a shame that we wait for the manufacturers to give band usage a boost.

K4IXC had his antennas battered by a tornado. The 144 and 220 Yagis were destroyed but John's 432 array came through with only slight damage. His 100-foot tower was slightly bent. John says he will replace the 144-MHz. long Yagi with a vertical stack of several short boom Yagis. He says a vertical stack of four or more 4- to 5-element Yagis is the answer to long-haul meteor scatter work. K4IXC suggests reading—and heading—the advice of K2GAL in *QST* for November, 1960, page 23.

Like most topics in ham radio, you can get a good argument when one begins discussing the proper stacking distance. "Proper" depends on what one wishes to achieve in stacking. If it is maximum forward gain, then $\frac{5}{8}$ wave is too close, unless you're using small bays, such as 4 elements or less. A $\frac{5}{8}$ wave spacing with longer bays gives a nice clean pattern, but less gain over a single beam. Most often the best approach may be to use a longer single Yagi, unless you're willing to solve the mechanical problems of wide spacing for maximum gain. An optimum spaced 8-element Yagi will produce more gain than a pair of 4-element Yagis spaced $\frac{5}{8}$ wave. More on this subject in a future column.

RECORDS

Two-Way Work

- 50 MHz.: LU3EX — JA6FR
12,000 Miles — March 24, 1956
- 144 MHz.: W6NLZ-KH6UK
2540 Miles — July 8, 1957
- 220 MHz.: W6NLZ — KH6UK
2540 Miles — June 22, 1959
- 420 MHz.: W5LUU — WA4KFW
1150 Miles — April 13, 1965
- 1215 MHz.: W6DQJ/6 — K6AXN/6
400 Miles — June 14, 1959
- 2300 MHz.: W2BVU/1 — K1DRB/1
225 Miles — Aug. 30, 1968
- 3300 MHz.: W6IFE/6 — W6VIX/6
190 Miles — June 9, 1956
- 5650 MHz.: WA6KKK/6 — WB6JZY/6
179 Miles — October 15, 1966
- 10,000 MHz.: W7JIP/7 — W7LHL/7
265 Miles — July 31, 1960
- 21,000 MHz.: W2UKL/2 — WA2VWI/2
27 Miles — Oct. 24, 1964
- Above 30,000 MHz.: W6FUV/6 — W6ICJ/6
2.3 Miles — Feb. 9, 1969



Monty Werry, VE3EVW, wintered on the island of Montserrat in the Caribbean. Using a transceiver and 4X150 transverter, Monty signed VP2MJ. He worked numerous South American stations and heard ZK1AA on 50 MHz.

In Kansas, W0DRL is constructing a large rhombic array similar to that at K0MQS. Al's pattern will be centered on 80 and 260°. I would guess we'll be hearing more about e.m.e. work at W0DRL come summer.

K0MQS will be using his rhombic for e.m.e. tests on 144.005, on the following dates and times: May 10, 1900 to 1935; May 11, 1945 to 2000; May 27, 0715 to 0805; June 7, 1740 to 1835, and June 23, 0525 to 0555, all times are GMT. Dick's rhombic is fixed. Those times are when the moon passes through the antenna's beamwidth. If you have the receiving capability for e.m.e., or think you have, give a listen. Further transmission data is available from Dick.

Before leaving the e.m.e. subject, K6MYC has moved into his new home and is assembling his e.m.e. antenna for planned September resumption of schedules. Mike's new address is 5418 Stancrest Drive, San Jose, California, telephone 408-227-1727.

Also in the west, WB6KAP will be scheduling KH6EEM in search of another elusive 2-meter opening between the mainland and Hawaii. Their success would better the existing terrestrial two-way record of 2,540 miles set in 1957 by W6NLZ and KH6UK. W7FQE, Vancouver, Washington, offers 144 schedules, c.w. preferred. Stand back, here comes de requests, John!

Bunky, K4EJQ, has a word of warning. He says, "the next fellow who calls me on 2 meters while 432 is hot and reports hearing me on 432 in some hard-to-get state had better be able to transmit something besides w.b.f.m. or a.t.v.—or he'll get a present from me: a sack of Tennessee mountain rattlesnakes!" I think ole Bunky is trying to tell us something. He has entertained himself this winter building several 144-MHz. finals while waiting for conditions and operating activity to improve. He also wonders what the possibilities are for an eastern v.h.f. conference this summer.

Incidentally, K3CFY has taken exception to my March column report that the Sunday night eastern v.h.f. net is somewhat inactive. He says, "not so—we meet every Sunday night at 2130 EST on or about 3.980." K3CFY has been the eastern NCS for the past year. The midwest group meets one

hour later on the same frequency, but may move slightly if the interference is especially tough.

K1ABR says K2HLLA has moved to Massachusetts. K2HLLA will fill the 144 DX void left Massachusetts when W1JSM moved to New Hampshire. K2HLLA's address is 4 Carter Road Westminister, Massachusetts 01473. His location on an 1100-foot hilltop.

Jack, K4GL, believes an effort should be made to end the division of the two-meter band. His first choice would be to allow Technicians to operate c.w. down to 144.1. A possible alternative would be to let the low-frequency-end group to move to 144.9 and tune above 145 MHz. Jack admits his proposal will take much selling, but he says many fine DX opportunities are missed due to band division.

Finally, monitor 144.1 this summer for sporadic E. At least one station, W5LO, has a beacon on the frequency. It is aimed northeast from New Mexico. We have a fine opportunity to help determine the upper frequency limits of E's and the frequency appearance at 2 meters.

220 MHz. and Up activity has especially felt this winter lull. K6IBY says the Southern California 220-MHz. Rag and Technical Net continues active with nearly 20 stations participating. Joe says many members are building low-noise converters and the further information on that net be had from him.

The East Coast Vhf Society will operate WA2WV portable from Mt. Equinox, Vermont on June 21 and 22. Schedules may be made by writing the East Coast Vhf Society, P.O. Box 1263, Paterson New Jersey 07509. Their equipment will include a kw. c.w. and f.m., a 3 db. receiver and 18 db. antenna. Here is your chance to work Vermont on 432.

K1ABR, Cranston, Rhode Island recently passed his amateur Extra, and Dick says he will be on 432 this summer.

At Cedarville, Ohio, K8DEO has observed decreasing tropo conditions through most of the winter, but laments the activity—and awareness of some operators. W1HDQ says the favorable winter conditions were due to a series of stalled storm areas. Stable tropo conditions developed along the edges. Ed says he has noticed for years that slow moving winter storms usually have good v.h.f. conditions associated with them. The DX may not be as great as warm-weather openings, but the signals are beautifully stable.

Elsewhere in this column appears two pictures of a.t.v. installations. Leo Gary, W9VRV, and W9NAU have been holding t.v.-to-t.v. contact three times weekly this winter with snow-free (pun) reception both ways. The path distance is 30 miles.

W9NAU's station consists of a standard 19-in. t.v. set with a u.h.f. tuner, trimmed down to the 420-MHz. band. The receiver operates from separate 20-element Yagi. His video transmitter is a modified ART-28 running 500 watts input. T

E.M.E Two-Way Records

144 MHz.: SM7BAE — ZL1AZR
11,055 Miles — March 4, 1969
420 MHz.: WA6LET — G3LTF
5,730 Miles — Sept. 25, 1965
1215 MHz.: W1BU — KH6UK
5,092 Miles — August 9, 1962

camera is an imported transistorized type. The audio transmitter is a modified 450-470 MHz. RCA f.m. Carfone running 50 watts input. Both transmitters are crystal-controlled.

The antenna is a 128-element slot and couples to the audio and video transmitters through a homebrewed slotted diplexer. The transmitting antenna is 60 feet high and the receiving antenna is 30 feet above ground. The receiving antenna couples to the t.v. set through a bandpass filter.

At W9VRV, the equipment consists of a standard t.v. set and a modified u.h.f. tuner. The receiving antenna is a 20-element 10-over-10 Yagi with bow-tie driven elements.

The video transmitter is also a modified ART-28. The transmitter has its own video modulator which grid modulates a pair of 4X150A tubes running 500 watts input on 444.5 MHz., crystal-controlled. The ART-28 is driven with 20 watts of r.f. from a RCA 450 MHz. Carfone r.f. strip. W9VRV also uses a transistorized imported camera. His transmitting antenna is an 80-element slot-type 75 feet high. The audio transmitter is likewise a modified RCA Carfone running 50 watts input on 449.0 MHz. Both video and audio transmitters feed into the antenna through a notch-type diplexer.

Both stations use interdigital filters, as described in the March, 1968, *QST*. The filter is in the antenna lead to the receiver, and is tuned to pass just the receiver signal. It skirts off very nicely at the transmitting frequency. A test was run using this filter with the video transmitter running 500 watts input, and the receiver coupled through the filter into one antenna fed by a notch diplexer. The received signal, from 30 miles away, was the same with or without the video transmitter being on. Future plans call for 2 diplexers into one antenna which will transmit both video and audio, and receive signals simultaneously.

The photograph taken at W9NAU was made during a duplex contact. It shows W9NAU in front of his camera. His t.v. set shows W9VRV's signal which was retelevising W9NAU's signal to W9NAU. W9VRV is on the monitor. The cameras at both stations incorporate an original idea, a combination viewfinder and monitor. The top half of the camera assembly swivels 180 degrees for either function. In the W9NAU photo it is in the monitor position. These units are homebrewed and use a 5-inch tube. The other photograph shows the W9VRV operating position.

W9VRV reports the following stations are also active on a.t.v. in the Chicago area: W9YTM, Cicero; W9JEC, South Holland; W9DUT, Norridge; WA9JVB, Chicago, and K9HJA in Des Plaines.

Thanks Leo for the fine a.t.v. information.

WA4HGN has been troubled with a chirp in his c.w. signal on 2300 MHz. Bill solved the problem by converting the 2C51 oscillator stage to an amplifier, and building a separate transistor oscillator.

This is a 64-MHz. 2N708 oscillator on a small piece of copper-clad epoxy board, using good quality parts such as silver mica capacitors and glass variables, for stability. The output is amplified by an outboard mounted 5763 buffer, giving just enough drive for the cathode of the converted 2C51 stage. To isolate the transistor oscillator from the heat, humidity and vibration, WA4HGN used a large-mouth vacuum bottle with the plastic cap and cup drilled for r.f. and d.c. leads to the oscillator. The vacuum bottle was partially filled with styrofoam chips and the oscillator nested in these. The bottle was then filled with more chips and

sealed. The assembly was mounted on a 4-inch panel in a styrofoam cradle and held on by large rubber bands.

This resulted in a signal on 2303.951 MHz. that W4HHK can tune on his 75A3 receiver in the 40-Hz. selectivity position and hold with no chirp and no drift. W4HHK has heard Bill's signal from a 4-foot dish on several occasions. The distance is about 105 miles. Bill also noticed a reduction in 60 Hz. modulation on the transmitted signal since using the transistorized oscillator. During schedules, Bill experimented with varying the height of the 4-foot dish from 21 to 38 feet. During one test the signal disappeared at both extremes but was very readable at 28 feet. W4HHK reports success in receiving WA4HGN on all tests in February and March, except during and immediately following precipitation. Normal receiving bandwidth is 3KHz. The signal peaks 10 db. above the receiver noise, and shows considerable fading. QST

— . . . —

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.

RULES FOR LIFE MEMBERSHIP

1. The Board of Directors has established a provision for Life Membership in The American Radio Relay League, Inc., effective August 1, 1967.
2. Life Membership is granted only by the Executive Committee, upon proper application from a Full (U. S. or Canadian licensed) Member.
3. The Life Membership fee is twenty times the annual dues rate, or currently \$130.
4. An applicant may choose an alternative time-payment plan of 8 quarterly instalments, \$16.25 each. In such instance he will provided an interim two-year Full Membership certificate. Upon completion of the payments, Life Membership will be granted.
5. Life Memberships are non-transferable, and dues payments are non-refundable. In the event an applicant is unable to complete payments on the instalment plan, he will be given a term of membership, at the annual dues rate, commensurate with payments received.
6. Other licensed amateurs in the same family, and at the same address, of a Life Member may retain or obtain Family Membership upon payment of the annual dues of \$1, but without receipt of *QST*. The dues of the Family Member may be prepaid for any number of years in advance, but there is no special rate.
7. Application forms are available upon request from the Secretary, ARRL, Newington, Conn. 06111.



YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

That "Little Talk"

Most of us, at one time or another, are suddenly faced with the program chairman of the local civic club, PTA, VFW, American Legion Auxiliary, or any one of a dozen organizations who asks us "Would you give a little talk about amateur radio at our next meeting?" She follows it with a pitch that includes enough flattery to weaken anyone, and the next thing we know we've said "I'd love to." Right then we are in a spot that calls for serious thinking of what *is* the best way to present amateur radio to a group that knows nothing about it.

None of us are speechless when we are discussing our on-the-air experiences with each other. We are even quite glib when enlightening our curious friends who ask us about radio, but this "little talk" is a far cry from any chatting. We are, frankly, much in the same situation as in the White Knight's poem in *Through the Looking Glass*, for we must answer:

"Come tell me how you live," he cried,
And what it is you do."

Our answers cannot be like those of the "aged aged man," for we have the opportunity to tell the real meaning of the amateur radio service.

There is a great temptation to impress our audience with a colorful array of certificates that we have earned, and some of the really beautiful QSL cards that we have amassed. Or we are equally eager to polish our halos, and stress the public service aspect until all of us sound like a bunch of dedicated deadheads, complete with harps and trailing clouds of cherubs. Again, it's quite possible that we dig deep into the SRI report, *Two Hundred Meters and Down, Fifty Years of ARRL*, and boast of the many "firsts," and special achievements that are a part of the amateur story. While others might talk of contacts, and the excitement of contest operating.

To tell the story is to tell a little of all this. It is to spice the tale of our successes, both personal and as a group. It is telling our audience that we owe our existence as a wonderful hobby to the fact that we have qualified as a service to the public. It is telling of the truly vital link that amateur radio plays in the communications story, particularly today when rapid communications are the life blood of a community.

*YL Editor *QST*, Please send all news notes to WB6BBO's home address; 1036 East Boston St, Altadena, Calif 91001.

But while we are telling it we have to watch our language, for we speak a foreign tongue. We "get loaded," we "read the mail," we talk in Q-symbols, and discuss our "wall paper," and Mrs. Jane Public would be as bewildered as our OM would be if he were attending a class in knitting (assuming any of us could get our OM to a knitting class!).



SWOOP certificate.

The people in the audience really want to know the answer to "what it is you do," and this is our opportunity to "tell it like it is," to let them know about our special interest, yes, but more, the contributions of the amateur to the communications art, not in the aspect of being plaster saints, but rather the improvements we have added to make our operating more pleasant and which have been accepted by the entire communications industry. All this is a part of our service along with the story of the amateur in public service. They want to know about our DX and the international fellowship that has come about through our getting to know each other on the air, for this is the real story of amateur radio told by us about our experiences.

Last Call for Toronto!

Travel advertisements on TV tell us that "this is the year for Canada," so if anyone has waited until now to "cross the line" into Toronto for the Mid West YL Convention, it isn't too late. A full program is planned so that we can sight-see, chat

renew friendships, make new friends, and put faces and figures on voices or fists.

The club call, VE3TOT, will be used at the special station. For the gals who want to maintain skeds, or check up to see if the OM is managing to survive without them, just contact Cathy Hrischenko, VE3GJI, 30 Lisburn Crescent, Willowdale, Ontario, and book a sked with her.

Above all, *don't* forget those "swaps": they are as much a part of the flavor of a YL gathering as the meeting itself.

The dates again: May 16, 17, 18, 1969 at the Canadiana Motor Hotel, Agincourt, Toronto, Ontario. See everybody there.

Meet the Club — Los Angeles YLRC (YLRC/LA)

The official name Los Angeles YLRL is deceptive because the membership of this group includes women from many parts of California as well as Arizona and Texas, among the 52 members.

"All feminine amateur operators are eligible for membership." It is a policy of YLRC/LA to maintain 51% membership in ARRL and 50% membership in YLRL.

Organized in 1946, the Los Angeles club is the second oldest YL amateur radio group, formed just four years after the NYC-YLRL club. Five of the members have served as president of YLRL with one, Martha Edwards, W6QYL, serving as YLRC/LA, and YLRL president simultaneously. It was members of this club who accepted a "dare" that resulted in the first International YLRL Convention held in Santa Monica, California in 1955.

The "Lads 'N Lassies" certificate is awarded by YLRC/LA to any amateur who submits proof of working ten members. Special recognition is noted in the certificate if all the contacts are made in c.w. Custodian is Irma Weber, K6KCL.

SWOOP

"An organization dedicated to creating happy times for the suffering wives of amateur radio operators," reads the program that is distributed at SWOOP initiations.

SWOOP, the Suffering Wives of Operators Protectorate, was originated by W6BDE, Esther Given, and was created to entertain the poor suffering XYL guests attending the National ARRL Convention in San Francisco, in 1956. The program was such a success that SWOOP has literally become a nationwide organization, and is on the "must" list for many hamfests as well as conventions.

Any group that wishes to include SWOOP as a part of an Amateur Radio gathering should send an inquiry to Esther Given, W6BDE, Box 84, Montara, California, Zip 94037, for the SWOOP Kit, containing programs, certificates, and the initiation ceremony.

No award has ever been developed to soothe the suffering OMs who don't indulge in radio. SWOOP is exclusively feminine.

YLRL Membership

There have been a number of inquiries about YLRL. Membership is open to any licensed woman

Nada Jones, WA6YEJ. Nada, one of our sightless amateurs was licensed in 1962, and in February of this year received her Extra Class license. Operating almost exclusively c.w., Nada participates in many nets.



"Lads 'N Lassies" certificate.

amateur-radio operator. Dues are \$3.00 per year. Any YL who is interested in becoming affiliated with this oldest of world-wide amateur radio organizations for women operators may write to the membership chairman: Marge Campbell, K4RNS, 1700 Nova Road, Ormond Beach, Florida, 32074, for an application.

Important postal changes in handling second-class mail matter are now in effect. Please advise us *direct* of any change of address. Four weeks notice is required to effect change of address. When notifying, please give old as well as new address. Your promptness will help you, the postal service and us. Thanks.





Operating News



GEORGE HART, WINJM, Communications Manager
ELLEN WHITE, WIYYM, Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, WIZJE
Contests: ROBERT HILL, WIARR

DXCC: ROBERT L. WHITE, WICW
Training Aids: GERALD PINARD

Get Off My Frequency. We have just conducted a search of the FCC Rules and Regs to try to find out where therein it states that no amateur shall cause QRM to any other amateur. Judging by some of the complaints we have been receiving lately, it must be in there somewhere. The closest we can come to it is 97.125 which states: "No licensed radio operator shall willfully or maliciously interfere with or cause interference to any radio communication or signal."

Of course many of the complaints do not claim violation of the regulations, just of operating ethics, but there does seem to be a growing tendency for many operators to consider the frequency on which they are operating as "their" frequency on which no one else should operate until after they have vacated it. Perhaps it is time to take a close look at this aspect of amateur operating.

The terms "willful" and "malicious" both have to do with intent. That is, intent to do harm (malice) or deliberately or without reason (i.e., willfully) cause QRM. Intent is something mighty hard to prove, since it usually rests only in the

mind of the person committing the act, but it is safe to say that *usually* someone who lands on "your" frequency does not do so with the intention of causing you QRM. Even if he knows he is doing so, this doesn't necessarily mean that he is making his transmission for that purpose, and therefore there is some question as to whether or not it is "willful."

In other words, no amateur or group of amateurs has prior or exclusive right to the frequency on which he or they are operating (except in an FCC-declared emergency, per 97.107). It is not "his" frequency just because he was using it first. It is not his because he is on record, somewhere, as using it regularly or at specific time. *All amateur operation (except 97.107) is subject to QRM from other amateur operation.* We might as well face it.

Does this profound and sweeping comment end the matter? Not quite, although perhaps it should. There is still the matter of ethics to contend with. What, for example, are the ethics in the following situations?

(1) A net which "fires up" on a frequency on

OPERATING EVENTS (Dates in GMT)

ARRL-IARU-Affiliated Club-Operating Events

May	June	July
1 Qualifying Run, W6OWP	4 Qualifying Run, W6OWP	3 Qualifying Run, W6OWP
3-4 Ohio Interstate QSO Party (p. 111, April QST).	14 Qualifying Run, WIAW	12-14 CD Party (c.w.)*
Nebraska QSO Party (p. 113, April QST).	14-15 VHF QSO Party (p. 57, this issue)	15 Qualifying Run, WIAW
OZ-CCA (p. 75, this issue).	28-29 Field Day (p. 58, this issue).	19-20 Ontario QSO Party
Russian Contest, c.w. (p. 75, this issue).		19-21 CD Party (phone)*
5-10 Educational Institutions Radio Club QSO Party (p. 110, this issue).		20 Minnesota QSO Party
10 Frequency Measuring Test ARRL Official Observers only.		26-27 New Hampshire QSO Party
10-12 Georgia QSO Party (p. 130, April QST).		* League Officials and Communications Dept. appointees, only.
16 Qualifying Run, WIAW		Sept. 13-14 VHF QSO Party
17 Armed Forces Day (p. 60, this issue).		Nov. 8-9 SS, phone
17-18 Michigan QSO Party (p. 106, this issue).		Nov. 15-16 SS, c.w.

NOTE: Possible W6OWP Qualifying Run "alternate" (same times and frequencies) is W6ZRJ.

which a ragchew is going on? The net adherents will say that the net's frequency and time are a matter of record, and the net couldn't do otherwise. The ragchewers will say that this is most impolite and inconsiderate, to say the least, that the net should wait until the ragchew is over or use another frequency. The situation is compounded if a DX station or stations are involved.

(2) A station which calls a CQ on a frequency occupied by a net. The net will say that only an idiot (lid) or a cad would do such a thing; he should listen first, stay off if the frequency is occupied. The perpetrator may defend himself by saying that he didn't hear anything (which could be true, especially if he didn't listen!) or that he has as much right to the frequency as the net (which is also true).

(3) An Official Bulletin Station that transmits its bulletin promptly at the time and exactly on the frequency which its pre-announced schedule calls for, only to be called afterward and vigorously "chewed out" by a couple of stations who happened to be near enough to be inconvenienced.

The complaining stations call him names, threaten to report him to the SCM or headquarters and have his appointment cancelled for not "listening first." The OBS defends himself, saying that he will be near someone no matter where he transmits and if he goes off frequency his regular listeners might not be able to find him.

(4) Two nets which find themselves both trying to operate on the same frequency at the same time. Which one has precedence, ethically speaking? The oldest net? The one performing the greatest service? The one with the most members?

But there we go, putting forward hypothetical questions and not giving any answers. What is the solution?

Well, there is none, really — except simply to stop wrangling about QRM, and stop impugning the motives of every other station that causes you QRM — except to grin and bear it. What you are doing may or may not be more important than what the other guy is doing. Probably you



DX CENTURY CLUB AWARDS



From February 1, through February 28, 1969, DXCC certificates based on contacts with 100-or-more countries have been issued by the American Radio Relay League to the amateurs listed below.

New Members

WA5REU...242 K0RTH...157 WB6UDC...147 JA4BX...145 K4DXS...139 W3JXH...138 W9BF...121	VK1QL...119 D18YE...116 W3MLD...111 UA6YD...109 W2PZF...109 Q2CKN...107 K1UKC...107	W9KCY...107 W5DAU...106 W9JVF...106 K4LRL...105 VE6ARQ...105 JA1HRQ...104 W8FRJ...104	VE2UN...103 UA6LY...103 WB4EHX...103 L44HL...102 WA5JDR...102 VE3...102 W2PHY...102 WA2VVV...102	W7ETZ...102 W8PUB...102 DJ6KK...101 W4DMS...101 W8WCW...101 HA6VK...100 UA1KAS...100	UM8FM...100 WA1LJC...100 W2MYK...100 WB2NYK...100 W7GVA...100 WA8KHL...100 W0KON...100
--	---	---	---	--	--

Radiotelephone

K1OZR...222 WA4GYE...195 SM5FC...186 Z89L...160 G3PMX...129	WB6UDC...124 SV0WL...121 K4MOJ...120 WA0GZA...110 G5AHW...109	K9KPK...108 VP7DL...108 WA0CEL...107 5N2LJA...106 W1RPF...105	WA4TWQ...105 WA8PWF...105 MP4TAO...104 W8FRJ...104 LA8PF...103	W3FQJ...103 WA9TBZ...103 YV5AAZ...103 9X5PB...103 G3VVU...102	K4ADK...102 JA1HRQ...101 W6EF...101 ZL1AMN...101 K8ZFR...100 WB4EPT...100
---	---	---	--	---	--

Endorsements

Endorsements issued for confirmations credited from February 1, 1969 through February 28, 1969 are listed below. Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

340 W6HX	310 K6EV	W2WD	UA3CT W1SXQ W5HTY	W3AG WA3HUP W8PCS	WA9TFM 180 OZ8RL PY2BBO WB4CGY	WA1FJU WA4GQM WB4MZZ WA8TFJ WA9QAM W0DAK	K8CMO K8EDQ PY4ALC VE2DCW VQ9KS VQ8CC	120 K2IEF K6TVL K9BNF WB2NDI WA3HGY W7SLU WA8AUM WA9TBA K4PHY/ YV5
330 W5UUKK	305 DJ7ZG G3KZ1 W5FT	280 K9PPX WA6YVV W0YTTQ	240 SM5AHK W5LLB	200 OH23F VE3DLC VE43A	160 FP8CY K4ADK K4OCE	140 DJ9ON W0IU		
325 W6HYG	W5HJA	260 K1OZR OH2BW	220 DL1MD	WA1ABW W6PBO				
315 W6KG	300 DJ0KQ							

Radiotelephone

320 W6HYG	280 I1SGZ WA2HOK W8GMF	220 WA5REU YV4QG	180 DL1MD W5LLB W9CCK WA91YG WA90AH YV4UA	160 WB2FMK W4OKO WA4GQM WB4CGY WA5REB W8OGW	140 HAKI K2PIU K5MFA K8CMO VK9KS VS6DR	W4EAL W0YTTQ	K4NKI K0RTH UA3CT VE1RU W2EV W2ELXF	W3KVS WA3HGY WB6DXU WB6DXU WB8KV WA0IRP
---------------------	--	-------------------------------	--	--	---	-----------------	--	--

will think so; most likely he will not. Unless a regulation is broken and the matter comes to hearing (very unlikely) there can be no decision on such a matter, and it makes no difference anyway. Within the authority and scope of his license, each amateur has exactly the same spectrum rights as every other amateur. The only interference that is illegal is "willful or malicious" interference, and there is precious little of this going on — much less than you might suspect. How about giving your brother amateur the benefit of the doubt? — *W1NJM*.

ARRL CODE PROFICIENCY PROGRAM

Qualifying Runs

Any person can apply for an ARRL code proficiency award. Neither League 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 (10-35 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. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6OWP (W6ZRJ, alternate) for the coming 3-month period.

W1AW will transmit a qualifying run on all listed c.w. frequencies at 0130 GMT May 16. (In converting, 0130 GMT May 16 becomes 2130 EDST May 15.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz. 0400 GMT May 1. (In converting, 0400 GMT May 1 becomes 2100 PDST Apr. 30.)

Code Practice

W1AW transmits daily code practice according to the following schedule. For practice purposes, the order of

words in each line may be reversed during the 5-13 w.p.m. transmissions. (Each tape carries a checking reference.)

Speeds	Local times/days	GMT times/day
10, 13, 15	7:30 P.M. EDST daily 4:30 P.M. PDST	2330 daily
5, 7½, 10, 13, 20, 25	9:30 P.M. EDST (SuTTh) 6:30 P.M. PDST (Sat)	0130 MWFSu
35, 30, 25, 20, 15	9:30 P.M. EDST MWF 6:30 P.M. PDST	0130 TThSat

The 0130 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your list by sending in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0130 GMT practice on the following dates:

Date	Subject of practice text from March QST
May 19:	<i>It Seems to Us</i> , p. 9
May 22:	<i>Phone Patching — Legitimately</i> , p. 11
May 28:	<i>A Band-Spotter and W1AW Marker</i> , p. 28
June 3:	<i>Amateur Radio Public Service</i> , p. 58
Date	Subject of practice text from <i>Understanding Amateur Radio</i> , First Edition
June 6:	<i>The Terminated Line</i> , p. 105
June 9:	<i>Standing Waves on Lines</i> , p. 105

SWITCH TO SAFETY!



W1AW SCHEDULE, MAY 1969

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EDST, Saturday 7 P.M.-2:30 A.M. EDST and Sunday 3 P.M.-10:30 P.M. PDST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. The station will be closed Memorial Day, May 30.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000
0020-0030 ⁴	3.700 ⁶	14.020	14.020	7.150 ⁶	14.020
0030	3.700 ⁶	14.100	14.100	7.150 ⁶	14.100
0100
0105-0130 ⁴	3.820	50.120	145.600	1.820	21.720
0130
0230-0300 ⁴	3.555	.....	1.805	.....	3.555
0300
0310-0330 ⁴	3.625	14.095	7.095	14.095	3.625
0330
0335-0400 ⁴	7.220	3.820	7.220	3.820	7.220
0400
0420-0430	3.700 ⁶	7.020	3.945	7.150 ⁶	3.520
0430-0500	3.700 ⁶	7.080	3.945	7.150 ⁶	3.555
1700-1800	21/28 ⁵	21/28 ⁵	21/28 ⁵	21/28 ⁵	21/28 ⁵	.....
1900-2000	14.280	7.255	14.280	7.255	14.280	.....
2000-2100	14.100	14.280	14.095	21/28 ⁵	7.080	.....
2200-2300	21/28 ⁵	21.100 ⁶	21/28 ⁵	7.255	14.280	.....
2300-2330
2330

¹ C.W. OBS (bulletins, 18 w.p.m.) and the code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02, and 145.6 MHz.

² Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.

³ RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 29.015 MHz.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.

⁶ W1AW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.

⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff; W1s QIS WPR, K6OSO. *Times-days in GMT. Operating frequencies are approximate.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for February Traffic:

Call	Orig.	Rcvd.	Rt.	Del.	Total
W3CUL	750	3964	3781	143	8638
K5TEY	4	2316	2309	1	4630
W3VE	196	1743	1602	121	3662
W7BA	9	1501	1363	134	3007
W8PHL	14	1498	1322	170	3004
K5BNH	9	1159	1050	63	2281
WA2UWA	120	1080	960	40	2200
W1PEX	21	893	874	12	1800
W9JYO	592	515	485	30	1622
W4THR	5	725	682	20	1432
W9LCX	6	733	670	10	1419
WA4JH	11	653	641	11	1316
WB2RKK	31	561	491	55	1138
WB4ATW	15	553	540	13	1121
WA9CNV	2	548	542	2	1094
WA48CK	21	540	516	2	1079
K4HHY	31	199	752	23	1025
K3SLG	2	522	475	22	1021
WA2BHN	26	471	453	18	968
WA9MHU	56	446	367	73	942
WA7BZY	4	416	411	6	837
W9ENU	2	414	409	5	830
W50BD	10	391	391	0	792
W3RML	24	417	317	3	758
WA8WZF	5	347	368	8	728
WA4DYL	6	380	323	5	714
W6RSY	30	348	262	70	710
W6GYH	69	320	316	2	707
K9NBH	686	2	0	0	688
W9CXY	5	337	323	16	681
W9EQO	121	271	271	0	663
K7RQZ	16	316	274	29	635
W0PZO	2	304	265	39	610
W4EYN	17	290	271	5	603
K9ZNP	28	281	155	119	546
W6BBO	29	266	249	2	546
WA3AOJ	8	270	215	45	538
W61PW	6	266	245	21	538
K81NE	10	276	246	3	535
K9FXZ	4	259	259	2	524
W10JM	5	258	252	6	521
W480Q	21	245	221	32	519
K3FSO	19	245	248	3	515
W3CUL	71	230	175	34	510
W8RYP	15	242	179	73	509
W40THQ	10	243	248	27	504
W2OE	46	244	208	3	501

Late Reports:

K9NBH (Jan.)	523	2	0	0	525
--------------	-----	---	---	---	-----

More-Than-One-Operator-Stations

K9LDP	350	0	350	0	700
-------	-----	---	-----	---	-----

BPL for 100 or more originations-plus deliveries

W6MIF 262	K8ZJU 122	WA6BYZ 109
WA9TUM 187	WA9QO 120	WA3HV 107
W3BY 149	W8CUL 113	VESGRU 106
WA3WF 143	W4SDW 112	K2KQ 104
WB2YVP 140	W1LGN 111	W48WGM 104
K2UBG 137	WB2VVB 111	W9ESJ 102
W1XXL 123	K6JGH 111	WA3TUV 101

BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listings: WA2ABY, W4NLO, W4VYS, W8BUC/A, W4THR, W8LXJ, W4BPNB.

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 400 or a sum original on 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.

ARRL FIELD DAY

June 28-29, 1969

But first, have you requested your FD log forms? Remember that each ARRL FD log sheet contains enough room to report 100 QSOs. Please try to estimate the number of contacts you'll make on each band (be generous!) — add 'em up, divide by 100 and ask for that number of logs. If you're brand new at this, estimate 100 contacts per band. Let us know the number of bands you plan to operate and we'll be able to send you sufficient check sheets to avoid duplicating contacts! A bid for Operating Aid 9A will certainly aid you with a correct message origination.

The mails aren't what they used to be so allow at least 4 weeks for third-class shipment of the forms. In a hurry? Then please forward sufficient postage for first-class return of the material. Furnish your zip code along with your name, call, street address, city, state and/or province. *CU FD!*

1969 Field Day Rules

(Continued from page 61)

If commercial mains are at hand, pull the main switch from 1900 Saturday until 2200 Sunday. Even if your generator goes *pluff* you lose the bonus if you turn on the commercial power.

(2) *Publicity.* Evidence of publicity must be attached to the FD log and report to get additional 200-point bonus. This can be in the form of a newspaper or magazine clipping, or a letter or memo from a BC or TV station stating that publicity was given.

(3) *Message origination.* An additional 200 points may be added if a message is originated by your club president or activities manager or other FD leader addressed to the SCM or SEC, stating the club name (or non-club group), number of operators, field location and number of AREC members participating. The message must be transmitted during the FD period and a fully-serviced copy of it in standard ARRL form must be included with the FD log and report.

(4) *Message handlings.* Add 10 points for each message received and each message relayed during the FD period, up to a maximum of 200 points. Copies of each message, properly serviced, must be included with the log.

SAMPLE SCORE: Assume a station in Class 3A with independent power running three 50-watt rigs. If 127 valid contacts are made, all power at FD site independent of commercial mains, publicity obtained and a message originated, the score would be computed as follows:

127 × 3 (Power 50 watts or less) × 3	
(Independent power)	= 1143
Bonus for 100% independence from commercial power (200 × 3)	600
Bonus for publicity	200
Bonus for message origination	200
Message handlings points (7 handled at 10 points each)	70
	<hr/> 2213

d. *Club Aggregate Mobile Scores.* Entries under Class C may be combined to form an aggregate score for the club, having no connection with the club's portable entry, if any. Individual reports must include the club name, and the club secretary or other designated club official must submit a claimed aggregate score. Only bona fide members of the club residing in the club territory may contribute to this aggregate mobile score.

11. Reporting: Mail reports or entries on or before July 27. Reports must show starting and ending time of FD operating period, bands used, dates and contact times in GMT, calls of stations worked, and ARRL sections or locations of stations worked. Reports must also show power inputs and sources of power, number of transmitters in simultaneous operation, location of station, number of persons participating, class of entry, and score computations. QST

Important postal changes in handling second-class mail matter are now in effect. Please advise us *direct* of any change of address. Four weeks notice is required to effect change of address. When notifying, please give old as well as new address. Your promptness will help you, the postal service and us. Thanks.

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE—SCM, John L. Penrod, K3NYG—SEC/PAM: W3DKX, RM: W3EEB, W3TRC wishes to remind stations to use "Q" signals only while passing c.w. traffic. W3CZS reports excellent results with his home-brew linear. K3VWQ joined the other operators over at WA3GAY. W3FEG is helping the KC4 boys with phone patch traffic. W3EEB reports on his new campground. Sounds like a nice place for the Delaware ARC to hold its Field Day. W3ACDV is enjoying his new HW-100. K3WLP is now the proud owner of a new Advanced Class license. WA3BAO is 2-meter s.s.b. WA3DYG issued W3L/RACES calls to sixteen stations. Net reports: DEPN, QNI 53, QTC 12; CEPN, QNI 52, QTC 1; DSMN, QNI 31, QTC 2; DTAN, QNI 42, QTC 14. Total net SET traffic: 154. Traffic: (Feb.) W3EEB 27, W3DKX 26, W3TRC 17, W3HWC 14, W3HKS 9, W3NX 7, K3NYG 5, W3ADUM 2, W3ADYG 1, W3GSM 1. (Jan.) W3TRC 27.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3ICC, RMs: W3EML, K3-MVO, W3MPX, K3SLG. PAMs: K3WAJ, K3MYS, V.H.F. PAM: W3FGQ. OBS reports were received from WA3EEC, W3CBH, WA3AFI, W3ID, K3WEU, W3AHD1, WA3INC; OBS reports from W3FGQ, WA3-HJQ, WA3EEC, WA3IAZ, W3AFCZ, WA3HD1. OO reports from W3BFF, W3FGQ, WA3IU, K3WEU, K3RDT, K3HNP, W3NNC, W3KEK.

Net	Freq. Operates	QNI	QTC	RM/PAM
EPA	3610 Daily 6:45 p.m.	386	487	W3MPX
PTTN	3610 Daily 6:00 p.m.	301	288	W3MPX
EPA&PTN	3917 Daily 6:00 p.m.	548	276	K3WAJ
PFN	3960 Daily 5:30 p.m.	729	1037	K3SLG
VHF (6)	50.25 Mon.-Fri. 7:00 p.m.	118	70	W3FGQ
VHF (2)	145.35 Mon.-Fri. 8:00 p.m.	79	16	W3FGQ
BNTN	3740 Mon.-Wed.-Fri. 7:15 p.m.	56	53	WA3IU

New officers: Lafayette College ARC—K3MINT, pres.; WA3EEC, vice-pres.; K3KBO, secy.-treas. Suburban ARC—WA3HGX, pres.; WA3DNY, vice-pres.; WA3-GPZ, secy.; WA3IAO, act.; WA3IMG, treas.; WA3-EGD, dir. R.F. Hill ARC—WA3FOQ, pres.; W3PNL, vice-pres.; WA3HMU, secy.; K3ALV, treas. Penn State ARC—WA3CFU, pres.; WA3KAC, vice-pres.; WA3LTW, secy.-treas.; K3PBL, dir. Awards were given by the SARC as follows: Public Service to WA3GEL, Man of the Year to W3BUR, W3CUL is off for Florida. W3VR is going along to get warmed up after a cold winter. W3FML, now the owner of an SB-200, reports TCC running smoothly. WA3AOJ is off for Florida, too. W3MPX is working hard at two nets. EPA and PTTN, WA3INC finally found the cause of his chirp. K3MVO has his old home-brew rig back on while he trouble shoots new gear. W3FGQ has been busy getting the v.h.f. nets perked up again. W3NNL and K3OIO hit pay dirt on a home-brew article for an FD transceiver. WA3ATQ still is hitting the mark on phone patches from the boys in Gtmo. WA3CNM is the new Montgomery County EC. The latest Novice from his class is WN3LZZ. W3JSX is getting back in harness. WA3HD1 got his "A" ticket. WA3AFI and W3CBH are keeping c.w. bulletins going. W3RV is all set with a new antenna. WA3EEC will be operating from Lafayette College ARC. WA3HMU is sporting a new HW-100. K3KTH's c.w. is beginning to sound like a computer. WA3EXB is going for his commercial tickets. To avoid much unnecessary correspondence I will in the future disregard late reports and not try to carry them over. Also, unless an error

is gross or makes the difference between award or no award let's drop the matter. Okay? Traffic: W3CUI, 8638, W3VR 3662, K3SLG 1021, W3EML 758, WA3AO, 538, K3PSO 515, W3CID 510, W3MPX 364, WA3IU, 308, WA3JWF 256, WA3INC 254, K3MVO 236, WA3-EXW 218, WA3IHV 195, W3FGQ 122, W3HK 103, W3-NNL 73, K3OIO 73, WA3ATQ 71, WA3FMI 70, WA3-CNM 68, WA3CND 53, WA3GLI 49, WA3FPM 47, K3WEU 47, WA3JKB 46, WA3CFU 45, W3JSX 45, WA3HD1 40, K3RUA 40, WA3AFI 39, WA3GWL 38, W3VAP 38, K3WAJ 34, W3CBH 31, W3BNR 28, W3-PFC 28, WA3IOB 26, K3PIE 26, W3RV 23, WN3JZI, 20, K3RTX 17, W3ADE 16, K3HNP 16, WA3EEC 15, K3VVG 15, WA3EXB 13, W3BUR 12, W3HMK 12, W3OY 12, WA3IYC 11, W3VA 11, WA3HMU 7, W3OMI 6, WA3BSV 5, K3KTH 4, W3NNT 4, WA3BJQ 3, W3EU 2, WA3IAZ 2, WA3CMD 1, WA3EYW 1, WA3-FCZ 1, K3FOB 1, W3ID 1, W3KEK 1, W3YPF 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM

John Munnholland, K3LFD—SEC: W3LDD.

Net	Freq.	Time	Days	Sess.	QTC	QNI	Mgr.
MDD	3643	0000Z	Daily	28	318	15.0	WA3HTQ/RM
MDDS	3643	0130Z	Daily	28	61	5.8	W3CBG/RM
MDCNTN	3920	2300Z	SPTS	16	84	23.5	K3GZK/PAM
MEPN	3920	2300Z	MWF				(No report) K3IAG
					1800Z	SS	
MTMTN	145.206	0200Z	T-S	22	28	10.9	W3IFW

New appointments: W3CSZ as OO; WA3GUI as OBS. WA3EOP holds "revival" meetings on ASTN every Sun. at 8 p.m. on 50.4 Mc. WN3KNJ is now WA3KN and is enjoying the new-found phone bands. The 196 SET turned on W3LQY and now she is riding all traffic tracks with the OM jockeys. K3JOM and K3TBI are running the Maryland 2-Meter Technical Net on 145.206 Mc. every Sun. at 1 p.m. Listen for the Central Maryland Emergency Net coming soon on 2 meter. WA3GUI, aged 16, is a budding traffic man. WN3LE plus 5N equals WA3LEQ/Extra Class for an XY known as Lou, where N equals 1 month. Top that you OMs. W3TN strikes again—BPL, that is, W3MNS logging more hours on 6N2, S.S.B. and C.W. since I returned. Watch QST for the MDC QSO Party announcement coming soon. K3JYZ, WA3HTQ and WC-UCE/3 ganged up on the ARRL DX Test for 718 contacts and 225 countries. WN3KGC, Pasadena, is not portable 3 Baltimore until his license modification arrives. W3EOK is back from a Florida vacation and says a W4 call looks good for retirement. W3LPT received the Mareconi Memorial Gold Medal of Service from the Veteran Wireless Operators Association while in London recently. K3RGB EC Baltimore City, operates his AREC Net on 28.680 Mc. every Sun. at 19:00 EST. WA3GYW is attempting moonbounce. W3CEC tried QSK for the first time in 33 years of operation and loves it. K3GZK is doing a fine job promoting local net/section net liaison in Central Maryland. From the SCM desk, the addition of a low-powered 2-meter rig to every low-band traffic station looks like a economical way to expand NTS-local coverage as well as an easy way to obtain an emergency operating capability with the aid of fixed or mobile battery power. Traffic: W3TN 356, W3CBG 155, WOUCE/3 13, K3LFD 88, K3GZK 85, W3DYA 79, W3ADO 77, W3-ATQ 62, WA3JRO 58, WN3KAA 51, W3LQY 50, K-ORW 44, W3FU 35, WA3ERL 29, K3JYZ 28, WA3EC 27, WA3HSU 25, W3FA 24, WA3IAQ 23, W3PRC 2, WA3GXN 17, K3OAE 17, W3ZNV 17, K3LFN 1, WA3GUI 13, WA3HKR 13, K3PQK 12, K3QDC 1, WA3JIR 11, WA3CEK 9, W3GEB 9, WA3KNJ 8, WA3-JHE/3 7, W3CRE 6, WA3GGO 6, K3JOM 4, WA3DW 2, K3RGB 2.

SOUTHERN NEW JERSEY—SCM, Edward Raser, W2ZI—Asst. SCM: Charles E. Travers, W2YP SEC: W2LWV, NJN Net Mgr.: WA2BLV, RMs: WA3-KIP, WA2BLV, PAMs: WB2VVB, W2ZI, W2ZVW doing a fine job as NCS of EAM. WB2DRG has been in the hospital for several months. W2BLM is trustee for club station WA2FEZ. K2CPR has been appointed to the new ARRL Advisory Committee. W2ORS has received his new call-letter license plates and the look swell. W2YPZ made a trip to Spain during the Easter vacation. W2ZQ has a new 1-kw. linear and

worked Alaska and Hawaii on 75 phone! W2VI is in Hollywood, Fla., for the winter, and signs K4GO. New OPS: WA9PRE/2, W2JI, W2BLM, W2DNF, W2TAZ, from Freehold, is attending Rider College in Trenton. He has his new Extra Class ticket, and 30-w.p.m. ARRL endorsement. Two new calls in Trenton are WB2IPF and WN2HPB. W2ZI is off to sea again, this time to New Zealand, Australia and the South Seas aboard the S.S. *Monterey*. K2ARY is faithfully transmitting his OBS skeds. A first report was received from WB2WHB. WB2BCH is now W3EPT in Silver Spring, Md. W2DNF joined the QCWA. WB2WF has new s.s.b. gear and is working all kinds of DX. The N.J. Emergency Phone and Traffic Net participated in the SET and made a total of 1563 points. W2PEV submitted an excellent report. W2ORS was high traffic man this month. NJPEN reports a QNI of 632 and total traffic of 355 messages. Traffic: (Feb.) W2ORS 24, WB2UYB 162, WB2VEJ 161, W2YXP 145, W2PU 89, W2ZVW 72, WA2ABY 71, W2ZI 49, W2BLM 34, K2SOL 32, W2IU 29, W2DNF 24, WB2WHB 21, K2SHE 17, W2CDZ 14, WA2KIP 14, W9PRE/2 14, WA2KAP 13, K2JJC 12, WB2FJE 11, K2MBW 5, W2JI 2. (Jan.) W2PU 75, W2ZVW 35.

WESTERN NEW YORK—SCM, Richard M. Pitzeruse, K2KTK—Asst. SCM, Rudy W. Ehrhardt, W2PVT. SEC: W2RUF. PAM: WB2VSL. RMs: W2FR, W2MTA, W2HUF, K2KTR. Section nets are listed in *Station Activities* in Feb. QST. A late session has been added to NYS at 2900 local time on 3795 kc. WB2WGF is a new OPS; WB2VSL is a new OBS. Renewals: W2RQF as OPS and OO, WA2BEX as ORS, W2IDM as EC and OVS. Your SCM had the pleasure of speaking to the Oswego County ARC. WA2DWE is QRX for a TH6DX to go with his SB-300/SB-400. W2QNA now signs K4AYR from Florida. WB2QAP, though busy at work and on the air, still finds time to play the organ. W2ZA, one of the first 70 radio amateurs has joined Silent Keys. NYS reports for Feb. show 670 messages cleared with 699 check-ims. BPLR W2OE made it the hard way with only 14 days of operation in Feb. WA2DCC is QRX for good weather to put the skyhook up. K2LCT finds it necessary to cut back on his OBS schedule because of extra work. WB2WGF is planning a pair of 813s to add to the Eico 753. WB2YEE received a shiny new NYSPTEN certificate. W2CFP, WB2RHJ and WB2VSL are all active in the newly-formed East Coast Amateur Radio Society. W2CFP has a weekly ten-minute radio program on WHCU in Ithaca dealing with amateur radio. Dave, K2SZJ and W2CXX are working on a 2-meter repeater for Ithaca. OVS WA2BSG passed the General Class test. The NCARC, K2PCQ, one of the only clubs operating out of a lighthouse, was robbed twice in Feb. WB2ZDP was forced to QRS on his 432 gear because of the high cost of varactors. Don't forget the WNY Hamfest in Rochester May 10. W2IDM and WB2ZDP observed some good aurora openings on 50 Mc. K2DUR and WA2SOO are running Novice classes for the Fulton ARC. W2RUF reports AREC activity in the section picking up sharply and also activity in NYSN continues at a fever pace. WB2VSL suggests a WNY appointees net. Traffic: (Feb.) W2OE 501, WB2VVP 441, W2FR 321, WA2CAL 309, K2KQC 251, WB2SMD 236, W2MTA 190, W2RUF 180, WA2BEX 160, W2HYM 136, WB2VND 114, WB2GAL 108, WB2HLI 78, WB2VSL 74, K2RYH 59, WB2YEE 58, WA2HSB 54, W2PRY 47, W2PVI 44, WB2WGF 43, W2IDM 42, W2RQF 39, K2UIR 35, K2DNN 34, K2QDT 34, K2VCZ 25, WA2GLA 23, WB2PHF 20, W2CFP 17, K2OFV 17, WB2RWR 15, WA2HSU 14, WB2YEM 14, K2IMI 13, K2KTK 12, WB2AVY 5. (Jan.) WB2RHJ 92, WB2YEM 29.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—SEC: W3KJP. PAM: W3WFR. RMs: WA3AKH, W3KUN, W3MFB, W3NEM. Traffic nets: KSSN, 2330 GMT; WPA, 0000 GMT, 3585 kc.; WPA, sessions 28, QNI 335, messages 346, stations 54; KSSN, sessions 20, QNI 144, messages 51, stations 27. Congratulations to K3ZNP on making the BPL. W3IYI and W3CFC sponsor code classes for the Indiana County ARC. K3RBH is the new pres. of the Nittany ARC. New board members are K3AKR, K3CXZ, W3TYL, WA3LJW and K3UMT. WA3IFC, WA3JBQ and WA3DTQ are new members of the Etna Radio Club; at the Steel City ARC it's K3UQD and at the Indiana ARC it's a new YL member, WN3JXA. K3VCI and W3FVU are avid county seekers. The Washington County AREC net meets each Thurs. at 0100 GMT on 21.350 kc. The WMAL AREC Net meets every Wed. at 2000 EST on 29 Mc. WA3DTG wired up an HW-100 while son WA3DOI put together the Heathkit SB-101. The Carroll Township Junior High Radio Club at Monongahela, WA3KNW, is on the air with an Eico 720 and a Lafayette HA-350 is ably represented

by WN3KFY, KMK, KGA, KQO, KJZ, KFZ, LAX and LZX. W3ZUH obtained a 120-countries confirmed DXCC endorsement. K3WVP expects competition in future CD Parties from WA3GPK. Anyone interested in broadcast-band DXing, contact K3WVP. K3HZL has upgraded to Advanced Class. K3OTY leans towards RTTY operations. The Trinity Area High school at Washington, Pa., WA3HWU, with a Johnson Challenger and Hallcrafters SX-146 and a TA-33 Jr. beam, is augmented by WA3DOH, FJAI, ITR, JDD and Novices WN3JDB, JDC, JJJ, JJK, JIL, KBL, KDX, KFD and WN3LSX. 2- and 6-meter activities show, WA3JDT with an HE-45A transceiver and a three-element beam, WA3DPI and K3QAY run Lafayette 460s on 6. WA3GIV a Squalo. In Erie County, RTTY enthusiasts are WA3HLN, WA3HDK, WA3GIV, WA3FPD, K3CKO, K3FVO, K3HFL, K3KJN, WA3ISN runs an HQ-110 and an HC-10. K3UIK, specialist in rotors, ordered gears and only needs a clip. WA3HRJ runs an HW-17 on 2. WA0OU, at Denver, keeps a sked with his dad, W3WDK. K3KJQ is a new voice on 6. K3AXS is back on the air. WA3GSB, with a new T-4XB, is indebted to WA3OH and W3MOK for their help in securing his Advanced Class license. Appointments: K3ESF as Blair County EC. Endorsements: WA3BLE as ORS/OPS, K3WVP as OBS. Traffic: K3ZNF 546, WA3PU 326, W3MFB 224, WA3AKH 130, W3LOS 112, W3KPJ 60, K3EXE 53, K3HCT 50, K3SJJN 43, K3HKK 42, W3GJY 34, K3SMB 25, WA3GPK 22, W3RUL 16, W3YA 8, W3BLZ 7, W3IDO 6, W3SN 6, WA3LDZ 4, WA3GTE 1.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. PAMs: WA9CCP and WA9PDI (v.i.f.). Cook County EC: W9HPG. Net reports:

Net	Freq.	Times	Days	Tfc.
1EN	3940 kc.	1400Z	Sun.	37
1LN	3760 kc.	0100Z	Daily	254
NCPN	3915 kc.	1300Z	Mon.-Sat.	664
NCPN	3915 kc.	1800Z	Mon.-Sat.	
Ill.PON	3915 kc.	2245Z	Mon.-Fri.	732
Ill.PON	3915 kc.	1430Z	Mon.-Fri.	
Ill.PON	145.5 Mc.	0200Z	M.W.F.	212
TNT Net	145.35 Mc.	0300Z	Sun.-Fri.	326

WA9QBM, WN9ZTJ and WA9VLP are the new officers of the Deerfield Amateur Radio Club. W9OKI is now an Advanced Class licensee. WA9TCW has a new Swan 250. WA9QZE is running a home-brew gallon with four 811s. W9VHD is back after a short illness. WA9RTI and his XYL, WA9RSK, of Clinton, have moved to Peoria. The Illinois Post Office Net is inaugurating a Sat. net on 3915 kc. with the time set at 2200Z. WA9ZHR is working new DX with his HW-100. The newly-founded Palestine ARC has received the call WB9-AOJ. Mr. Fritz Franke, of Hallcrafters, gave a chalk talk on "The Decision Threshold Computer" at the Mar. 5 meeting of the Chicago Area Teleprinters Society. K9LLU's new QTH is Newberry Park, Calif., with the call W6KCI. According to reports received, many clubs which have been conducting code and theory classes for advancement and also new amateurs have graduated many new licensees. Neil Whitney gave a talk and demonstration on "Programmed Slide Rule" at the Hamfesters meeting on Feb. 28. The Hamfester is holding its annual nomination for Illinois Amateur of the Year Award. If you know of an amateur who has performed a service to the public during the year please contact Hamfesters at 6000 South Tripp St., Chicago, Ill. 60629. The Rock River Radio Club will hold its third Hamvention at Amboy, Ill. Sun., May 18. Contact W9SON for further details. This column's sympathy is extended to K9DCG and his family on the loss of his father. New Advanced Class licensees are K9KGV, W9UFH and K9LUX. W9BRY is now W9FL. The Chicago Suburban Radio Assn. held its Mini-Fest Mar. 16 in Brookfield. The 1969 ARRL Central Division Convention will be held in Indianapolis, Ind., Sat., May 24, 1969. Write to 309 Benton Drive, Indianapolis, Ind. 46227, for details. WA9CNU, WA9MHU, K9NBH and WA9TUM are BPL certificate recipients this month. Traffic: (Feb.) WA9CNU 1094, WA9MHU 942, K9NBH 688, WA9TUM 487, WA9AKR 481, WA9QBM 193, WA9ZUE 181, W9NXC 139, WA9TOC 129, W9HOT 103, WA9NZF 62, W9DOQ 58, W9JXY 51, WA9LCD 46, WA9WNH/9 41, WA9BRQ 38, WA9UXF 34, K9RAS 29, W9YH 25, W9LDU 22, K9TXJ 7, K9RFZ 6, W9LNQ 6, WA9VQT 6, K9DQU/WB9AIE 5, K9HSK 5, W9PRN 5, WA9LHU 4, W9IDY 2. (Jan.) K9NBH 525.

INDIANA—SCM, William C. Johnson, W9BUQ—

Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9BUQ.

Nets	Freq.	Time	Feb. Tfc.	Mgr.
IFN	3910	1330Z Daily	2300Z M-F	225 K9IVG
ISN	3910	0030Z Daily	2300Z S-S	496 K9CRS
QIN	3656	0100Z Daily		130 W9HRY
Ind. PON	3910	1245Z Daily		29 K9EFY
Ind. PON V.H.F.	50.7	0200Z Mon.-Thurs.		180 WA9NLE

W9PMT, Mgr. Hoosier V.H.F. Nets, reports Feb. traffic as 110. The W9YB TV crew reports that contact was made with K9FUE. WA9JNC has an HW-12 mobile for any emergency. WA9ITB has been handling traffic from K9NBH at Great Lake NTS. W9DOK is back from Florida after six weeks. W9EJW has been checking into the QIN Net. WA9TQH passed the Advanced Class exam and is using a T4X-RAA. WA9-9EQ passed the Extra Class exam. W9HWR is the EC for Gibson County. WA9NYU is running a Galaxy 5 Alark 2 Johnson Matchbox feeding a 180-ft. wire. The Wabash County Amateur Radio Club is sponsoring its First Annual Hamfest May 25, 1969, at the 4-H Fairground at Wabash, Indiana. Contact K9ULW, 1165 N. Cass St., Wabash, Ind. 46992. To all Indiana amateurs: The Indiana nets need additional net control during vacation time. The nets are listed at the head of this column. May 24-31, has been proclaimed as Indiana Amateur Radio Week by Gov. Edgar D. Whitcomb. The Indiana Ham Assn. Hamvention will start Indiana Amateur Week. QIN Honor Roll: W9BDP 27, K9VHY 25, W9JFQ 24, K9DHC 17, WA9BWW/9 16, W9EPZ 16, WA9FDQ 15, WA9KAG 15. Amateur radio exists because of the service it renders. BPL certificates went to W9JYO, W9ENU, W9EQO, K9FZX, WA9OQ. Traffic: (Feb.) W9JYO 1622, W9ENU 839, W9EQO 663, K9FZX 524, K9IVG 421, WA9OQ 309, W9HRY 285, W9JFQ 277, WA9VZM 195, WA9BWW 180, WA9VBG 168, W9BUQ 110, W9CMT 75, W9ICU 64, K9CRS 50, K9HYV 47, W9FVH 46, K9EFY 42, WA9-VRV 40, W9ARN 36, K9CBY 33, K9VHY 30, WA9-OHX 29, W9YXX 27, W9DOK 26, WA9WME 26, W9LQ 23, WA9ITB 22, WA9GNA 21, WA9SBR 20, WA9TJF 17, WA9GJZ 16, W9PMT 16, WA9BHG 15, W9ALM 13, WA9BV 13, WA9LPS 13, W9EJW 10, K9FUJ 10, K9-WGN 10, K9KFM 9, WA9LHG 9, WA9OAD 9, K9QVT 9, WA9AXF 8, W9DZC 8, K9RWQ 7, W9BDP 5, WA9-9EQ 5. (Jan.) W9QLW 96.

WISCONSIN—SCM, Kenneth A. Ebner, K9GSC—SEC: W9NGT. PAMs: K9DBR, WA9IZK, W9LVC, W9NRP, WA9QNI, W9AYK. RMs: K9KSA, W9DND.

Net	Freq.	Time	Days	QNI	QTC	Mgr.
BWN	3985 kc.	1145Z	Mon.-Sat.	387	249	W9AYK
BRN	3985 kc.	1700Z	Daily	610	185	W9LVC
W9BN	3985 kc.	2200Z	Daily	1388	289	WA9QNI
WIN	3662 kc.	0015Z	Daily	311	133	W9DND
W9SN	3780 kc.	2330Z	Daily	136	36	K9KSA
WRN	3620 kc.	0030Z	Sun.	16	2	K9GSC
SW2RN	145.35 Mc.	0130Z	Daily	268	26	WA9IZK
SWRN	50.4 Mc.	0200Z	Daily			K9DBR

Net certificates went to WA9WKI and K1LQI/9 for W9BN; new appointment to WA9TPV as ORS; renewed appointments to W9CBE as OBS, W9CBE and W9ODD as ORSS, W9ESJ and W9ODD as OPS; K9-DBR as OVS. W9NYCY was active in the Novice Roundup with 153 QSOs. The 1969 WNA Picnic will be held in Madison, Wis., July 13. BPL for Feb. traffic was earned by W9CXV and W9ESJ. The AAA "Bring em Back Alive" program for highway safety will be in effect again this year during the holiday periods. WA9VIV will be the Madison outlet to AAA. Additional information can be obtained from him or WA9QNI. Traffic: W9CXV 681, W9DND 295, K9CPM 279, W9ESJ 218, WA9RAK 118, K9KSA 83, WA9QNI 30, K9TBY 76, K9FHI 68, W9AYK 54, W9DXV 41, W9KRO 41, WA9QQM 39, WA9QOC 39, WA9UMT 33, WA9TXN 33, WA9PKM 32, K9JPS 32, W9DM 27, W9-NRP 26, K9PEQ 24, W9IHW 23, W9BCB 19, K9GSC 16, W9RTP 14, W9IRZ 11, WA9HFB 10, WA9UNW 8, K9CDF 4, WA9SAB 1.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopschke, Jr., WOTCK—SEC: WA9MZV. RMs: K9ORR, WA9-ARRA. PAMs: WA9OEF, WA9HRM. MSN meets daily on 3685 kc. at 2330Z and 0300Z. MJN meets Tue.-Sun. on 3685 kc. at 0000Z. Noon MSPN meets Mon.-Sat. on 3945 kc. at 1705Z. Sun. and holidays at 1400Z. Evening MSPN meets daily on 3945 kc. at 2315Z. Minn. RTTY Net meets Sun. on 3620 kc. at 0100Z. AREC Net meets Sun. on 3910 kc. at 2330Z (DST schedule). Congrats to new Ramsey Co. EC, K9LAV.

In the recent SCM election 606 votes were cast, with Larry Shima, W9PAN, being elected. My hearty congratulations to Larry and best wishes for continued growth in Minnesota activities. This is my last report after four years of interesting work as your SCM. I want to thank each of you who took part in the public service work of the League in any of the many phases of activity. A special thanks to you a pointees who gave much assistance in leadership positions. I am sure W9PAN, WA9MIV and WA9-IAW each want to thank you for your support in the election. 73 for now. Traffic: (Feb.) K9ZRD 23, WA9IAW 237, WA9THI 216, KOJLJ 116, KOMVT 11, WA9ORR 96, WA9MIV 90, WA9ONS 80, WA9OQ 73, WA9RKY 66, WA9PUH 65, W9BUC 60, WA9-TQT 59, W9TCK 51, W9FHH 50, WA9POC 47, WA9ODB 47, KOZBI 45, KOFLT 34, K9CNC 34, K9SRK 19, W9HEN 18, WA9GXM 17, WA9RKF 16, WA9AAU 16, WA9JPR 16, W9FHO 14, W9KRN 13, W9ATO 13, W9OKL 13, W9EQO 11, WA9LAC 10, WA9DFT 9, WA9ONQ 9, WA9ONS 9, W9OMB 8, WA9OEF 8, K9ZWH 8, W9BUC 7, WA9EPX 7, W9PAN 6, WA9HRM 5, WA9JRA 5, W9OSZJ 2, WA9JKT 1, K9WXH 1. (Jan.) W9MZR

NORTH DAKOTA—SCM, Harold L. Sheets, W9D—SEC: WA9AYL. OBS: K9SPH. PAM: W9CARM: WA9RSR. K9PYZ is recovering from a heart attack in a Chicago Hospital. W9BF and W9E were given retirement dinners the same week end. We have been operating W9ZRT, the Bismarck Club station, in the basement of the Capital Bldg. WA9J and father were guests at WA9GRX-W9BF on the way back to Breckinridge. WA9KRI took a winter trip to the central states. W9TOM finally got a two-element beam up. WA9OJV got his repaired antenna made the DX Contest. W9ARB/O, of the Grand For AllB, went all out for the PON C9PX Party. WA9-1LB, W9DXX, K9PYG, WA9RWM, K9SPH, K9ITP, WA9RSR, K9PKZ, WA9HUD, W9EJF, WA9-MND and K9BWZ also took part in it. W9RT got the new HW-100 on the air. W9BF took part in the Frequency Measurement Test and did real well with the FS-1 Secondary Standard he built. W9OHC has a new addition to the family—a son, WA9MSJ mobiling in Arizona and California. WA9HUD led the check-ins for the Tenth Regional Net again. We, WA9OJV and W9BF helping out. W9HUD's trap report shows his activity in that direction so route your out-of-state traffic through him. W9NWM leading the group with s.s.b. traffic via MARS. WA9-RSR reports for the C.W. Net for Jan. 23 session 108 QNI, traffic 19. The NDRACES Net held a practice run for the SET Sat. and on Sun. 59 stations checked in, stood by and handled the messages of the program. My congrats to all who participated and K9SPH and WA9AYL who made it such a success.

Net	Sess.	Check-ins	Tfc.
Goose River 160M	4	56	0900 CST Sun. W9CDO
YL WX Net	20	376	23 0730 CST M-F WA9GR
NDRACES	37	820	177 1730 CST M-F K9SPH
NDPON	12	243	31 1730 " " Sat. WA9HUI
			0900-1730 Sun.

Traffic: (Feb.) WA9HUD 209, W9NMV 152, WA9-RWM 85, WA9GRX 44, WA9KRS 33, K9SPH 2, WA9TBR 26, W9WWL 23, W9DM 20, W9EJF 10, WA9JPT 10, W9DXX 4, W9CDO 2. (Jan.) WA9-RWM 54.

SOUTH DAKOTA—SCM, Seward Holt, K9TX—SEC: WA9CPX. RM: W9IPE. PAM: WA9CVI. Congratulations to WA9PNB and WA9LLG on the reelection as net managers. Contact W9ONE or WA9-PNB if you have any information of former South Dakota hams and any information about the history of hams, nets, etc., to be included in their new directory and historical summary of the South Dakota section. Remember the South Dakota Picnic to be held in Mitchell in Aug. We will see you all there. We will W9DIY and K9ALP a speedy recovery. Net report NJQ Net—455 QNI, 105 QTC, 73 informals. Late Section Phone—1305 QNI, 78 QTC, 144 informals. SDN 23 sessions, 18 QTC, 307 minutes. The following W9-10 or more times: WA9OAY, W9AYD, WA9GFW, W9IPE, W9ONE, K9TXW. Traffic: W9ZWL 4, WA9PNB 233, WA9LLG 50, W9IG 48, WA9BZD 1, WA9FUZ 14, W9DVB 12.

DELTA DIVISION

ARKANSAS—SCM, Robert D. Schaefer, WA9I—SEC: W9SPBZ. RM: W9NND. PAM: WA9PFW. W9S7LI passed the General Class exam. Welcome

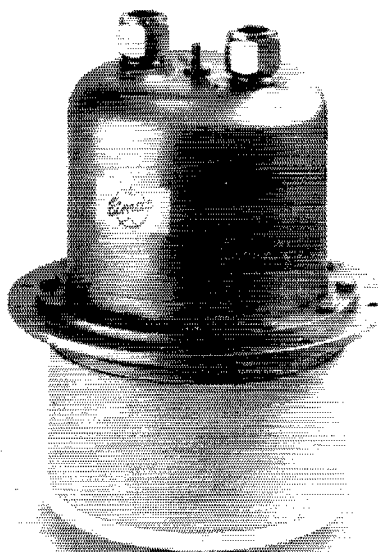
Beneath this calm exterior lurks... Supertetrode!

Eimac's sensational new water cooled 50 and 100 kW tetrodes are the world's finest for high power applications. They're ideal for transmitters in HF, FM and broadcast bands, for over-the-horizon radar, distributed amplifiers, high energy physics and high power voltage regulation.

Both tetrodes feature transconductance double anything even we've been able to offer. They have greatly reduced cathode lead inductance and a unique re-entrant anode, permitting a shorter stem and lower input capacitance. Feedback capacitance also is much lower, simplifying tube neutralization and eliminating

any need for a neutralization circuit. In both tubes the screen base is designed to serve as an electrostatic shield.

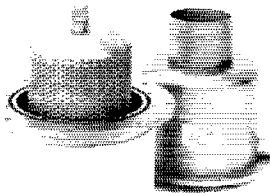
These tubes have 4 to 5 dB higher gain than comparable tetrodes, yet are very compact. The 4CW50,000E (50 kW model) weighs only 35 pounds. It has 310 pF input capacitance, 52 pF C_{out} and 0.6 pF feedback capacitance. The 4CW100,000E weighs 50 pounds, has 349 pF C_{in} , 60 pF C_{out} and 0.8 pF C_f . For data and application assistance contact your nearest Varian/Eimac distributor or ask Information Operator for Varian Electron Tube and Device Group.



Supertetrode Keeps its Super Cool.

Eimac's revolutionary 4CV50,000E 50-kW Wick-Cooled Tetrode combines the electrical features of the industry's first "Supertetrode" with a unique new vapor-cooling concept. This system replaces bulky anode cooling fins with a compact metal-mesh wick which dips into an integral boiler, and is permeated with water by capillary action.

The result is a dramatically smaller package. Tube plus boiler measure only 6½ inches in cross section, weigh 35 pounds. Water level is not critical. The unit will operate efficiently in a position up to 45° from vertical, ideal for mobile and marine installations.



And performance is truly superior. It betters comparable tetrodes in output by 4 to 5 dB. It has greatly reduced cathode lead inductance and a unique re-entrant anode, permitting a shorter stem and only 310 pF input capacitance. Feedback capacitance is only 0.6 pF, making tube neutralization very much simpler. For data and application assistance on this or any Eimac tube, contact your nearest Varian/Eimac distributor or ask Information Operator for Varian Electron Tube and Device Group.

new hats WA5VSE and WN5WKG in Monticello and WN5WLX in Warren. Father-and-son team WA5TVF and WA5ULA have new General Class tickets and a new SB-101. The Camden Amateur Radio Club has been reorganized. The EC Net needs your support. WA5AVO is back on the air with a new Galaxy 5. Congratulations to WA5VDH, Arkansas winner in the Arkansas QSO Party. WN5VSV now has 47 states and 10 countries. Net reports for Feb.:

Net	Time	Freq.	Tjz.	Mins.	QNS	Mgr.
OZK	0100Z	3790	24	533	188	W5NND
RN	0030Z	3995	35	456	608	WA5PPD
APN	1200Z	3930	12	1451	435	W5VPW
PON	2130Z	3925	369		421	W5ELF
Teenage	2330Z	3995	23	352	275	WA5QM4Q

Traffic: W5OBD 792, W5NND 159, W5MYZ 53, WA5-QM4 57, WA5KEF 44, WA5RCK 26, WA5TLS 21, W5-SMS 13, WA5TJB 8, W5PJ 4.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK, RM: K5ANS/5, V.H.F. P.A.M.s: WA5-DXA, W5QUR. Don't forget that the Fifth Annual Hamfest sponsored by the BRAAC will be held May 3 and 4 at the Belmont Motor Hotel, W5SKW has been awarded a Certificate of Merit for his activities as EC in Southwestern Louisiana. This award will be presented by W5BUK, our SEC, at the Lake Charles Fish Fry and Hamfest sponsored by the Southwest La. ARC to be held at Prien Lake Park June 28 and 29. And don't forget the GLARC Hamfest at Alexandria July 12 and 13. W5KC, our FB DXer, is planning to put up a quad, W5BMM, up Plain Dealing way, is ready to take the Extra. Two newcomers to the 3900 Round Table are W5GMO and W5SJK. K5UAR has been awarded an IAN Net certificate while WA5VGD is with Uncle Sam's CG in the Caribbean, WA5VMO is most active with LAN, WA5LGO is stowing his new Extra Class license, K5ANS/5, our FB RM, also is LAN Mgr. Up Monroe way the Twin City hams have started a Novice Class with 30 enrolled! W5JYA is active with Navy MARS and the Delta S.S.B. Net and has returned from a trip to Jamaica, W5MXQ reports the Jefferson ARC has 6-meter code practice Mon., Thurs. and Sat. W5EA is active on 40-meter c.w. WA5QVN is signing up many of the gang in the AREC. W5LQ, an OOTC from Shreveport, is active again mostly on 30-, 40- and 20-meter c.w. W5NMS is sporting a new receiver, W5BBV is all hep over flying. Many of the GNOARC gang assisted in communications to help the Police during the MardiGras Parades. WA5PPJ has a new electronic keyer, while W5NOH has completed a solid state converter. W5FMO is polishing up his fishing gear, indicating spring is here. K5JBC still is chasing that elusive DX. W5BV is again most active on s.s.b. Traffic: W5MI 434, W5MXQ 89, W5CEZ 87, K5ANS/5 71, WA5WBZ 24, W5EA 12, W5M U, WA5QVN 9, W5JYA 2, WA5JG 2.

MISSISSIPPI—SCM, Clifton C. Comfort, WA5KEY—W5PPB is recovering nicely from a heart attack. K5ZFM has his new quad up but reports it worked better on the clothesline post than on the tower. WA5TUD drove 190 miles looking for two 82K 2-watt resistors with no luck. That fellow who forgot that his electric drill could trip his VOX sure has a good signal. He found out what was happening just in time to keep from being reported to the FCC monitoring station. We welcome K5FZX back on the air on S.S.B. WA5TUD may be portable again by the time you read this. The expected new QTH will have enough room for an antenna farm. W5BW's 39-year-old Phosphor Bronze antenna is arousing much interest. The MSBN Winter Picnic was held for the first time in the southern part of the state. Thanks to K5HYE for the leg work. The updating of our field organization is in progress now. Those who were left out or feel that their toes were stepped on are asked to please write the SCM.

Gulf Coast Side Band Net	3925 kc.	Daily	2330Z
Miss. Side Band Net	3990 kc.	Daily	0015Z
RACES	3987.5 kc.	Sun.	1345Z

Traffic: WA5FI 181, W5BW 105, K4RIN/5 90, WA5-SIM 11, WA5JWD 5, WA5SEG 5.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—SEC: W4WJH. P.A.M.s: W4PPP, WA4YBT, WA4EWW, WA4CRU. RM: WB4GSS.

Net	Freq.	Days	Time	Sess.	QNI	QTC	Mgr.
TSSB	3980Z	Tue-Sun.	0030	27	1233	151	WA4YBT
TPN	3980	M-Sat.	1245	23	1100	83	W4PPP
		Sun.	1400				
ETPN	3980	M-F	1140	20	547	9	WA4EWW

TCN	3980	Thurs.	0200	4	53	0	W4FYV
TPON	3980	Mon.	0030	4	140	23	K4RTA
TTN	7290	Daily	2200	28	346	115	WA4CRU
TN	3635	Daily	0100	28	149	33	WB4GSS
ETVHF	50.4	TuThSat.	0000	12	234	0	WA4TJJ
ETVHF	145.2	W & F	0000	8	61	0	WA4TJJ

WB4GSS has been appointed RM. Our thanks to WA4YEM for a fine job. Anybody interested in a slow-speed c.w. training net? If so, drop me a line or a message to K4RCT, Memphis. The RATS of Nashville and the Greenville ARC are working with Explorer Scouts. MARA (Memphis) joined the Tenn. Council of Clubs. An all-out CD party battle is in the making between K4AMC and K4PUZ, who is planning an antenna farm at his new QTH, W4SKH, Oak Ridge Radio Operators Club, operated at the Tenn. State Women's Bowling Tournament and provided on-the-spot message service for the ladies and chalked up another score for amateur radio. Make your plans to attend the Humboldt Hamfest, June 8, and the Cross-ville Hamfest July 19-20. Traffic: W40GG 236, K4AT 183, W4SQE 143, WA4UAZ 140, WA4WBK 78, W4SKH 61, WB4GSS 49, WA4VX 44, W4KQL 42, WB4JFT 40, WB4ZE 34, W4PFP 25, W4CRU 22, WB4GT 21, WA4NEC 17, WB4HY 14, WA4CGK 12, K4MQI 12, WB4HSS 11, WB4FHK 10, WA4GLS 10, WB4ANX 9, W4TYV 9, K4UMW 9, W4YKN 9, WA4ZZX 8, WA4-BXH 6, WA4EWW 5, WA4YON 5, K4AMC 4, WB4-DGI 3, WA4YFG 2, W4VJ 1.

GREAT LAKES DIVISION

KENTUCKY—SCM, George Wilson, W4OYI—SEC: W4VYS. Endorsed: K4FPW as OVS and OBS; K4-CSH, K4YZU, WA4GMA, WB4RTM as OPS; K4-NYO, WA4WWT, WA4DYL as ORSs.

Net	Freq.	GMT	QNI	QTC	Mgr.
KRN	3960	1130	376	51	K4KJS
MKPN	3960	1330	449	104	K4TRT
KTN	3960	0000	922	249	WA4AGH
KYN	3600	00-0300	473	647	W4BAZ
FCATN	50.7	0200	156	74	W40TP

Louisville's Kenvention will be held Aug. 29-30 at Stouffers Downtown Motor Inn. K4YZU is chairman. Henderson has a Novice class going. The Armed Forces netted one with WB4FOT and W44YXC going in and K4DMU coming out. New Kentuckiana RC wheels: K4FKK, pres.; K4FLP, vice-pres.; WA4UDK, secy.; K4KZH, treas. WA4UIH is now Advanced Class. The Owensboro Club/RACES station has changed its call to K4HY in memory of Jeff, our late SCM. The Unlimited Hydroplane Race in Owensboro June 15 will call for about 20 stations, about 16 of them aloft. Kentucky hamming is on the move. We have all-time highs on such important barometers as number of EC's (18), number of AREC registrants (252) and enthusiastic, active appointees (73 individuals with 95 appointments). Keep those cards and letters comin', folks! Traffic: (Feb.) WA4DYL 714, W4NLO 293, W4-BAZ 291, WA4VUE 236, WA4UIH 214, K4YZU 161, K4MAN 111, K4TRT 109, WA4AGH 104, K4HOE 86, WB4HQW 81, W4NBZ 77, W4OYI 67, WB4FDK 61, WB4DQM 58, WA4VZZ 58, W4UK 55, WA4GHQ 41, WB4EOR 35, WB4EQY 31, W4KJP 30, K4VDO 28, W4ADO 23, W40TP 23, K4AVX 21, WA4MXD 18, K4-UMN 18, K4SWL 16, W4BTA 15, WA4UHR 12, K4-YCP 12, WB4ZX 11, W4SWB 11, WA4MEX 7, WB4-HTN 6, W4MIX 4, WA4WVT 3, WB4GCV 1. (Jan.) WA4WWT 153, K4VYX 70, K4TRT 47, K4SWL 38, W4ADO 9, WB4GCV 3.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8MPD. RMs: W8FWQ, W8RTN, WA80GR, K8KMQ, W8LX. P.A.M.s: K8GOU, K8JED. V.H.F. P.A.M.s: W8CVQ, W8YAN. Appointments: W8BEZ, W8HKT, W8WZ, K3KRX/8, W8NOH, W8YAN as ORSs; W8TIC, W8YAN as OPSs; W8NOH, W8PWF as OVSs; K8AYJ, W8YTL as OBSs, K8DX's XYL Edna, recently passed away.

Net	Freq.	Time	Days	QNI	QTC	Sess.	Mgr.
QMN	3663	2300	Dy	926	542	83	W8FWQ
WSSB	3965	0000	Dy	802	146	28	K8WRJ
PON-DAY	3935	1600	M-Sat	2510	523	24	K8LNE
BR/MEN	3930	2230	M-F	844	168	24	K8LJS
GLETN	3932	0230	Dy	857	124	28	W8ONZ
M6MTN	50.7	0000	M-Sat.	455	40	23	W8LRU
PON-CW	3645	0000	M-Sat.	67	11	24	VE3DPO

Your new SCM is Joseph L. Pontek, K8HKM, P.O. Box 238, Holt, Mich. 48842. Thanks for 10 years of good cooperation. Send K8HKM all your Form 1 traffic reports, net reports and club bulletins. New of-

(Continued on page 106)

Large SWAN Stock = Fast Delivery



RAY SEZ: "Why so much new SWAN in stock?" Simple! SWAN makes GREAT transceivers and AMATEUR ELECTRONIC SUPPLY is a GOOD place to do business with. The demand created by the SWAN and AES Combination requires a huge inventory of Factory-Fresh equipment to insure prompt delivery.

GOOD REASONS for buying your new SWAN from **AES**

- TOP TRADES for your good clean equipment
 - STAY-ON-THE-AIR PLAN - Enables you to keep your trade-ins until your new gear arrives - Lose no operating time!
 - Pay as little as \$5.00 down - balance on convenient Revolving Charge
 - PERSONAL SERVICE from fellow hams who understand your problems
 - SAME DAY SERVICE on most Orders and Inquiries from our Centrally Located Modern Facilities
- Top Notch Service Department



LOOK at your low Monthly Payment AFTER JUST \$5.00 DOWN

Now!...You can purchase the new 110vac/12vdc Cygnet Transceiver (shown above) or any new SWAN equipment on our convenient Revolving Charge Plan. For example; after a \$5.00 down payment, you can own a Cygnet for only \$13.00 a month.

With our NEW plan, there are no more bulky payment books! Once a month you receive an itemized statement showing your exact account balance after the small 1 1/2% monthly service charge has been added. Add-on Purchases (of \$50.00 or more) are easy. The minimum Initial Revolving Charge Plan order is \$100.00 - and, of course, subject to credit approval.

Balance	Monthly Payment
Up to \$300	\$10
\$300.01 to 340.	11
340.01 to 370.	12
370.01 to 400.	13
400.01 to 430.	14
430.01 to 460.	15
460.01 to 490.	16
490.01 to 520.	17
520.01 to 550.	18
550.01 to 580.	19
580.01 to 610.	20
610.01 to 640.	21
640.01 to 670.	22
670.01 to 700.	23
700.01 to 730.	24
730.01 to 760.	25
760.01 to 790.	26
790.01 to 850.	28
850.01 to 910.	30
910.01 to 970.	32

SAVE \$50

Purchase any new Swan transceiver or linear at the regular price with no trade-in and you may take a \$50.00 Credit toward the purchase of any other merchandise.

To: AMATEUR ELECTRONIC SUPPLY
4828 West Fond du Lac Avenue
Milwaukee, Wisconsin 53216

I am interested in the following new equipment:

I have the following to trade: (what's your deal?)

Ship me the following New Equipment.

I enclose \$ _____; I will pay balance (if any)

C O D (20% deposit) Revolving Charge Plan

Name _____

Address _____

City _____

State _____ Zip _____

Send Reconditioned Equipment Bulletin

AMATEUR ELECTRONIC SUPPLY

4828 W. Fond du Lac Ave.; Milwaukee, Wis. 53216
Phone (414) 442-4200

STORE HOURS: Mon & Fri - 9 am to 9 pm; Tues, Wed & Thurs - 9 am to 5:30 pm; Sat - 9 am to 3 pm

ABSOLUTELY

NEW

TRI-EX

W-67

FREE STANDING TOWER.

SUPPORTS 9 SQ. FT. OF ANTENNA.

Shown with internal Ham M rotator and 2" mast.

INCLUDES

- **FREE: RIGID BASE MOUNT**
- **PRE-DRILLED TOP PLATE — For TB-2 thrust bearing.**
- **HIGH STRENGTH STEEL TUBING LEGS. Solid rod, "W" bracing.**
- **EASY MAINTENANCE — No guys or house brackets needed.**
- **RISES TO 67 FT. — Nests down to 22 ft.**
- **HOT DIPPED GALVANIZED AFTER FABRICATION! All welding by certified welders.**

IMMEDIATE DELIVERY

FREIGHT PREPAID INSIDE CONTINENTAL U.S.A.



Tri-Ex TOWER CORPORATION

7182 Rasmussen Ave., Visalia, Calif. 93277

ficers: Genesee County RC—W8YMA, pres.; WA8WGK, WA8NSD, W8IFK, WA8POB, vice-pres.; K8BPQ, secy.; K8KMQ, treas. Van Buren County ARC—WA8QHI, pres.; WA8YYI, vice-pres.; WA8PRJ, secy.; WA8QGV, treas.; W8NRX, W8RWE, W8GVC, board. Stu Rockafellow ARS—WA8TLW, pres.; WA8BVP, vice-pres.; WA8UJZ, secy.; WA8WJX, treas.; WA8WME, WA8SNK, K8YNV, K8VQP, W8MWG, board. W8AXN heard wedding bells. W8RWK/WA8ZXX have a new jr. operator. New Extra Class licensees: K8VQP, WA8RJZ. W8TIC is back on the air with a 20A exciter and a linear. WN8CMQ has HW-16 transceiver, 80/40 dipole and 15 vertical. The CMARC had some trouble getting its repeater license. W8HID moved to Utica. K8EQC has a new Valiant and an HW-12. W8OHS has a new Clegg 22er. WA8NYK and WA8SIQ worked WB4JMP (ex-WA8VGA) at Sun City, Fla., on 15. BPLers: WA8WZF, K8LNE, K8ZJU, WA8WGM. W8LXJ has been hospitalized with a stroke, but is improving. K8CKD is instructor in Mason County RC classes. K8CJQ moved to High Hill near Allegan, with WA8VGQ helping operations. W8AAM is getting set for retirement. K8HLR is using invisible antenna from the apartment. Silent Keys: WA8DBN, W8MID. Traffic: (Feb.) WA8WZF 728, K8LNE 535, K8ZJU 259, K8KMQ 213, W8JTQ 201, W8GAI 147, W8NOH 130, WA8SCQ 129, WA8QGI 125, WA8WGM 125, K8MXC 123, W8EU 120, W8IZ 118, K8GOU 90, K8JED 78, W8MO 72, W8FX 54, W8DSE 53, WA8OGR 47, W8RTN 38, W8BEZ 30, WA8INZ 27, W8YAN 25, WA8ZPH 25, W8SCW 20, W8UC 19, W8SS 12, K8QLL 10, WA8LRC 8, W8MPD 8, W8TBP 8, W8FWQ 7, WA8VBL 5, K8VDA 4, K8CJQ 3, WA8VGQ 3, W8AAM 2. (Jan.) K8HLR 99.

MICHIGAN QSO PARTY

May 17-18, 1969

The Central Michigan Amateur Radio club is pleased to announce the second annual Michigan QSO Party to run for 24 hours, from 2100 GMT May 17 to 2100 GMT May 18, 1969.

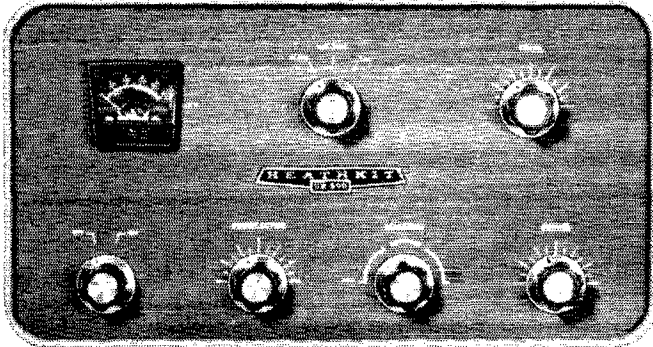
Rules: The same station may be worked on c.w. and on phone on each band. Call CQ Mich with Michigan amateurs signing de Mich or this is Michigan. Michigan stations send RS(T) and a three digit serial number starting at 001 and county. All others send RS(T), the three digit serial number starting at 001 and state, province or country. Score one point per contact (Michigan stations may work other Michigan stations). Michigan multiply by states, provinces and non W/VE countries (includes Mich.). Others multiply points by the number of different Michigan counties (83 maximum). Certificates will be awarded to the highest scoring stations in each state, province and non-W/VE. Michigan stations will compete for first-place trophy and 2nd thru 5th place certificates. A trophy will also be awarded to the highest out-of-state score. Suggested frequencies are (c.w.) 3560 7060 14060 21060 28060, (phone) 3930 7235 14240 21310 28650 50400 52525 145000 and 146940. Logs showing dates, times, stations worked, exchanges, bands, modes, location and final score must be mailed no later than June 30, 1969. Send logs to the Central Michigan Amateur Radio Club, P. O. Box 73, Lansing, Michigan 48901.

OHIO—SCM, Richard A. Egbert, W8ETU—Asst. SCM; Roger Barnett, K8DGG. SEC: W8OUU, RM W8IMI. PAM: K8UBK, V.H.F. PAM: WA8ADU. Feb net reports.

Net	QNI	QTC	Sess.	Freq.	Time	Mgr.
OSSBN	1742	1310	55	3972.5	1430 & 2245Z	K8UBK
BN	564	529	55	3580	2300 & 0200Z	W8DMI
06MtrN	283	76	28	50.61	2300Z	WA8ADU
OSN	176	69	27	3580	2225Z	WA8YNU
APRICOT	280	289	28	51.0	0000Z	K8ONA

This month's column was written by K8DGG. W8ETU has returned from HS-land and is resuming his duties as SCM. Please note that net times are listed one hour earlier in GMT (same time local) because of Daylight Saving Time. New Novices: WN8CQC, WN8CZZ, WN8CQE, WN8CQF, WN8CUL. New Techs.: WB8CQC, WB8CQE, WB8CQF. New Advanced Class: WA8YXE and W8DDY. New Extra W8IBX. Congratulations to those dedicated clubs and

NEW Heathkit® SB-500 2-Meter Transverter



Only \$179.95*

- Provides complete 2-meter capability for SB-101, SB-110A, HW-100 and the SB-301/401 combination
- USB, LSB & CW operation • 144 to 148 MHz coverage • 130 watts PEP input ... 50 watts PEP output • Highly sensitive receiver • Fast, easy tuning
- No cable switching • Handsome SB-Series styling

Now, in answer to many requests, Heath has a fast, low cost way to put you on two meters . . . without having to buy a whole new rig. If you own an SB-101, SB-110A, HW-100 or the SB-301/401 combo, you're almost there. Here are the details on how to get on "2" — the SB-500 way.

Here's How It Works. In the receive mode, the SB-500 takes an incoming 2-meter signal and heterodynes it to either 6 or 10 meters, where the low band gear handles it in the usual way. On transmit, a 28 or 50 MHz driver output is heterodyned to 2-meters, amplified and coupled to the output.

Here's What It Delivers. When used with any of the gear above, the SB-500 2-Meter Transverter gives you complete 2-meter SSB or CW transceive operation from 144 to 148 MHz. A pair of inexpensive 6146's in a push-pull AB₁ circuit deliver a husky 50 watts output into a 50 ohm nonreactive load. Final plate voltages are derived from the driving unit, but all other operating voltages come from a built-in power supply — no extra supply to buy. Receiver sensitivity is 0.2 uV for a 10 dB S+N/N ratio . . . that means solid copy QSO's. A front panel on-off switch places the SB-500 into operation or allows the low band gear to operate straight through to an antenna or drive a linear . . . a combination of complete rear apron jacks and internal relay switching eliminates troublesome cable changing. Reliable relay-controlled T/R switching too. Tuning is fast and easy, and a built-in meter

monitors either final plate current or relative power. ALC voltage is supplied to the driver to aid in preventing over-driving and distorted signals. A built-in 1 MHz crystal calibrator is also included.

Solid, Stable Construction. The sensitive receiver and oscillator go together on well planned circuit boards. To insure stability and make adjustment more exact, the transmitter and power supply components are ruggedly chassis mounted. The SB-500 comes complete with all interconnecting cables too. Start enjoying the QRM-free world of 2-meters today . . . with the new Heathkit SB-500 . . . another hot one from the hams at Heath.

Kit SB-500, 19 lbs. \$179.95*

SB-500 SPECIFICATIONS — RECEIVER: Sensitivity: 0.2 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. Spurious Response: All are below 0.1 microvolt equivalent signal input, except at 145.310 MHz (50 MHz IF only). Antenna Input Impedance: 50 ohm unbalanced. **TRANSMITTER:** DC Power Input: 130 watts PEP. Power Output: 50 watts (50% duty cycle). Output Impedance: 50 ohm with less than 2:1 SWR. **GENERAL:** Frequency Range: Any 2 MHz segment between 144 & 148 MHz into 50 MHz or 28 MHz tuned IF. Mode of Operation: SSB or CW only. Power Requirements: (1) 120/240 VAC, 50/60 Hz at 82 watts (internal). (2) 700 to 800 VDC at 200 mA (from driving unit). Fuse: 3/4 ampere slow-blow for 120 VAC (formerly 3AG); 1/2 ampere slow-blow for 240 VAC. Front Panel Controls: Meter-calibrate switch, final tuning, off-on (function) switch, preselector, final loading, driver tuning. Chassis Controls: Relative power adjust & bias adjust. Rear Apron Connectors: RF output, ALC, linear relay, relay, drive, power plug, low f receiver, low f antenna, fuseholder. Tube Complement: 6CB6 transmitter mixer, 6CB6 crystal calibrator, 6DS4 receiver RF amplifier, 6DS4 receiver mixer, 12GN7 transmitter RF amplifier, (2) 6146 final amplifiers, (types 6146A or 6146B may be directly substituted), 7059 heterodyne oscillator-amplifier, 8156 RF driver, 0A2 voltage regulator. Diode Complement: 5 silicon diodes, 750 mA, 500 PIV; 3 in power supply, 2 in ALC; 1 Germanium diode, IN191; REL PWR. Cabinet Dimensions: 12 3/4" W x 6 3/8" H x 13" D. Overall Dimensions: 12 1/4" W x 7-15/16" H x 14" D including knobs and feet. Net Weight: 14 3/8 lbs.



FREE '69 CATALOG

Describes these and over 300 other Heathkits. Save up to 50% by building them yourself. Use coupon and send for your FREE copy!

HEATH COMPANY, Dept. 9-5
Benton Harbor, Michigan 49022

Enclosed is \$ _____, plus shipping.

Please send model (s) _____.

Please send FREE Heathkit Catalog.

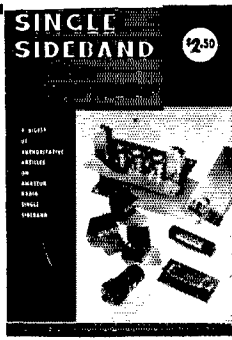
Name _____ (Please Print)

Address _____

City _____ State _____ Zip _____

Prices & specifications subject to change without notice.
*Mail order prices; F.O.B. factory.

AM-218



**Do you really understand
the Why and How of
Single Sideband?**

Single Sideband for the Radio Amateur starts with the Why and How and proceeds to explain in detail the functions of various circuits used in the generation and reception of an SSB Signal.

7ransmitter construction, Linear Amplification, receiving techniques, Adjustment and Testing are some of the items you will find useful and informative in your day-to-day operation of a Single Sideband station.

\$2.50 U.S.A.

\$3.00 Elsewhere

**THE AMERICAN RADIO
RELAY LEAGUE, INC.
NEWINGTON, CONN. 06111**

instructors offering classes including: Greater Cincinnati ARA with W8UQU, K8CKI and K8CKJ; Lancaster and Fairfield County ARA; DeVilbiss H.S. with WA8ZPI; Urbana ARC with W8SXQ; Dayton ARA with K8SPC; Inter-City RC with W8EMK and W8VTP; and Columbus ARA with W8ELE. No doubt there are many others. Any omissions are unintentional. The Canton QCWA held a dinner meeting and honored W8HR and his XYL on their 52nd anniversary. New officers of the Lake Geauga ARC are W8-GQU pres.; WA8TNG vice-pres.; W8EFB, secy.-treas.; W8LAG, act. mgr. W88AIIY is new secy. of the OSU ARC. The Inter-City RC had its annual auction with 150 attending. Local nets include: Sunday Noon Naggers on 50.4 at noon in the Atwater area; Stark County Mutual Aid Net on 28.8 at 11:45 A.M. WA8OCG is working on a 3-400Z kw. final. W8AN was heard in G-Land on 160 phone. W8UX helped K8UBK on MidCARS when URK's car broke down on a lonely highway. WA8RUO says WA8TZY made WAS. Incidentally, WA8RUO says he had a great time in his first SET. He has been named "Ham of the Month" by the Treaty City ARA's *Beano*. The Buckeye Net is sponsoring an Ohio QSO Party. Details Apr. QST. WA8RQQ says OSU and work leave little time for traffic. W8GLQ worked 6YDA, and H8OTV on 100. K8PBE says ALEC membership is slowly growing. W8YHN and WA8TYP report aurora openings on 2 and TYT now has 32 states on 2. Lancaster ARA will hold a hamfest June 8. W8EPA is a welcome addition to OSSBN from Gallipolis. We have received several inquiries about appointment as ORS, OPS, OBS, OVS and OO. These appointments provide a means of recognition for service to other hams and to the public. Anyone interested should send a card or message to W8ETU for application. New net certificates: BN to WA8ETX and W88AKW; OSN to WA8WAK. Traffic: (Feb.) W8UPH 3004, W8RYP 509, W8SZU 402, WA8-DWL 263, WA8ETX 232, WA8LAM 132, WA8BZX 221, W8LMI 208, W8QCU 208, W8GVX 277, K8ONA 161, W8OUU 154, W8ERD 147, WA8PPK 134, W8ADUL 132, WA8FSX 126, W8UDG 120, WA8UTX 107, W8CHT 92, W8QZK 92, WA8ULF 89, K8UBK 85, W8LT 70, W8-GNL 69, W8PMJ 67, WA8GRR 66, W8OE 66, W8GOE 65, W8LRE 65, W88AKW 56, W8NAL 54, WA8VNU 51, WA8MHO 49, WA8ADU 48, WA8PZS 48, K8DDG 43, W8FRV 43, WA8UPI 43, WA8QFK 36, WA8SHP 35, W8DAE 31, WA8ETW 26, W8FGD 26, W8UX 26, K8-PBE 25, W8YHN 23, W8WEG 21, WA8CXV 20, K8-DHJ 20, W8GRG 20, K8CKY 19, W8WDU 19, WA8-RQQ 18, WA8JW 15, W8TZE 14, W8LAG 13, WA8-QHG 13, W8CXM 11, W8TV 11, W8HII 10, W8IO 9, W8QXQ 9, WA8KPN 8, WA8WJR 8, WA8AJZ 6, WA8-CFJ 6, K8LFI 5, WA8BZR 4, W88CHW 4, WA8JEH 4, W8DYF 2, WA8MCR 2, WA8PZJ 2, WA8RUO 2. (Jan.) W8SZU 238, WA8PZJ 28, WA8RQQ 16.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Berry, K28JN-Asst. SCM and RM: Ruth E. Rice, WA2-VYS. SEC: W2KGC. PAM: WB2VJB. *Section nets:* NYS, 3675 kc. nightly at 0001 and 0300Z; ESS, 3590 kc. nightly at 2300Z; NYSPT&EN, 3925 kc. nightly at 2300Z; NYPON time correction to 0300Z. *Club notes:* RPI (W2SZ) lists W2DVQ as pres.; W2DRW, vice-pres.; W2ECU, secy.; K1BVM, treas.; W2EXP, equipment supervisor. The s.s.b. room at W2SZ now boasts tiled ceiling and wall-to-wall (almost) carpeting, with plans for new windows, sliding door and paneled walls being worked on. The Hudson Council (HARC) reorganization under new Pres. K2SPO is aimed at more inter-club service for council members. In New Rochelle, the CNR had W2CYK/W2LH speak on antenna theory and operations of its Feb. meeting and is now conducting its 10th year of license training covering Novice through Extra theory. The Westchester Club's (WARA) Feb. speaker was W2-KFB on "What Makes a Good S.S.B. Signal." Poughkeepsie ARC's Officers are WB2YQU, pres.; WA2STH, vice-pres.; W2DCH, secy.; W2PED, treas. W2-RBG reports the Albany Club had a demonstration on slow-scan and normal-scan amateur TV in Feb. *Station activities:* WA2JGL is installing new equipment for the Order of Holy Cross Radio Club (WB2AAL) at the monastery in West Park. Look for their world-wide net on 12.255 kc., 1900 GMT Sat., linking the Episcopal monks with their mission in Liberia, school in Tennessee and chapter houses on both coasts. W2PV has a new tri-bander up. WB2YQU is having trouble with the 2 meter FET converter from the *Handbook*. A call for help was received via the W2-CUT repeater but handled from Albany. The Feb. 2 aurora added two new ones, W9 and VE1, to WB2-YQU's 17-state 2-meter total. W2SZ made the first 230-Mc. contact. K2RRZ is back from ski trip. W2-DXM is active in traffic nets from Albany. WA2VEG

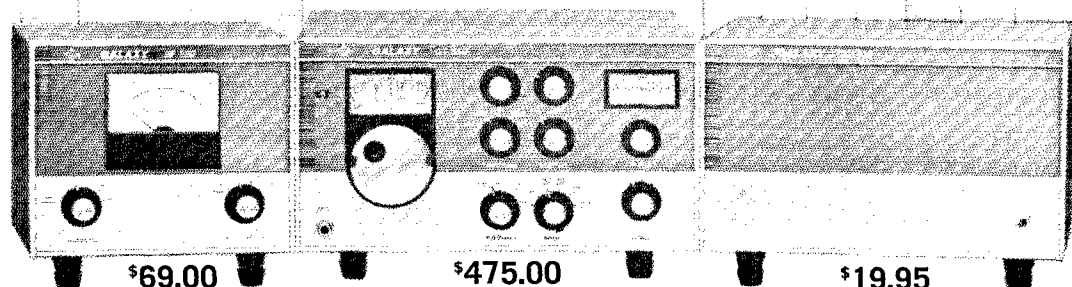
NOW—GALAXY PROUDLY UNVEILS

NEW Power!
NEW Features!
NEW Beauty!

THE EXCITING NEW **GT-550** TRANSCEIVER

5 BAND
SSB
Mobile or
Fixed
Station

☆ AND A COMPLETE LINE OF HANDSOME
MATCHED ACCESSORIES!



\$69.00
The New Galaxy
Wattmeter/Antenna Selector

\$475.00
The Powerful New Galaxy
GT-550 TRANSCEIVER

\$19.95
The Beautiful, Matching
Galaxy Speaker Console

"HOT," Husky, and Handsome!

You asked for it...now it's here! The new GALAXY GT-550 and a complete line of handsome matching accessories!

Your suggestions made it possible. We took your ideas—added some of our own and went to work. We built in new power, new conveniences—such as a 25 kHz calibrator option, and no frequency jump when you switch sidebands. Then we hired the best designers in the business to give GALAXY a distinctive "New Look"!

Our new GT-550 has all those great qualities of the famous Galaxy V's...and then some! It has new POWER...550 watts SSB, making it the hottest transceiver made! A new single scale VFO Dial makes frequency interpolation child's play...the new skirted knobs make tuning and band-changing a split-second job...and, that slick, king-sized finger-tip tuning knob works like a dream! Compact—only 11¼x12¾x6"! \$475 Amateur Net.

P.S. Sounds unbelievable but it's an even HOTTER receiver than our previous Galaxy V's!

Space prevents telling you all about the handsome, matched accessory line. Write for a free brochure that's loaded with exciting news!



GALAXY ELECTRONICS

"Pacesetter in Amateur/Commercial Equipment Design"

10 South 34th Street • Dept. QST-AA41 • Council Bluffs, Iowa 51501

Kill ignition noise and other strong impulses

with a

**DRAKE
MODEL
34-NB**

**NOISE
BLANKER
KIT for
TR-3 or TR-4**



Unlike the usual noise clippers or limiters, the 34-NB is an advanced noise blanker which actually mutes the receiver for the duration of the noise pulse. Between noise pulses, full receiver gain is restored. (The receiver AGC is affected only by the desired signal strength, not by the noise at the antenna.) Low level signals masked by noise impulses without the noise blanker can be copied when the blanker is used. The 34-NB is a must for the mobile operator.

HOW IT WORKS...

A noiseless electronic series switch is inserted at the output of the receiver mixer. This switch is operated by the output of a special receiving circuit which is tuned to the 9 MHz IF with bandwidth of 10 kHz. The switch opens for noise impulses but closes to allow the signal to pass.

The kit consists of these main parts: 9-NB board (composed of 17 transistors, 4 diodes and circuitry), NBK board, capacitor assembly, switch assembly, lever knob, and miscellaneous hardware.

Installation of the kit is about a two hour job for the competent technician only, requiring the usual hand tools, plus soldering iron and electric drill. Factory installation, \$15 plus shipping.

Model 34-NB **\$129⁰⁰** Amateur Net

At your distributor or write to

R. L. DRAKE COMPANY

Dept. 159, 540 Richard St., Miamisburg, Ohio 45342

is quad-less after the big snow. Traffic: (Feb.) WA2 BHN 968, W2EAF 153, WA2CRW 141, WA2VYT 123, WA2JWL 55, W2JKI 47, WB2VJB 44, WB2YO 42, K2-SJN 28, WA2BUF 21, WB2RBG 19, WB2DXM/2 14, WB2FOA 11, W2TPV/2 2. (Jan.) K2HNW 6.

EDUCATIONAL INSTITUTIONS RADIO CLUB QSO PARTY (School and College)

May 5-10, 1969

All amateurs are invited to participate in the First Annual Educational Institutions Radio Club QSO Party, sponsored by the Mount Vernon High School Radio Club, K2VUSU. The party has been planned to encourage active operation by all school (elementary through college) radio clubs, and to promote recognition of the tremendous stimulus to the fraternity by these organizations. It will also give many of the clubs' recently licensed Novices some concentrated operating experience both at school and home stations.

Rules: Time will be from 1500 to 2300 GMT each day, May 5 through 10. The general call will be CQ RC. Participating clubs will sign 'de (call) RC K.' Exchange QSO number (clubs prefix with "C" for positive identification), RST and ARRL section. At least one side of each QSO must be with a participating club station. For scoring purposes, a complete exchange with a club station is worth 5 points, an individual station is worth 2 points. Multiply by the number of ARRL sections and countries worked. (A station may be worked only once per band). A 100-point bonus will be awarded by the contest committee to each club that works from its school with assigned call. Frequencies suggested because of the predominance of Novices) are at or near 3725 7175 and 21175 kHz, c.w. only. Higher-grade licensees may use 3575 7075 14075 and 21075. Certificates will be awarded to the highest scoring station in each state, province or country. Second and third place awards will be issued if, in the opinion of the contest committee, the number of entries warrants it. Logs must show dates, times, stations worked, band, sections, RST and QSO numbers, with computed final scores, must be signed and post-marked no later than June 2, 1969. (Club logs must include signatures of the Trustee and club president.) S.a.s.c. required for results and appropriate certificates. Send all information to Mr. C. Andrew Randall W2EY, Trustee, Mt. Vernon H. S. Radio Club, 100 California Road, Mt. Vernon, New York 10552.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW.

NLI*	3630 kc.	1915/2200 Nightly	K2UAT	RM
NLIVHF*	145.8 Mc.	1930 MTWTF	WB2RQF	PAM
NLIphone*	3932 kc.	1600 Daily	WA2UWA	PAM
Clear Hse	3925 kc.	1100 Daily	WA2GPT	Mgr.
Mic Farad	3925 kc.	1300 Ex. Sun.	K2UBG	Mgr.
East US	3688 kc.	0001 Nightly	K2UBG	Mgr.
All Svc	3925 kc.	1300 Sun.	K2AAS	Mgr.
NYSPTEN	3925 kc.	1800 Daily	K2SPO	Mgr.

*Section Nets All times shown above are local.

The "Thought of the Month" saluted forth from the writings of WA2RZZ, editor of the *Huntington RACES Bulletin*. It goes like this, "Message handling is probably one of the most underestimated tasks that exist—it is really an art!" Isn't that a bodacious truth? Our beloved old Director once said, "Traffic-handlers as a rule; are not born but come from school." Although he frequently talks in rhyme, the simple truth is practice makes the artisan. Won't you join one of the above nets and get in on the practice? K2UBG allows that holidays, state fairs and antennas creaking under a heavy snow load turned the month into irantic Feb. WB2RQF should be safely ensconced in the new QTH by now. WB2YKU was appointed Asst. PAM for the NLI Phone Net by WA2UWA, the new PAM. WA2RU is back from his visit to California. WA2JZX still is setting up in the new QTH. K2JFE reports on Staten Island ARA's operation "Ferryboat." W2KWN is busy mobbing through W3- and W4-Land. K2RIW and W2-TVN are teaching license upgrading classes for the Suffolk County RC. K2JDH, WA2KEC and WB2WLV

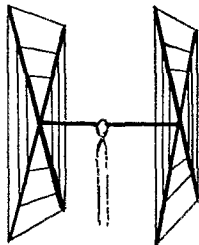
GOTHAM ANTENNAS ARE MUCH BETTER OF COURSE, YOU PAY MUCH LESS

How did Gotham drastically cut antenna prices? Mass purchases, mass production, product specialization, and 16 years of antenna manufacturing experience. The result: The kind of antennas you want, at the right price! In QST since '53.

QUADS Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3—

CUBICAL QUAD ANTENNAS—

these two element beams have a full wavelength driven element and a reflector (the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators)—absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!



10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 1 1/4" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

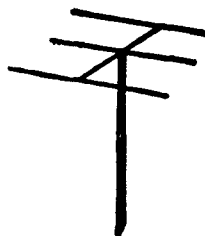
Now check these startling prices—note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD	\$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD.	25.00
FIFTEEN METER CUBICAL QUAD.	24.00
TEN METER CUBICAL QUAD.	23.00

(all use single coax feedline)

BEAMS The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9ADQ, and 4U1ITU. THAT ANTENNA WORKS!VN4DYN

Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36' of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; 3/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.



2 E1 20	\$19	4 E1 10	\$18
3 E1 20	25*	7 E1 10	32*
4 E1 20	32*	4 E1 6	18
2 E1 15	15	8 E1 6	28*
3 E1 15	19	12 E1 2	25*
4 E1 15	25*		*20' boom
5 E1 15	28*		

ALL-BAND VERTICALS

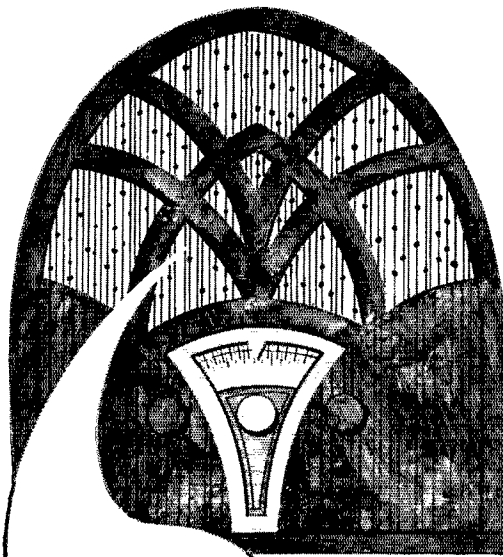
"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGJ, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ51KN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15,	
10, 6 meters	\$14.95
V80 vertical for 80, 75, 40,	
20, 15, 10, 6 meters	\$16.95
V160 vertical for 160, 80, 75,	
40, 20, 15, 10, 6 meters	\$18.95

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139



**Tedford crystals...
since the early
days of radio**

Back when radio wore short pants, we were one of the gang. Today we're showing our age . . . in the capability to produce quartz crystals with remarkable aging characteristics, minimal drift factors and an unusually broad frequency range.

Tedford may be the old timer in the industry, but we don't look it. Our new plant is deceiving — air conditioned, humidity controlled, with the most sophisticated equipment we could lay our hands on.

If you need a few crystals (for your rig) . . . or thousands of crystals, crystal filters, integrated filters or temperature compensated crystal oscillators (in your electronic industry job), Tedford is sincerely interested. Write for free product catalogs: Tedford Crystal Labs, Inc., 4916 Gray Road, Cincinnati, Ohio 45232. Phone: 513/542-5555—TWX: 810/461-2476.

**TEDFORD
CRYSTAL LABS, INC.**

FREQUENCY CONTROL DEVICES

are to be congratulated on making the Advanced Class. The same goes to WA2YOU. And, there also WN2IEM, who passed the General, Sun., May 18 "Worked TuBoro Radio Club" Day. There will be a certificate for working five members on 2, 6 or meters. WB2DRW was elected vice-pres. of the R Radio Club (W2SZ) up in Troy, N.Y. WB2WFJ back on the air with an SB-100. The Huntington C. alerted all three of its nets during the Feb. and blast. WA2FNQ and WB2TDK have picked up the General-type bands. WB2ZIT moved into a new QTH over East Northport way. K2JVT blew the transmission out of the old 1932 Buck mobile. WB2GS is in the Navy operating radio aboard the U Cambria. W2HAE says there were more hams over Harrison's on Washington's Birthday than show up most hamfests. It's encouraging to see the Radio Club of Brooklyn continuing to make gains in its drive rebuild. WB2DJQ also made General. Congratulations K2UBG presently is installing a portable 110V generator at the QTH and can't wait to start chanting "Who's afraid of the big bad blackout!" Traffic (Feb.) WA2UWA 2200, K2UBG 463, WB2RQF 182, K2UAT 163, W2EW 118, WB2YKU 91, K2AAS 74, WA2AEK 74, WA2RUI 38, WB2WFJ 25, W2EC 14, WA2GRJ 11, WA2EMP 9, WA2JZX 7, W2DBQ 5, K2JFE WA2BRF 3, WB2NLM 3, WA2QJU 2, W2JTZ 1.

NORTHERN NEW JERSEY—SCM, Louis J. Amoso, W2ZZ—SEC: WA2ASM, RM: WB2RKK, PAM: W2PEV, K2KDDQ, WA2KZF and WA2TBS.

ARPS Section Net Schedules

Net	Freq.	Time	Days	Sess.	QNI	Tfc.	Mgr.
NJN	3695 kc.	7:00 P.M.	Dy	—	—	—	—
"	"	10:00 P.M.	Dy	56	231	311	WA2BJ
NJSN	3740 kc.	8:00 P.M.	Dy	21	44	14	WB2PR
NJEPTN	3929 kc.	6:00 P.M.	M-Sat.	28	632	355	W2PEV
NJAN	50,300 kc.	8:00 P.M.	M-F	22	259	47	WA2KZ
PVTEN	145,710 kc.	7:30 P.M.	Dy	28	363	310	K2KDDQ
ECTN	146,700 kc.	9:00 P.M.	Dy	28	230	185	WA2TBS

Endorsements: WB2RKK as RM for NNJ and OJ K2KDDQ as PAM for PVTEN, W2DMJ as EC Wood-Ridge, K2KDDQ as EC for Passaic and W2T as EC for Blairstown, W2TPJ, W2BVE and K2BMM OOs. All appointees are requested to check the data on certificates and forward to me if overdue. WB2BJ reports that the group at K2USA is now conducting code and theory classes Wed. at 1930 and Sat. at 1 local time. We wish to welcome to our ranks WN2I in Chester and WN2ITX in Dumont. We also hope to hear you on for a QSO. Congratulations to WA2D and WB2QJ on passing the Extra Class; K2IBF as WA2BCN on passing the Advanced Class and to WN2GTV on passing the General Class exam. This year NJAN winter meeting was held at WB2JCI's QTH. WB2QJ reports working lots of DX on 15-meter c/w. W2CVW operated in the 160-Meter Contest. W2P is working over his Model 25 for the RTTY N W2ZZ and WB2DRJ are now on f.s.k. and will be 2-meter a.f.s.k. shortly. W2JDH is building an 811 kw. WN2IHV is using the DX-20 and HQ-170 at station. The East Orange High School ARC is on with the S/Line. The club officers include WN2D, pres.; and W2SUE, advisor. The Bergenfield H School ARC's officers are WB2EZL, pres.; WA2E vice-pres.; WN2FIV, secy.; WA2UZS, advisor. The school station includes the KVM-2 and TA-33 beam OO reporting for Feb. shows W2TPJ with 51 observations, W2BVE with 25 and K2BMM with 15. If you interested in this work, please contact your SC Traffic: (Feb.) WB2RKK 1138, WA2TBS 315, WB2F 306, WA2TAF 231, WA2WID 216, K2KDDQ 188, W2NSV 164, K2DEL 154, WB2AMY 125, K2HHT WA2BAN 108, WB2DDQ 102, WA2ACJ 90, W2PEV WA2CAI 69, WB2BXX 63, WB2WNZ 54, WA2EUX WA2CCF 47, W2ZZ 43, WA2DRH 42, WA2BAU WB2YXY 38, WA2GLI 35, WA2ACP 32, W2CVW WA2NJB 28, WB2SSH 23, WA2CLO 22, WA2KZF K2PBP 19, WB2YPQ 16, W2TFM 10, K2MFX 9, W2FWZ 8, K2USJ 5, K2ZFI 5, WA2ZIE 5, WB2JRT WA2EUO 2, WB2DRJ 1, (Jan.) WB2AMV 143, W2VXY 141, WB2YPQ 55, W2CVW 48, WB2HEO WA2GIE 28, W2JDH 22, WA2ZDA 22, WB2TUL WB2CLI 13.

MIDWEST DIVISION

IOWA—SCM, Wayne L. Johnson, KOMHX—S KOLVB, PAM: WOPZO, RM: WOLGG, OBSs: W LCX, WOJAQ, WOCXN, WOSEF, WAOMIT, P UVU was hospitalized recently and is now doing 1 Congratulations to WOLUA, who is now WOA WA0JZX also has his Extra Class license. WOGQ



First class or tourist... Swan gets you there loud and clear.

THE SWAN 500C

**5 BAND — 520 WATT TRANSCEIVER
SSB-AM-CW HOME STATION — MOBILE —
PORTABLE**

You're really operating 'First Class' with our 500C. It combines all the features you require to have a complete SSB-AM-CW transceiver with performance, quality, and reliability second to none.

The P.E.P. input rating is conservatively rated at 520 watts, but actually, with the pair of 6LQ6 blast rated tetrodes in the final amplifier stage, peak input exceeds 570 watts before flat-topping. With this kind of power, S-9 signal reports from the far corners of the world are commonplace. Audio quality of the 500C is definitely superior to most other transceivers on the market today. This is due to the high frequency crystal lattice filter used in the 500C that is made especially for us by C-F Networks. This filter provides excellent channel separation, combined with the smooth, natural voice quality for which the Swan 500C is so well known. Velvet smooth dual ratio tuning is achieved with our custom machined planetary drive, machine tooled to extremely close tolerances. Refinements of the Swan VFO have resulted in superior mechanical and thermal stability and more precise dial calibration. For the CW operator, the 500C includes a built-in sidetone monitor, and by installing the SWAN VOX accessory, you will also have break in CW operation.

The Swan 500C is a deluxe transceiver with proven reliability and performance, yet is priced substantially less than competitive gear. See it at your Swan dealer soon.

\$520

MATCHING AC POWER SUPPLY

Model 117XC **\$105**

12 VOLT DC POWER SUPPLY

Model 14-117 **\$130**

THE SWAN

Cygnet

**5 BANDS—260 WATT SSB TRANSCEIVER WITH
BUILT IN AC-DC SUPPLY AND LOUDSPEAKER**

It's a complete radio station in a lightweight, easy-to-carry package, that even includes the microphone, and yet costs only \$395. Just connect a power source and an antenna, and you're on the air. Plenty of power to work the world with a strong, clear signal on phone or CW, and with excellent receiver sensitivity second to none.

The Swan Cygnet has been an instant success since we first introduced it in February. Experienced hams find it ideal for taking along on business trips or vacations since it can be operated from a motel room, boat, car, or practically anywhere. Newly licensed hams find that the Cygnet provides a complete amateur radio station at a minimum investment.

If you're one of those practical people who knows that the back of the airplane gets there the same time as the front . . . you, too, will like our Swan Cygnet.

See it, and try it at your Swan dealer soon.

\$395



SWAN
ELECTRONICS

*For better ideas
in amateur radio.*

NEW 1969

WRL

Electronic Equipment

CATALOG



Brand New!
Filled with amazing
buys in electronic
equipment includ-
ing dozens of new
and exclusive
items you can't
buy anywhere
else!

Anything in the
book on easy
credit terms,
TOO!

LATEST... Most Up-to-Date Selection of the Best in ELECTRONICS!

92 pages — filled with the most complete
inventory of Hi-Fi, Radios, Tape Recorders,
CB equipment, Ham gear, Electronic equip-
ment. Parts and tools...at real money-
saving prices. **Send for your copy now!**

FREE!

JUST MAIL IN
COUPON!

World Radio Laboratories
3415 West Broadway
Council Bluffs, Iowa 51501

Dept. QST-41

Gentlemen:

Please send me your Free 1969 Catalog.

Name _____

Address _____

City _____

State _____

Zip _____

electd pres. of the Cedar Valley Club. WOEIF built a 5- and 10-Mc. WWV receiver from a recent QST article. WOPFP advises that the Story County Club has a new club call, WOYL, in memory of W. L. Cassell, former holder of the call. The AREC meets Sun. at 1900Z on 3977 with KÖLVB. Each of four areas alternate as host. Some areas are contemplating 2-meter f.m. for AREC work. It's time to get your reservations and registration in for the National Convention in Des Moines June 20-22 if you have not already done so.

Net	Freq.	Day	GMT	QNI	QTC	Mgr.
Iowa 75	3970	M-Sat.	1730	1366	264	WOPZO
Iowa SSB	3970	M-Sat.	2300			WÖVLS
Iowa 160	1815	Daily	0000	845	8	KÖTDO
PON	3915	Tu-Th.	2330	116	7	WÖDYY
PON-CW	3697	M-F	2330	32	3	WÖDYY
TLCN	3560	Daily	2330	211	352	KÖAZJ

Traffic: (Feb.) WÖLCK 119, WÖPZO 610, WÖKB 458, KÖAZJ 278, KÖJGI 234, WÖUPX 96, WÖLGG 54, WÖJPI 29, WÖDYY 20, WÖAGMZ 15, KÖTDO 14, KÖKAQ 11, WÖCZ 9, WÖAMIT 9, WÖVDP 9, WÖÖBSF 8, KÖEVC 8, WÖIAE 8, WÖAIW 7, KÖIDN 6, KÖJMA 5, WÖPPW 2. (Jan.) WÖAMIT 9, WÖQG 5.

KANSAS—SCM, Robert M. Summers, KÖBXP—SEC: KÖEMB, PAM: KÖJMF, RMS: KÖMRI, WÖJFV, V.H.F. PAMs: WÖCCW, WÖLSH. Silent Key: WÖAQD. Our sympathy to WÖKKS, who lost his YXL. New appointments: WÖPB and WÖLBB as OPSs; KÖFPC and WÖQZP as ORSs. Renewed: KÖPSD and KÖGIG as OPSs and WÖLSH as V.H.F. PAM and OVS. KÖPSD reported handling 43 phone patches in Feb. on the amateur bands, Zone 9, 2-Meter Net, and Zone 15, 6-Meter Net, combined with the NCK and ACARA 2-meter nets and gave us 19 sessions, 88 QNI and 17 QTC. Radio KEYN, Wichita, boasts a staff of 30% amateur radio operators including KÖWTM, WÖMGC/O, WÖKQW/O, WÖCSH and WÖQPM, KÖJID, EC Zone 10, reports that the Zone 10 AREC Net now is back in operation Sun. at 9:30 a.m. on 3920. On Feb. 22 the Flint Hills ARC honored WÖHVL as its Amateur of the Year at the Annual Dinner Meeting. Sun. morning following the meeting I had the pleasure of visiting with the Topeka Amateur Radio Club then at noon the KÖNL famed workshop was open so I stopped by for a visit with our Vice-Dir. Sun. evening found me with the Hiawatha Amateur Radio Club for a real enjoyable and, I hope, informative week end. The Hambutcher Picnic will be held at Fort Leonard Wood, Mo., June 15 with a fun frolic the evening of the 14th. For more information contact WÖÖBTG. The group will be monitoring 7280. After 30 years of c.w. operation we should be hearing and working WÖCJH on s.s.b. with a new Swan 500C. Feb. net results:

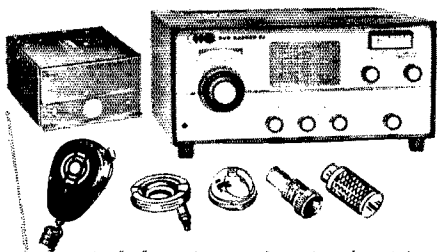
KSBN	QNI 792	QTC 225	Sess. 25	Mgr. KÖJMF
KPN	229	6	16	KÖJMF
KQS	321	206	56	KÖMRI
Ks. PI	58	2	7	WÖCCW
HBN	567	93	21	KÖICB
KPON	939	1039	28	WÖLXA

Traffic: WÖTHQ 504, WÖHI 268, WÖLXA 207, WÖINH 182, WÖNFP 157, WÖPSN 133, KÖMRI 128, WÖLLC 124, WÖQQQ 100, WÖLBB 91, KÖBXP 83, KÖJMF 73, WÖQZP 65, WÖCWH 55, WÖSBG 52, KÖPSD 45, WÖGZ 31, WÖQSEV 31, KÖUVH 26, WÖKED 25, KÖLPE 25, WÖONZ 25, WÖCCW 23, WÖRGX 18, KÖFIG 15, WÖJOG 15, WÖKPE 11, WÖGJ 8, KÖGZP 6, WÖDJ 4, KÖFPC 3, KÖJID 3, WÖUJT 3, WÖLYC 2, WÖSOE 2, WÖLSH 1.

MISSOURI—SCM, Alfred E. Schwaneke, WÖGS—SEC: WÖBUL. This will be my last report as SCM. To thank all who helped over the past six years would be impossible, but I do want to recall some of those who rendered outstanding service while I was SCM: WÖBUL as SEC and manager of MEN; KÖWKC and WÖBWW as NCSs on MEN; WÖUD for her consistent and faithful work promoting c.w. nets such as MON, SMN, MNN, and QMO; WÖFKD for QMO; WÖMM for promoting and KÖIHA, KÖTCB, KÖTGU, WÖRTO for ably carrying on MoSSB; WÖFLL for promoting the PHD Net and Club and WÖKUH for carrying it on; WÖWYJ, KÖJPL, KÖAEM, WÖTDR, KÖYBD as managers of MON; WÖEMX and WÖELM for ATTN; KÖONK for recruiting new station appointees; WÖHVJ as manager of MoPON; and all those who have served as NCSs on the nets, as OOs, as ECs, as OVSs. At one time we had over 10 nets active in section-wide service. In

"Duo-Bander 84"
80-40 Meter
SSB Transceiver
HAM NET... \$159⁹⁵
WRL CHARG-A-PLAN \$8 Monthly

A Complete 80-40 Meter MOBILE PACKAGE!



Includes: 1 ea.: Duo-Bander 84, DC384 Power Supply, one Band-spanner Antenna, BDYF Mount, 350C mic, Mic Plug, PL 259 Plug, UG176/U Reducer and 25' RG58/U coax Cable. All supply cables are included.

ORDER: ZZMA103 package.
\$288.33 (\$14 monthly)

OR...

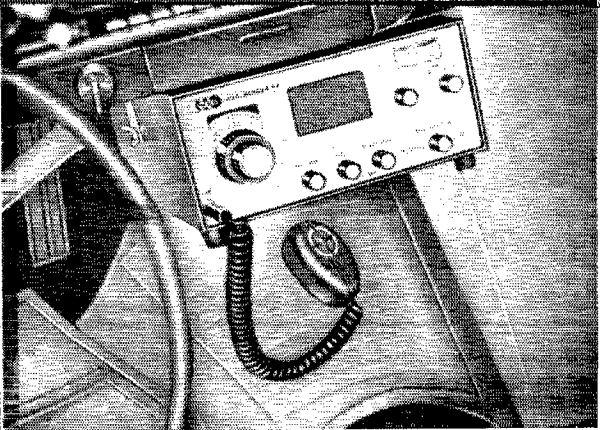
A Complete 80-40 Meter FIXED STATION PACKAGE!

Includes 1 ea.: Duo-Bander 84, AC48 250 watt supply, 80/40 Duo-Doublet Antenna kit, 350 mic., Mic. Plug, PL259 Plug, UG-176/U Reducer and 100 ft. RG58/U coax cable.

ORDER: ZZMA104 Package.
\$213.23 (\$10 monthly)

ORDER: ZZMA105 Package.
\$243.23 (Same as above with 400 watt AC supply)
(\$12 monthly).

HERE'S NEW MOBILE POWER!
NOW 400 WATTS
the HOT one!
 WHY SETTLE FOR LESS!



A Real POWERHOUSE
at a Real WRL Bargain Price!

A GREAT RIG...Now even Better than Before! Designed for the Amateur whose interest is 80 and 40 meter SSB. Here's Power (now 400 watts!) to make good contacts...a Selective Receiver...Stability... Compactness (only 5x11 1/4x10"). It was a great value at the old price. *Now you get 100 watts more power and can buy either of these two great packages at \$20.00 less!* Buy now on our easy monthly terms!

- 400 watts PEP-SSB • Rugged—Reliable Printed Circuitry • 2k-Hz Dial Calibration • Dual-Speed Vernier VFO tuning • E-Z One-Knob Tune-Up—"Just Peak Output" • Built-in Speaker • Mobile Bracket supplied • Combination "S" and Output meter • Crystal Lattice Filter.

No Other Rig offers ALL these Great "84" Features!

Use this Handy-Quick Mail-Order Coupon

You can get the Duo-Bander 84 on WRL's easy payment plan.

WORLD RADIO LABORATORIES, Inc. QST-g41
 3415 West Broadway Council Bluffs, Iowa 51501

Please ship me the following:

- Duo-Bander 84 66MA059 \$159.95
- Duo-Bander MOBILE Package ZZMA103 @ \$288.33*
- Duo-Bander Fixed Package ZZMA104 @ \$213.23*
- Duo-Bander Fixed Package ZZMA105 @ \$243.23*
- Your FREE 1969 HAM Catalog
- My Check or Money Order for \$_____ is attached.
- Charge it to my WRL charge acct. #_____.

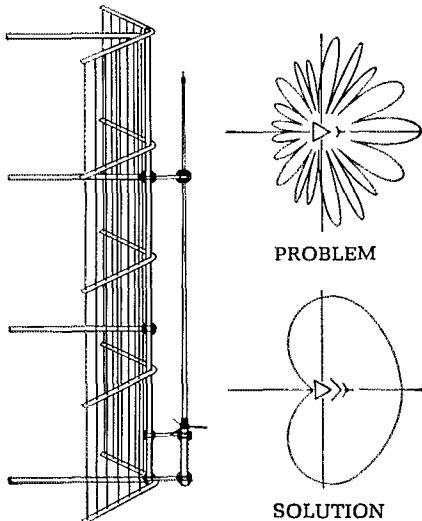
*Sorry—these reduced prices are without trade. Write us for trade-prices

Name _____
 Address _____
 City _____ State _____ Zip _____

An "outside corner" reflector smooths out 220° coverage for a 450-MHz system.

Problem: How to obtain uniform coverage in a 220° sector at 450 MHz using a side-mounted antenna on a tower having a cross-section of several wave lengths. A standard antenna mounted in this uncontrolled environment produces a pattern with many lobes and nulls causing dead spots in the service area.

Solution: Mount the same antenna in a controlled environment. In this case, the antenna, a standard Catalog No. 400-509 Stationmaster, was mounted outside the apex of a corner reflector. Selecting the proper angle at the corner and the correct spacing of the Stationmaster from the apex eliminates the nulls and gives the required 220° coverage.



Antenna Problems? Call us. Every time we solve yours, our list of special products (like a 260° "outside corner" reflector) grows. Communication Products Company, Division of Phelps Dodge Electronic Products Corporation, Marlboro, New Jersey 07746, (201) 462-1880... Los Angeles, California 90065, (213) 245-1143.

COMMUNICATION PRODUCTS COMPANY



DIVISION OF PHELPS DODGE
ELECTRONIC PRODUCTS CORP.

addition, my thanks to all of you who endured through my family tragedy and the subsequent and continuing reshuffle of my personal life. I also appreciate receiving all the various club newspapers. W0GCL renewed ORS; W0GS renewed as ORS and OPS. W0BUL reports extra sessions of nets for SET showed a total of 156 QNI and 212 QTC. WA0WQA is the new call of the Mules ARC at QMSC, Warrensburg. K0BIX is trustee and faculty sponsor. W0WPU is a new Novice and WA0UTB a new Tech. Class in K.C. Net reports for Feb.:

Net	Freq.	Time	Days	Sess.	QNS	T/c.	Mar.
MoSSB	3963	2400Z	M-Sat.	23	861	343	W0RTO
MON	3585	0100Z	Daily	21	118	68	K0AEM
MNN	7063	1900Z	M-Sat.	24	31	35	W0BUD
SMN	3585	2200Z	Sun.	4	14	15	W0HVD
MoPON	3930	2100Z	M-F	25	53	179	W0HVJ
PHD	50.45	0130Z	Tue, (GMT)	4	120	6	W0AKUH

Traffic: (Feb.) K0AEM 285, WA0HTN 178, WA0FKD 143, W0BUD 138, W0KBE 90, W0RTO 21, W0AKUH 19, W0JKF 14, W0BVL 9, K0ONK 3, W0AQXG 3. (Jan.) W0AQXG 82.

NEBRASKA—SCM, V. A. Cashion, K00AL—SEC: K0ODF. Monthly net reports for Feb.: Nebr. Storm Net, WA0LOY, 0030Z session, QNI 1044, QTC 47; 0130Z session, QNI 933, QTC 26. Nebr. Emergency Phone Net, WA0GHZ, QNI 1520, QTC 280. Nebr. Morning Phone Net, WA0JUP, QNI 988, QTC 35. West Nebr. Phone Net, W0NIK, QNI 620, QTC 20. AREC Phone Net, W0RZ, QNI 160. Nebr. C.W. Net (NEB I), WA0FGV, 0100Z session, QNI 102, QTC 14. Nebr. C.W. Net (NEB II), WA0HWR, 0400Z session, QNI 76, QTC 35. 160-Meter Phone Net, WA0CBJ, QNI 806, KTC 26. WA0FGV has been appointed RM for the first session of the Nebraska C.W. Net. The Smoke Signal Senders Annual Pow-Wow is scheduled for May 31-June 1. The Pine Ridge Amateur Radio Club Picnic will be held June 1 at Chadron State Park. BPL for Feb.: K0LDP. ECs are requested to become familiar with Form 35 for completion whenever emergency and public service is performed by amateurs. C.W. nets need more QNI to survive. Help keep Nebraska nets active. Traffic: (Feb.) K0LDP 700, WA0DOI 343, W0LOD 335, WA0IBB 317, K0JFN 147, W0BFV 128, WA0GHZ 96, WA0JH 71, WA0LVI 58, K0SFA 51, W0HTA 48, WA0CBJ 47, K0KJP 44, K0JTW 37, WA0FGV 34, K00AL 33, WA0QLE 32, W0VEA 27, WA0HWR 26, W0AGK 20, WA0JUF 17, W0BFN 16, W0GEQ 15, WA0MHW 14, K0HNT 13, WA0IXD 12, W0EWZ 10, WA0GVJ 10, K0ODF 10, WA0OMY 10, WA0TNG 10, WA0JTU/O 9, WA0EEI 8, WA0IBL 8, K0IWK 8, WA0QX 7, W0RJA 7, W0HOP 6, WA0TET 6, W0YFR 6, K0DGV 5, W0NIK 4, WA0PI 4, WA0RPB 4, K0YRL 4, K0FJT 3, K0MUF 2, W0PEA 2, WA0PSN 2, W0SWG 2, W0WZR 2, W0KFY 1, WA0NYM 1. (Jan.) WA0DOU 368.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John McNasser, W1GVT—SEC: W1PRT, RM: W1HSN, PAM: W1YBH, V.H.F. PAM: K1SNF. Net activity report for Feb.:

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3640	Daily	1845	28	367	433
CPN	3880	M-S 1800 Sun.	1000	28	520	310
VHF 2	145.98	M-S	2300	20	123	44
VHF 6	50.6	M-S	2100	20	190	69

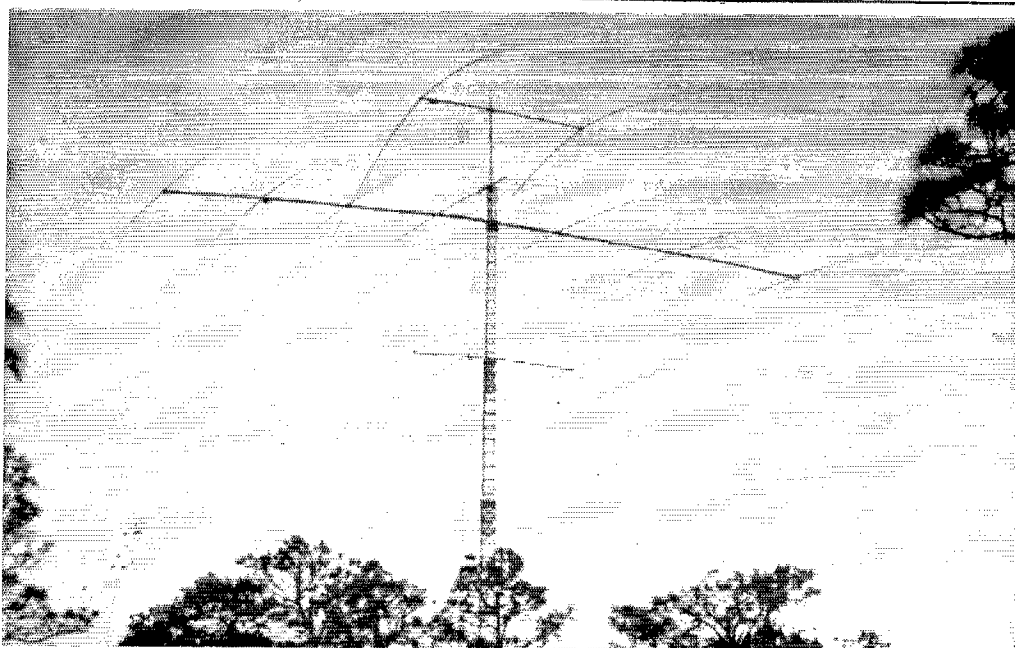
SIGNAL/ONE Offers An OPPORTUNITY RARER THAN "ONCE IN A LIFETIME" . . . FOR ONE HIGHLY QUALIFIED RF DESIGN ENGINEER

with 5-10 years' strong experience, including project responsibility for sophisticated HF equipment development.

WANT TO accelerate your career by joining the select group of professionals who've already initiated the greatest ham gear revolution in two decades? A BSEE and thorough working knowledge of state-of-the-art techniques and devices, such as mentioned in SIGNAL/ONE's display ad in this issue, is essential. An MSEE is desirable (and an Extra-Class license would be frosting on the cake).

Send a detailed summary of education, experience, and salary history to

General Manager
220 Anvil St. N.,
St. Petersburg, Fla. 33710



STATE of the ART

But It's Only Half The Battle!

A BIG ANTENNA -- UP HIGH -- IS HALF THE BATTLE. But in the words of an old proverb, "Any antenna you can *keep* up is too small."

LUCKILY FOR MOST OF US, the picture doesn't revolve (no pun intended) entirely around real estate and tolerant neighbors. Operating savvy is still paramount. *And now equipment of unprecedented performance, versatility, and quality is available to complement your skill.*

NEW CRITERIA FOR THE NEXT DECADE IN AMATEUR RADIO have resulted from state-of-the-art developments in electronic technology. Ham radio publications abound with examples...

TRANSISTORS? The *dual-gate MOSFET* offers a compelling *performance* argument for solid state receivers. *Power transistors* are ideal for broad-band amplifiers and d-c regulators. Smaller bipolar devices are available for an endless variety of small-signal and control jobs.

BUT "STATE-OF-THE-ART" MEANS MORE THAN TRANSISTORS . . .

- **LINEAR IC'S** reduce complexity and cost, permitting use of sophisticated signal-processing schemes which would be prohibitive with discrete components.
- **TOROIDAL INDUCTORS** provide high "Q" for filter networks, yet minimize needed space and shielding.
- **SMALL CERAMIC-METAL VACUUM TUBES** deliver high power with excellent linearity and rugged dependability.

■ **DIGITAL IC'S** make the electronic frequency counter practical as a precision alternative to mechanically driven dials.

■ **TAPE-WOUND CORES** of special grain-oriented steel slash power transformer size and weight by as much as two-thirds.

■ **NEW SYSTEM, CIRCUIT, and PACKAGING** techniques, made possible by the component revolution, add to performance and convenience.

APPLYING SPACE-AGE TECHNOLOGY to Down-to-Earth communications needs is our business. See just what we mean . . .

CATCH THE SIGNAL/ONE ROAD SHOW THIS SPRING - at Dayton, Swampscott, Des Moines, or another major hamfest near you.

Some of the outstanding distributors who can give you the SIGNAL/ONE performance story are --
Harrison Radio - Farmingdale, Jamaica and N.Y.C.
Henry Radio - Los Angeles and Anaheim, Calif.
Butler, Missouri
Amateur Wholesale Electronics, Coral Gables, Fla.
Amrad Supply, Inc., - Oakland, California
Stellar Industries - Ithaca, New York

"It Speaks for Itself"

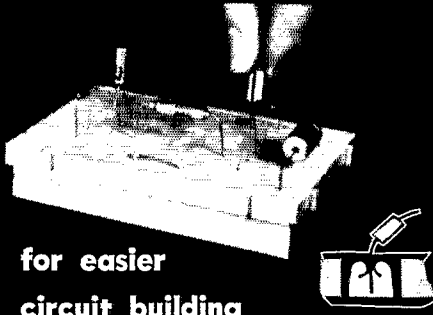


SIGNAL/ONE

A Division of ECI (An NCR Subsidiary)

2200 Anvil Street N. • St. Petersburg, Florida 33710

Introducing . . . S-DeC breadboard



for easier
circuit building

An S-DeC contains 70 push-in contact points which are arranged in two sets of five numbered rows with each five points joined together by a leaf-spring busbar; this pattern is similar to that used in popular wiring boards. Larger circuits can be made by keying units together to form a continuous breadboard of any size.

Components are simply pushed into the sockets where they are held securely by double-leaf phosphor-bronze contacts. This system ensures a good wiping action on insertion and withdrawal, giving low contact resistance. The accessory kit provides solderless connectors to use with controls which are mounted on a panel slotting into the S-DeC base.

S-DeC with control panel, jig, accessories and project leaflet. \$5.75 each

DeC STOR—Two decks, control panel, jig, accessories, project leaflet with components tray all in black plastic box. \$11.75 each

4-DeC Kit—Four decks, two control panels, jigs, accessories, and project book in attractive plastic case. \$20.75 each

INTRATEC

399 Jefferson Davis Highway
Arlington, Virginia 22202

Please send me postage paid:

- S-DeC's @ \$5.75 each
- DeC STOR @ \$11.75 each
- 4-DeC's @ \$20.75 each

I enclose a check/money order for \$.....
Va. residents add 4% sales tax
Money refunded if not satisfied.

Name

Address

City

State Zip Code

Box Q5

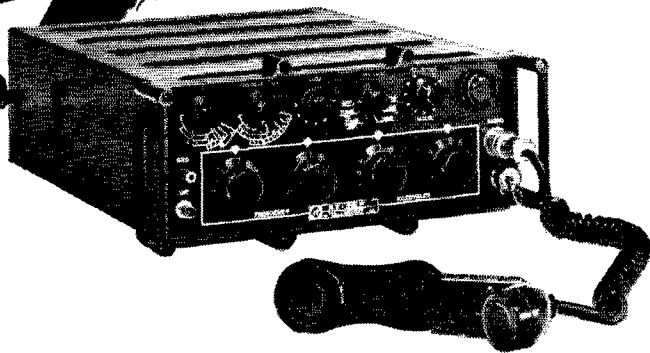
High QNI: CN—WAIHEW, WAIHLP, WAIHOL, WAIHGF and WAIJGA. CPN—KISXF and WIGVT 27. WAIHEW and WAIHGF 23, WA2HMX and WIYBH 21, W8CWE/1 19, WAIKXS 18, WINBP 16, WAIHOL and WILUH 15. SEC WIPRT thanks all ECs who sent reports—send yours now if you forgot. N.E. Director W1QV requests correspondence covering topics you feel should be discussed at the Board Meeting in May. Traffic operators know the NCS works hard, remains on frequency for the full net session and sends a complete report promptly to the net manager. Connecticut is fortunate in having devoted, dedicated and very capable managers. Without them, organized Connecticut section nets would fail. My sincere thanks to RM WAIHNSN, PAM WIYBH and V.H.F. PAM KISXF. They do the work of keeping our section nets organized. The new Sunday Morning V.H.F. Net is on 145.35 Mc. at 9:30 A.M. The Talcott Mountain U.H.F. Society meets each Wed. p.m. on 145.35 Mc. Congratulations to: WAIHGN on Feb. BPL; WAIKJR on Advanced Class; Murphy's Marauders on High Scores in the 8S Contest; and WAIHNSN, Nutmeg Net News editor on an outstanding monthly bulletin. The New England Division Convention will be held May 24 and 25 in Swampscott, Mass. See you there! Traffic: (Feb.) WAIHEW 452, W1EFW 412, WAIHGN 293, WAIHGF 265, WAIHNSN 243, W1WCG 153, KISXF 143, WAIHFN 126, WAIHOL 117, W1AW 77, WIGVT 73, WAIJGA 51, W1LAR 46, WAIKMR 42, WIYBH 38, W1RFJ 34, WAIHGX 32, W8CWE/1 25, WINBP 24, WIBDI 23, WAIHLP 22, WAIHGG 20, WAIJQC 20, KIYGS 17, W1GEE 16, WICTI 15, WAIKXS 15, WAIKQN 14, W1QV 11, WICUH 9, WAIKWS 9, WIBNB 8, WAIHJ 6. (Jan.) W1WCG 281, WAIKEK 6.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—We all want to wish W1JMA the best on his retirement as Engineer in Charge of the First District of the FCC Silent Keys: Ex-W1BCM, W1NAX, W1LYH, K1KWK, the wife of W1AAR. W1FH has retired. W1UIR broke her leg. If your town does not have an EC and you feel you are qualified, write to me or W1AOG, our SEC. Technicians are eligible. W1AOG's wife broke her wrist while in Florida on vacation. New YLs: W1N1KPL Newton, W1N1KRQ Pepperell. WAIKUG, ex-K1KTK, is in Framingham. W1IAU and W1EPR are conducting classes for hams at the Whitman RC. W1W1MH received a special award in the Calif. QSO Party. W1RXZ is back on the air. W1BFD worked some new countries on 15. K7JRE/1 has a new antenna for 15, 20 and 40. W1N1KJ made WAS and has a CP/25 certificate. W1N1JNJ and W1N1KBZ are father and son-in-law. Ernie Behrens is Advanced Class. W1D1Y, editor of *Ham Radio Magazine*, spoke at the South Shore Club. Guests were T12-JCC, KH1J and K1SCQ, who was on the USS *Pueblo*. W1AXL is NC of the Farmers Net on 1840 kc. each Sat. from 7 to 9 p.m., writes W1MGP. The 6-Meter Crossband Net had 20 sessions and 95 QNIs. Appointments endorsed: W1HGT as OVS, W1s KMG and AQE as ORS, W1FJ as OPS, W1AQE as RM, W1ALP as OBS, W1MX and W1OOP are on 432 Mc. W1VAH built an integrated circuit keyer. W1N1FKM is 63 years young. W1AFNM is working DX on 10. W31TR/1 has 32 in WAS from MIT, Mass. PON had 23 sessions, 1611 QNIs, 92 traffic. W1ADPX says there are 35 stations on 6 RTTY. New are W1JWZ and W1YZC. The T9 RC Net met at W1MVQ's. W1TJP is in Florida. The OOTC Chapter met at Lord Wakefields. The Chelmsford ARA voted to grant an annual award of a certificate to some qualified individual in its area, to be known as the Robert Cameron Memorial Award. Massasoit ARC has two nets every Tue. night on 145.32 and 28.7 Mc. New officers of the Massasoit ARC are KIUIW, pres.; W1BFD, vice-pres.; W1EBG, treas.; W1CUY, secy. We now have an East Coast Amateur Radio Service on 7255 kc. Write to W1KRN at WBZ, Boston. W1SMO is NOLA in Navy MARS. W1N1KTA is active in the Lexington HS Club, K1JMQ. W1AJNSN spoke on d.b. unit at the Middlesex ARC. W1TED spoke at the Whitman RC and KIUCT was made "Ham of the Year" at its banquet. The Cape-way RC met at K1NPZ's QTH. W1N1KSF is K1IPB's son. EM2MN had 21 sessions, 138 QNIs, 214 traffic. The Yankee RC had another of W1AAT's "Old Timers Nite." Quannapowitt RA had a talk on "Amateur Radio Astronomy" by a speaker from MIT. K1MVT says that the Maritime Mobile Service Net on 20 does a swell job on phone patching for the Navy boys. K1ESG is busy on TCC skeds. W1EIFE has a R108 for 2 and a G50 for 6. W1KOR/WA2KZV is a new OVS. EMN had 31 sessions, 139 QNIs, 174 traffic in Jan.; 28 sessions, QNIs 201, 164 traffic in Feb. Traffic: (Feb.) W1PEX 1800, W1OJM 521, W1EYF 419, K1ESG 330, W1IBL 296, W1EMG 147, W1ADPX 88, W1HKJ 80, K1PRB 64, W1CTR 61, W1EAE 56, W1EIFE 43, W1EIFU 34, K1YUB 34, W1DOM 29,



SSB RF-301P PACK SET

RF-301P [AN/PRG-()-]



... makes him part of a fixed station, mobile and man pack HF SSB system which uses the same components and modules

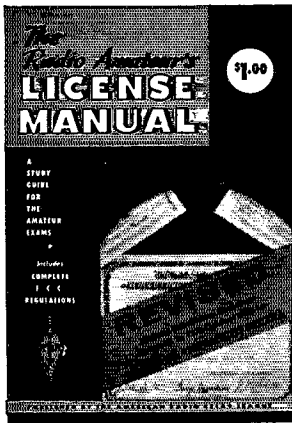
The RF-301P, latest equipment in R F Communications' line of military transceivers, is a rugged pack set which uses printed wiring board modules, components and circuit techniques common to the RF-301 and RF-301A. In this concept, logistics, operator training and maintenance are minimized. And, the pack set is an integral unit in a flexible communications system. ■ Frequency range 2 to 15 MHz ■ Frequency stability—1 part 10^6 with no ovens ■ Transistorized frequency synthesizer for 1 KHz steps plus continuous tuning ■ Power output 50 watts PEP ■ Selectable sideband and CW modes ■ Weight less than 35 lbs. including NICAD battery ■ Full line of accessories ■ Available off the shelf at a commercial price.

Please write for details on the RF-301P and its accessories.



RF COMMUNICATIONS, INC.
1680 UNIVERSITY AVENUE • ROCHESTER, NEW YORK 14610

For employment opportunities, send your resume to the Personnel Director. An equal opportunity employer.



With new regulations in effect, every amateur should have the latest information. And, the latest information is contained in the current *LICENSE MANUAL*.

Complete FCC Regulations
—in addition to sample questions for Novice, Technician, General, Advanced and the Extra Class examinations.

\$1.00

POSTPAID

The AMERICAN RADIO
RELAY LEAGUE INC.

NEWINGTON, CONN. 06111

WAIJL 29, WIATX 27, WINUP 27, W1BUB 13, WAIHHK 10, WIAIX 10, WAIJMR 9, K1LQC 7, K2GLQ/1 6, WAIION 3, K1CLM 2, W1LE 2, W1ADF 1. (Jan.) W1MX 103, W1EAE 78, WAIHFE 58, W1SMO 2.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1CLF. RM: W1BJG. PAM: W1AFLG. Traffic nets: Sea Gull Net meets Mon. through Sat. at 1700 on 3940 kc. Pine Tree Net meets daily at 1900 on 3596 kc. c.w. It is with deep regret that we pass on that W1UDD, of Portland, is a Silent Key. He was the manager of the Barnyard Net and active in nets and most phases of radio. He will be sadly missed by all who knew him along the way. The Old Farmers Net has been reactivated on 1840 kc. Sat. evening 7 to 9 and would like representatives from all areas. W1AIFQW is busy on 80 and 20 c.w. and is using a vertical on 20. Traffic: W1BJG 270, K6CAG/1 172, W1AIFLG 59.

NEW HAMPSHIRE—SCM, Donald W. Morgan, K1QES—SEC: K1RSC. RM: K1BCS. PAM: K1APQ. We welcome the following new members to our ranks: WN4LKN, who became interested by listening to the GSPN; W1K1RB, Plaistow; W1K1RO, Amherst; W1K1RZ, Kingston. W1MGP reports the Old Farmers Net has been reactivated on 1840 kc. Sat. night from 7 to 9 with 25 watts maximum power. W1JB is on daily, 10 through 75 phone, and K1OQ is on 160 meters. W1YWC has a new Drake R4-B. The GSPN reports 868 check-ins and 141 traffic for Feb. The month of the big snow, a state of emergency existed in some cities and towns for three or four days when 45 inches or more of snow fell with high winds. Antennas suffered, buildings collapsed, roads were impassible. Traffic: (Feb.) W1IHH 227, K1BCS 85, K1PQV 61, W1HXN 29, K1QES 6, W1SWX 2. (Jan.) K1TXC 14, W1SWX 8. (Dec.) K1TXC 3.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1LH. RM: W1BTY. PAM: W1TXL. V.H.F. PAM: K1TPK. K1SPN report: 29 sessions, 454 QNT, 134 traffic. The W1AQ Club of Humford reports that work has started on a new operating room for the club ris. Club Pres. K1AGA reports that Field Day preparations have started and K1LH has reserved the field. Antennas will be completed in the near future and the club generator will be overhauled. W1DK has the club ARRL registration completed and several members recently joined the League. The recent snow-storm cancelled the program of the Newport County Radio Club of Newport and the New England Division Director will visit them at a later date. W1TXL, of the club, has received another BPL award and is the state's leader in BPL. W1JFF has been very active in the RACES program and is active on 2 meters. K1QFD will be on 20-meter s.s.b. as soon as she finishes building her HW-32A. Traffic: W1TXL 428, W1BTY 103, K1YEV 64, K1YVC 47, K1QFD 38, K1TPK 26, WB2HPW/1 24, W1ABLC 8.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	Freq.	Time	Days	QNT	QTC	N.Mgr.
Gr. Mt.	3855	2230Z	M-S	526	21	W1VMO
Vt. Pone	3855	1430Z	Sun.	114		W1EDI
VTM	3685	2330Z	M-F			K1UZG
VTCD	3990½	1500Z	Sun.	39	18	W1AD
Carrier	3865	1400Z	M-F	292	20	W1KKD
VT&B	2909	2230Z	M-S	589	133	K17DVP/1
		1330Z	Sun.			

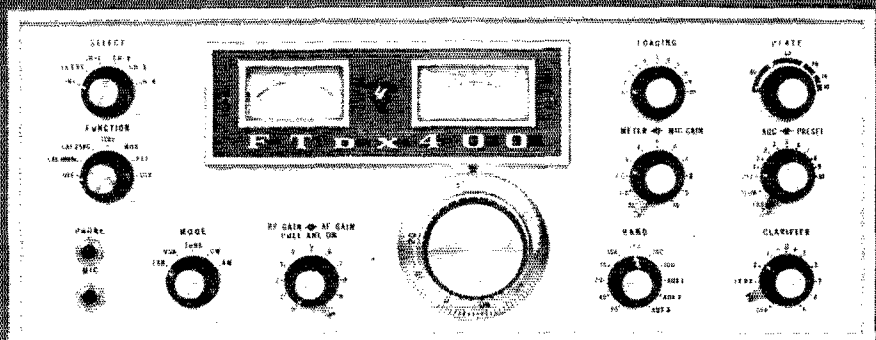
Welcome to new Novice W1K1RX (Ludlow). Also welcome to W1FCI (ex-K2PSL), who moved to Cornwall and is doing some TV work on the ham bands. Two-meter i.m. still is growing. K1MPN and W1ZYZ now are on and more are in the process. The East Coast Amateur Radio Service (ECARS) now is operational on 7255 daily at 7:30 A.M. all day. Please advise if you are interested in ARRL appointments and would like to see more traffic reports: Traffic: K1BOB 344, W1FRT 44, K1MPN 43, W1AGKS 31, W1MRW 6.

WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—RM W1DWV reports W1MN attendance during Feb. comparable to Jan. with traffic about the same. Only the Gardner/Fitchburg area remains as a challenge to improve our coverage. Stations calling in order of attendance were: W1BVR 27, W1DWV 27, W1ZPB 23, K1WZY 20, K1JY 17, W1HI 12, W1STR 11, W1HRC 7, W1EOB 6, W1KK 5. K1ANF is converting an R432A surplus receiver to use FET. Bill and W1QWJ had an excellent demonstration on printed circuit construction at the Mar. HCRAI meeting. The May meeting will be home-brew night at HCRAI. The Pre-WW II Farmers Net has been reactivated on

TOP OF THE YAESU



LINE



THE FT_{DX} 400 TRANSCEIVER

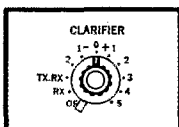
Conservatively rated at 500 watts PEP on all bands 80 through 10 the FT dx 400 combines high power with the hottest receiving section of any transceiver available today. In a few short months the Yaesu FT dx 400 has become the pace setter in the amateur field.

FEATURES: Built-in power supply • Built-in VOX • Built-in dual calibrators (25 and 100 KHz) • Built-in Clarifier (off-set tuning) • All crystals furnished 80 through the complete 10 meter band • Provision for 4 crystal-controlled channels within the amateur bands • Provision for 3 additional receive bands • Break-in CW with sidetone • Automatic dual acting noise limiter • and a sharp 2.3 KHz Crystal lattice filter with an optimum SSB shape factor of 1.66 to 1.

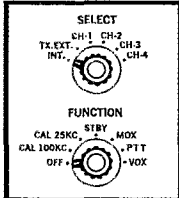
Design features include double conversion system for both transmit and receive functions resulting in, drift free operation, high sensitivity and image rejection • Switch selected metering • The FT dx 400 utilizes 18 tubes and 42 silicon semi-conductors in hybrid circuits designed to optimize the natural advantages of both tubes and transistors • Planetary gear tuning dial cover 500 KHz in 1 KHz increments • Glass-epoxy circuit boards • Final amplifier uses the popular 6KD6 tubes.

This imported desk top transceiver is beautifully styled with non-specular chrome front panel, back lighted dials, and heavy steel cabinet finished in functional blue-gray. The low cost, matching SP-400 Speaker is all that is needed to complete that professional station look.

SPECIFICATIONS: Maximum input: 500 W PEP SSB, 440 W CW, 125 W AM. Sensitivity: 0.5 uv, S/N 20 db. Selectivity: 2.3 KHz (6 db down), 3.7 KHz (55 db down). Carrier suppression: more than 40 db down. Sideband suppression: more than 50 db down at 1 KHz. Frequency range: 3.5 to 4, 7 to 7.5, 14 to 14.5, 21 to 21.5, 28 to 30 (megahertz). Frequency stability: Less than 100 Hz drift in any 30 minute period after warm up.

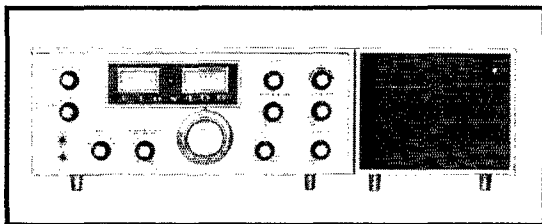


CLARIFIER CONTROL—Does the work of an external VFO—allows operator to vary receive frequency 10KHZ from transmit frequency, or may be used as an extra VFO combining transmit and receive functions.



SELECT CONTROL—Offers option of internal or outboard VFO and crystal positions for convenient preset channel operation.

FUNCTION CONTROL—Selects crystal calibration marker frequency and desired transmit mode of operation.



FT DX 400 \$599.95 — SP-400 \$14.95



SPECTRONICS

BOX 356, LOS ALAMITOS, CALIFORNIA 90720

— PROFESSIONAL EQUIPMENT FOR THE AMATEUR —

When it comes to Antenna Systems . . .

IS YOURS a space problem?
a budget problem?
an installation problem?
an application problem?
—or simply a problem of where to buy?

Your One-Stop solution is **ANTENNAS, INC.** Exclusively specialists in radiating systems, complete systems or any component part.

ARRAYS—complete or in kit form, quads, yagis, dipole assemblies, verticals—fixed or mobile, towers, masts, rotors, guy and control cable, transmission line, coax relays and switches, connectors and adaptors, test gear, technical publications, corrosion resistant hardware, corrosion proofing chemicals, insulators, installation and wiring hardware, aluminum tubing and plate, wire, and much, much more.

If your requirements are for a complete system, major components, or the smallest yet important piece of hardware—**ANTENNAS, INC.** has

AMPHENOL	GOTHAM
ANTENNA SPECIALISTS	HI-PAR
BELDEN	E. F. JOHNSON
BILADA	MILLEN
BIRNBACH	MINI-PRODUCTS
CALCON WIRE	MOR-GAIN
CDE ROTORS	MOSLEY
COMDEL	NEWTRONICS
CUBEX	OMEGA-T
CUSHCRAFT	POLYGON PLASTICS
DGP	POMONA
DPZ	ROHN
DOW-KEY	SKYLANE
E-Z-WAY	SWAN
R. L. DRAKE	TELREX
HAM-KITS	TIMES WIRE
HY-GAIN	TRI-EX
GENERAL ELECTRIC	TRISTAO
GENTEC	UNADILLA
GOLDLINE	VESTO
	WATERS

ANTENNAS, INC. can be your One-Stop, Single-Source! Write today for our catalog—no charge, of course.

ANTENNAS, Inc. Dept. A

512 McDonald Road, Leavenworth, Kansas 66048

1840 kc. from 7 to 9 P.M. Sat. WIMOP indicated an invitation to all WM operators on 160 meters. K1ZOH should be out of the hospital by this printing. We hope Sr. Loretta Thomas is OK. WAI1ZS reports news in from Cathedral HS in Springfield. WA1DNB is settled in Belchertown and is helping civil defense communications. Also, he is EC there. Appointments: WA1DNB and K1ANF as ECs. Endorsed: K1SSH as EC, K1SSH as ORS. K1BVV has a TA-33 and a rotor. W1GUI has a new shack complete with carpet and plush chair, maps and charts, a new receiver and beam outside. Ellis is looking for a 6-meter s.s.b. rig. K1DPP still needs Delaware and Maryland on 6 for the Worked All States East of the Mississippi on Six award. Traffic: W1EOB 176, W1ZPB 146, W1BYR 109, W1HH 107, W1DW 95, W1STR 63, K1WZY 46, W1KK 40, W1HC 20, K11JV 12, WAI1ZS 8, W1HRC 4, W1UPL 4, WA1DNB 1.

NORTHWESTERN DIVISION

ALASKA—SCM, Albert F. Weber, KL7AEQ—KL7-FJW reports that 10 members of the Arctic Club upgraded licenses this year. We do not seem to have the number of people from the CB club who did the same, but it's been at least 15, so things are looking up. KL7FKO reports that transistorized 2-meter gear is looking like go, so he will be airborne soon. With the ice road north out of Livengood, the Arctic Club is planning a winter Field Day sometime, north of the Arctic Circle. Sure wish it would be usable in the summer, but then there wouldn't be much accomplishment I suppose. In fact, it's been several years since we have had winter Field Day, even around Fairbanks. How does an all-Alaska winter Field Day sound to people? Would like to hear any comments, and we can sure have one next year. Traffic: KL7CAH 136, KL7FKO 14.

IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC: K7THX. The FARM Net convenes week days on 3935 kc. at 0200 GMT. The Idaho C.D. Net convenes week days on 3991 kc. at 1515 GMT. W4THOX is moving to Alaska. W7AXL is helping boys and girls to become hams and reports one new Novice since the first of the year. W7IMH has been appointed EC for Ada County and W7DQU has been appointed EC for Bonneville County. W47BDD operated 12 hours during the SET. W7FIS has been appointed ORS and OO. K7KRO is recovering from a serious illness and has been discharged from the hospital. A ham station has been set up in the Lewiston Highway Department fallout shelter. FARM Net report: 20 sessions, 699 check-ins, 328 traffic handled. Traffic: K7KBX 480, W47BDD 113, W7AXL 33, W7ZNN 30, W7GHT 23, K7OAB 20, W47GJE 16, K7JSL 13.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE. RM: W47DMA.

Section Nets	Freq.	Time	Day	QNI	QTC
Montana Traffic Net	3910 kc.	0100	M-F	680	83
Montana PON	3950 kc.	0245	D	435	142
Montana Section Net	3950 kc.	1700	Sun.	42	4

Appointments: W7IMZ as Missoula EC; W47JWF as OPS. Most of the active radio clubs in the state are getting set for the upcoming Field Day to be held in June. Get your group out and join in the fun. W47IZR is now on with an 8B-101 and has a fine signal. W47HDD is very active on 75. Lee is an NCS for the PON in the state. K7PWF spent some time in the Seattle area putting an FB mobile signal back into the state. K7OZY is back in the state and will be on the air soon. K7CCZ is active on 160 meters. W7CBY has finished the kit TV receiver. There still is lots of activity on 2-meter f.m. in several cities in the state, using 146.760 simplex. We still are in need of OOs and RN7 check-ins. Traffic: K7CGJ 16, W47IZR 10, W7TYN 8.

OREGON—SCM, Dale T. Justice, K7WWR/W47KTV—RAM: W7ZFH. PAM: K7RQZ. Section nets:

Net	Time	Days	Freq.	Mgr.
BSN	0030/1900Z	Daily	3875 kc.	K7IFG
AREC	0200Z	Daily	3875 kc.	K7YQM
AREC	0230Z	Tue-Sat.	145.35 Mc.	K7YLA, W47DLE
ON	0100/0200Z	Daily	3980 kc.	W7VIF
OSN	0130Z	Tue-Sat.	3585 kc.	K7GGQ
PON	0130Z	Thurs.	3920 kc.	W7MLJ

W7ZFH reports for the OSN for Feb., sessions 20, check-ins 117, high 9, traffic 64, high 9. K7YQM reports for the AREC, sessions 23, check-ins 737, traffic 45, contacts 73, QSTs 4, maximum number of counties 17. K7IFG reports for the BSN, sessions 52, traffic 176,

1969

A. R. R. L.

NATIONAL CONVENTION

JUNE 20-21-22 1969
Fort Des Moines Hotel
10th & Walnut
Des Moines, Iowa 50309

MIDWEST'S GREATEST AMATEUR RADIO ATTRACTION

PROGRAMS FOR EVERYONE
DX-FM-UHF-AM-MARS-VHF
ARRL-XYL-Eye Bank
Manufacturers Space

COMPLETE WOMENS PROGRAM
Fashion Shows
Entertainment
Luncheons • Tours

FCC Exams and Forum
Chief of NASA Communications—NASCOM
CW Contest
Special Entertainment Friday and Saturday Nights

SUNDAY BANQUET
speaker . . .

SENATOR BARRY GOLDWATER, K7UGA
GET-TOGETHERS • RAGCHEWS • FELLOWSHIP
DISCUSSIONS and MUCH, MUCH MORE!

Attendance by Registration Only

REGISTRATION \$6.00 • ENTERTAINMENT \$6.00 • BANQUET \$6.00 PRE-REGISTRATION PACKAGE \$15.00 PER PERSON IF MADE PRIOR TO JUNE 10, 1969. WRITE CONVENTION '69, BOX 1051 DES MOINES, IOWA 50311.

For Room Reservations, contact Hotel Fort Des Moines • Clip and Return for pre-registration Prior to June 10, 1969



.....

Name _____ Call _____

Wife's Name _____ Call _____

Address (Street) _____

(City and State) _____ Zip _____

Registration \$6.00 • Entertainment \$6.00 • Banquet \$6.00 • Pre-Registration Package \$15.00 per Person
ATTENDANCE BY REGISTRATION ONLY

Make check payable and mail to: CONVENTION '69, Box 1051, Des Moines, Iowa 50311

how often could you have used...

a Seizer

two-position
snap-lock

**Handy as an
extra hand or helper.
Clamps lightly or tightly ...
for moments or minutes.**

A remarkably versatile tool with unusual holding qualities. Clamps tightly. Holds wires for soldering, acts as a heat sink, retrieves small parts from hard-to-reach places. Two-position snap-lock. Box joint construction. Precision machined from perfectly tempered stainless steel.

4 MODELS: 6" (serrated jaws) Nos. 42H straight and 43H curved nose; 5" Jr. (smooth, slim jaws) Nos. 32H straight and 33H curved nose.

XCELITE

XCELITE, INC., 142 Bank St., Orchard Park, N.Y. 14127
Send Bulletin N564 on Seizers®.

name _____

address _____

city _____

state & zip _____

In Canada contact Charles W. Pointon, Ltd.

contacts 223, check-ins 1087. K7YQM is the new mgr. of the AREC Net. K7GGQ is the new mgr. of OSN. A new ham in Cave Junction is WN7LSY. The Post Office Net is looking for members. WA7JMD is putting up an 80-meter dipole. WA7KIU passed the Advanced Class exam. WA7ASP became W7NX. WA7FTN handled 585 phone patches to S.E. Asia during the month. WZUL is now in Eugene. WA7GFP reports a fine turnout for the first Valley V.I.L.F.er Picnic held in Oak Grove. Traffic: K7RQZ 635. W7WEY 146. K7IFG 108. WA7F5 76. WA7KIU 60. K7CBA 59. W7ZFH 46. WA7HKV 43. K7OUP 29. W7ZUL 28. W7AZD 24. WA7HJV 19. W7ALLJ 18. K7YQM 18. WA7BOO 14. WA7GMP 14. WA7ICD 14. K7KPT 14. W7AVW 12. K7WWR 11. WA7LXX 10. K7STG 9. W7DEM 8. W7BNS 6. K7WNX 6. W7AFQ 4. WA7EQE 4. WA7GJZ 4. W7PJO 4. WA7JMD 2.

WASHINGTON—SCM, William R. Watson, W7BQ—SEC: W7UWT. Asst. SEC: K7WTG. RM: K7CTP.

AREC	3930	Sun.	1800Z	QNI	52	QTC	8	Sess.	4
WSN	3590	Daily	0245Z	QNI	326	QTC	187	Sess.	28
NTN	3970	Daily	1930Z	QNI	943	QTC	748	Sess.	28
NSN	3700	Daily	0300Z	QNI	201	QTC	67	Sess.	28
WARTS	3970	Daily	0200Z	QNI	1086	QTC	129	Sess.	27

Governor Evans will be asked to set aside Sept. 1-7 as Amateur Radio Week for 1969. Response was good to our legislation for reducing the fees of license plates to \$5.00 from \$30.00. Contacts made to the legislators through the clubs were extremely helpful in briefing them on amateur radio's public service activities for justification of our cause. The U. of W. ARC reports new officers for 1969 are WA7JGO, pres.; WA7BAY, vice-pres.; WA7FYD, secy. A campus-wide drive for members is under way with code practice on 160 meters. The Apple City Club is planning a Ham Jamboree in June open to the public. The Washington State Hamfest plans are moving along for July. Details should be out soon. The Walla Walla Club auction will be an April event along with the Skagit Hamfest. The Spokane area should have higher licenses after the April visit of the FCC Examiner. New appointment: W7PI as OPS. W7BQ attended the Clark County Banquet as guest speaker. The N.W. Tech Net has started another series of General and Advanced Class material Sun. at 3 P.M. on 3970 kc. The BEARS started a full program of license training at all levels. WA7BDB and WA7ACQ are class instructors. WN7KWY reports the new Novice Traffic Net on 7187 kc. daily at 0930Z and invites more members. WA7JZO also is assisting in the organization. ORS W7AXT was nailed by an SM while trying to QNB Alaska. W7QE is looking for c.w. on 144 and will meet schedules on 144.040. W7ZIW is back on the traffic nets after the addition of a new jr. operator. Traffic: W7BA 3007. WA7HKK 1432. WA7BZY 887. K7UDG 482. W7DZX 480. W7KZ 274. W7PI 250. W7AXT 128. W7JWJ 121. K7CTP 118. W7BQ 117. K7XJO 82. WA7EYN 79. WA7ICW 75. W7JKY 67. WA7JEB 66. W7GVC 52. W7ZIW 47. W7GYF 41. W7IEU 29. WA7ACQ 26. W7BUN 26. W7RXH 26. WA7BDB 19. WA7JZO 15. K7OXL 15. K7MGA 14. K7TCY 14. K7SUX 11. W7APS 10. W7UUI 10. W7UWT 8. K7YFJ 7. W7ZHZ 7. K7SNG 5. WN7KWY 4.

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—Official and acting official SCM is Paul Parker, WB6DHH, 2236 Whyte Park Ave., Walnut Creek. I am now in charge of such things as the monthly report and all position-filling and if you want an appointment will be glad to give you one if you qualify. Please write and see. To those in this section who sent in reports this month you will be able to see that the post of SCM has not been vacated and that there really is such a person. WB6YCA reports that the Novice Round-up can even be fun for non-Novices and his FB total of 6836 is a testimony to that. Chuck is awaiting his Navy MARS call and looking into some RTTY gear. Can anyone in the section give this man a hand? Chuck also was in on a happy experience when his hobby helped save the life of a young child when an important blood transfusion had to be administered. W6IPW says that 20 meters has really been open during the day and working the world around is not an uncommon thing. WA6DIL reports that he is getting his feet wet in traffic nets and that some of his teachers might not appreciate them as much as he does. If you didn't see your call here where it should have been it is because you didn't send any reports to me. If you used station activity report cards, please contact me, I will be glad to send you some. Traffic: W6IPW 538. WA6DIL 165. WB6YCA 23. WB6DHH 5.

RCA has all-new FCC commercial license training

*Get your license—
or your money back!*

Now RCA Institutes Home Study Training has the FCC License preparation material you've been looking for—all-new, both the training you need, and the up-to-date methods you use at home—at your own speed—to train for the license you want!

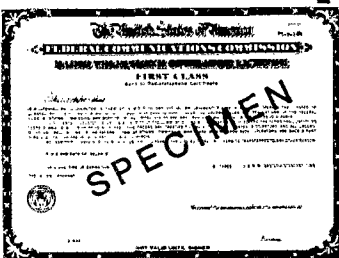
2 Convenient Payment Plans—You can pay for lessons as you order them, or take advantage of easy monthly payment plan. Choose the FCC License you're interested in—third, second or first phone. Take the course for the license you choose. If you need basic material first, apply for the

complete License Training Program.

SPECIAL TO AMATEURS. This course is primarily for Commercial License qualifications. But it does cover some of the technical material that will help you prepare for the new Advanced and Amateur Extra class tickets. Check out the information the coupon will bring you.

Mail coupon today for full details and a 64-page booklet telling you how RCA Institutes Home Training can show you the way to a new career—higher income—and your FCC License.

RCA



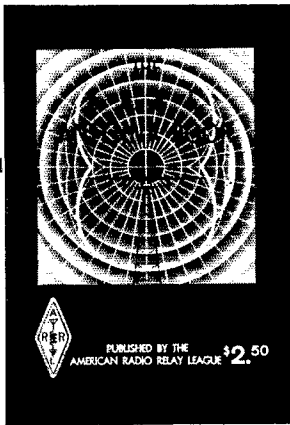
RCA INSTITUTES, INC.
Dept. BA-59
320 West 31st Street, New York, N.Y. 10001

Please rush me without obligation, information on your all-new FCC Commercial License training.

Name _____

Address _____

City _____ State _____ Zip _____



Did your antennas take a beating this winter

?

Got plans for better antennas?

Warmer weather is on the way and it's time to be thinking about repairing your antennas and building new ones.

The latest edition of the Antenna Book is jam-packed with ideas for antennas for all frequencies from simple wires to complex arrays. Get a copy of *The ARRL Antenna Book* and make use of the latest in antenna information and ideas.

\$2.50 U.S.A.

\$3.00 Elsewhere

AMERICAN RADIO RELAY LEAGUE

Newington, Connecticut 06111

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6GHZ. PAM: W4UAF/KH6. RM: KH6AD. V.H.F. PAM: KH6EEM. QSL Mgr.: KH6DQ. RACES Nets: (40, 10, 6, and 2 meters) Coordinate with KH6AIN.

Nets	Freq.(Mc.)	Time(GMT)	Days
Friendly Net	7.290	0700Z	Wed.
PACIFIC Interisland Net	14.320	0830Z	M-W-F
Boy Scout Ham Radio Net	21.360	1800Z	Sat.
S.E. Asia Net	14.320	1200Z	All
Marianas Islands Net	3.850	0830Z	2, 3, 4 Tue.
Gecko Net (Marianas Is.)	14.240	0930Z	Tue. & Thurs.
Pacific DX Net	14.240	0700Z	Fri.
Marine Corps Net	21.380	1900Z	All
Confusion Net (Phone Patches)	21.400	0200Z	All

Plan your Mainland vacation to include the 1969 Pacific Division Convention June 13, 14 and 15 at the El Dorado Hotel, Sacramento, Calif. League Hq. speakers, ARRL/DX/MARS/QCWA/TFC/VHF/WCARS, mobile judging, contests, FCC exams, YL programs, displays and tours of Sacramento, to name a few events. Interested persons should write to Convention Committee, 4100 Worthing Drive, North Highlands, Calif. 95660, for details and reservations. W4ZZ was in town recently and looked up W6WGB, who arrived on the Liner *President Wilson*. Ex-KS6BR is now signing W4RUU. Some of the Honolulu Sideband Club gang went to KH6AFG's place after the formal Pizza-in at Shakey's/Keeaumoku. KH6GND now Advanced Class, is on with a Collins S/Line to a vertical. KH6OO is on with a new Swan 500C. K1PND/KH6LJ/1, will be back in Japan this summer signing KA21J. KH6FQE, ex-KH6NEZ has had the DX bug of late. KH6FRI is also signing VETCBB. Seen at the DX convention in Fresno in Jan. were KH6AA, KH6FRI, KH6GHC and ex-KH6EPW, now W6QY. KH6BJ/6 sails a nice signal into the islands on 20 and 40 meters too.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. W7TVF worked WAS on c.w. with two-letter calls, and will continue to schedule anyone stateside or DX needing a Nevada contact. WA7BEU was elected Boulder City Rotary pres. WA7KQJ reports activity from Lander County. The K7UGT repeater lost its antenna in a recent ice storm. Novices were reported in the majority in participation of the Reno SET. The SARS has 30 students enrolled in the amateur radio code and theory class at the U. of Nevada, Reno. WA7HXO, repeater of the Las Vegas Repeater Assn., is operational from Mt. Diablo (Potosi) 5 miles northwest of Goodsprings. A.B. 36 was signed into law by Governor Laxalt after being amended so as to not affect Nevada amateurs in securing their call-letter license plates. A vote of thanks to the many who took such quick action and provided assistance. W7DDB repeater 146.34/146.94 now has another feature, 52.525/52.525 and 52.525/147.84 Mc. WA7LWT, ex-K4LHP is active on 2-meter i.m. and WA7BQY has his Extra Class license. W7CTK's new QTH is Parhump. W7PRM has rebuilt his RTTY TU and reports FB print on a model 15. The a.f.s.k. unit in QST has created lots of interest and should provide for more 2- and 6-meter a.f.s.k. K7ICW reports back on the air and is active after a month's diagnostic trouble with his h.f. exciter for v.h.f.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—Feb. was a rough month for Sacramento Valley with all the rain in the valley and snow in the mountains. WN6FHN, active on 80 meters from Lake Almanor, says he had to switch over to an inverted Vee since his vertical antenna is getting covered up by all the snow. K6RPN, in Grass Valley, rebuilt his c.w. rig with break-in. WB6VSC has been busy looking for California counties. WB6EAG will be operating from Central France during Aug. with the call F6MR. W6DOR, our Pacific Division Convention chairman, has been so busy that it has left him little time for operating; and to top it off, Ev lost his 6-meter quad in a 70-m.p.h. wind! WA6CXB has been busy constructing a small 420-Mc. transceiver. New officers of the Nevada County ARC are W6NDT, pres.; K6RPN, vice-pres.; K6FJ, secy.; W6GCSM, treas. New officers of the Oroville ARS include WB6FMI, pres.; WN6GKY, vice-pres.; W6SLS, secy.; W6DHI, treas. W6SIG now has a new first-class QTH. Don't forget to make your reservations for the convention to be held this June in Sacramento. Traffic: (Feb.) W8VDA/6 257, WB6MAE 44, WA6RBD 22, K6YZU 21, WB6VSC 18, WB6WJO 18, W6LNZ 10, K6RPN 8, WB6EAG 2, (Jan.) K6YZU 35, W6LNZ 4, (Dec.) W6LNZ 70.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6WLV. WA6JUV is installing a new beam to help in his v.h.f. work. He has 40 states confirmed on

Great things

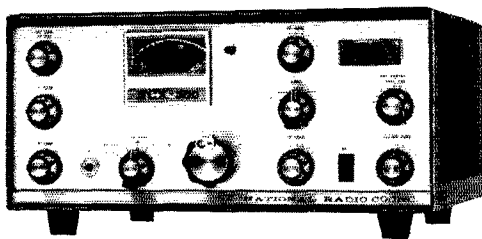
from NRCI

the Great Transceiver

NCX-500

Here's the potent 5-bander with a 500-Watt punch. Check the terrific features on this low-priced performer:

- 500-Watt PEP input on SSB, grid-block keying on CW and compatible AM operation.
- Sidetone monitor, plus built-in code practice oscillator.
- Receive vernier, with tuning range greater than ± 3 kHz.
- Separate AM and product detection.
- Fast-attack/slow-release AGC in all modes.
- Crystal-controlled pre-mixing with single VFO for effective frequency stability, plus identical calibration rate on all bands.
- Crystal lattice filter for high sideband suppression on transmit, and rejection of adjacent-channel QRM on receive . . . plus solid-state balanced modulator for "Set-and-Forget" carrier suppression.

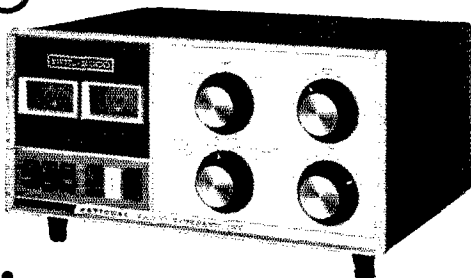


the Rockcrushing Linear

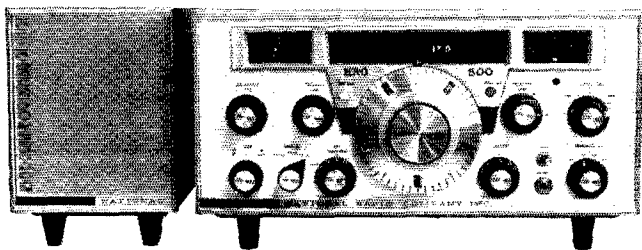
NCL-2000

Check this full legal power, completely self-contained desk-top linear amplifier for the 80 through 10 meter bands. 2000 Watts SSB PEP. The NCL-2000 can also be operated on CW, AM, or RTTY at 1000 Watts DC input.

- Built-in power supply and cooling fan.
- Equal power output on all bands, 80 through 10 meters.
- Most complete safety and overload protection, including 1-minute time delay relay, overload relay, lid interlock, and automatic shorting bar.



the Classic Receiver HRO-500



No other amateur receiver can come close to the performance of the HRO-500, with the widest frequency range and greatest performance of any general coverage receiver ever built:

- 5 kHz through 30 MHz frequency range, in five main bands (60 500-kHz sub-bands) with 1 kHz calibration accuracy on 1/4 inch per kHz dial.
- Passband tuning for SSB and CW operation.
- All solid-state for high reliability, portability, low power requirements, and absolutely cool operation.
- Phase-locked frequency synthesizer for superior stability and overall calibration.
- AGC threshold control to knock out background QRM.

For complete details and specifications, write:

NATIONAL RADIO COMPANY, INC.

NRCI

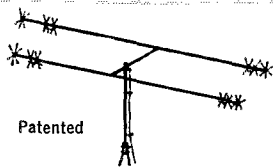
37 Washington St., Melrose, Mass. 02176
Telephone: (617) 662-7700 TWX: 617-665-5032

Now... 2000 Watts P.E.P.

Full Power/Minimum Size

FOR APARTMENTS • SUBURBAN HOMES

Marine and Portable Operation
Packaged for APO and FPO Shipping



6-10-15-20 METERS

The time proven B-24 4-Band antenna combines maximum efficiency and compact design to provide an excellent antenna where space is a factor. New end loading for maximum radiation efficiency. No center loading.

Bands	6-10-15-20 Meters
Power Rating	2000 Watts P.E.P.
El. Length	11'
Turn. Radius	7'
Total Weight	11 lbs.
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

Model B-24
Net \$59.95

MULTIBAND COAXIAL ANTENNA for 6-10-15-20 METERS

Needs no ground plane radials. Full electrical 1/2 wave on each band. Excellent quality construction. Mount with inexpensive TV hardware. Patented.

Power Rating	2000 Watts P.E.P.
Total Weight	5 lbs.
Height	11'
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

Model C4 Net \$34.95

Send for Free Brochure if there is no stocking distributor near you order direct from factory. We pay shipping to your Qth if in Continental U. S. A.

Mini-Products, Inc.

1001 W. 18th Street • Erie, Pennsylvania 16502

• LEADERS IN COMPACT ANTENNAS •



HANDY DANDYS FOR SMALL PARTS STORAGE

Handy Dandys are sturdy, plastic caps that snap into 1/8" peg-board and hold quarter-twist baby food jars. Ideal for storing all kinds of small parts and things. Keep your workshop neat. 8 for \$1 — 36 for \$3.50 — 72 for \$6 — 500 for \$36.50. Handy Dandys only. No jars. Shipping paid anywhere USA. Send payment with order — no C.O.D.'s!

WICKLIFFE INDUSTRIES, INC.
P.O. Box 286, Dept. QT5, Wickliffe, Ohio 44092

6 meters. WA6ALK is mostly on 2 meters these days. W6EAJ, from the wilds of Humboldt County, finds the Grand Pappy Net on 160 meters his biggest activity. K6TJWJ still is the mainstay on the Golden Bear Net. W6WLV and W6BWV are on the NCN along with WA6BYZ, with Humboldt, Sonoma and San Francisco Counties covered, someone is needed in Marin for an NCN outlet—3635 kc. at 0300Z daily. W6BJQP got in some traffic work while at home. K6SRM is turning out a newsletter for the Valley of the Moon Radio Club. Officers of the Valley of the Moon Club are WB6KMI, exec. vice-pres.; K6SRM vice-pres.; WN6NQZ, treas.; WN6PQV, secy. The Tamalpais Radio Club now meets at the Bethel Baptist Church on West Novato Blvd. the 3rd Fri. W6RQ came up with a score of 0.4 parts per million in the Feb. FMT. W6HSA, editor of the *San Francisco Club Bulletin*, has been in the hospital. W6RQ seems to be our most active OO. The Marin Club's theory classes, conducted by WA6CKF, have been well attended. W6AEY, in Loleta, handled some traffic. W6NHF is interested in a weekly net for the Redwood Empire Region. New AREC members in the Willits area are W6AEV and WA6UHR. W61VS at Ft. Bragg, is an Asst. EC. W6BCIE has her beam up again. W6BUY has located in Marin and is looking for some DX. After a long absence, the *San Francisco Courier* surfaced in Mar. again. Traffic: WA6BYZ 377, W6WLV 227, W6AEY 29, WA6AUD 21, W6BJQP 18, W6BWV 16, K6TJWJ 12, W6NHF 5.

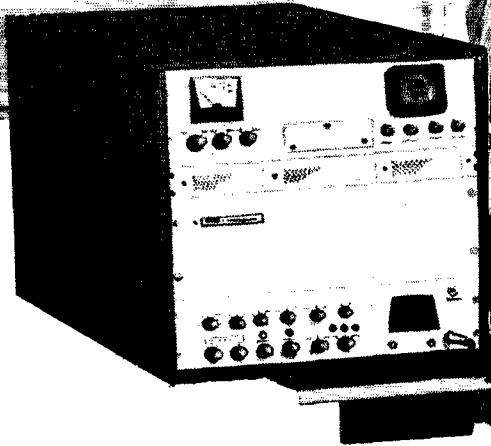
SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—The Turlock Amateur Radio Club held its 40th anniversary meeting Feb. 14 with 74 in attendance. W6JUK and W6JPU were among those attending. The Delta Amateur Radio Club's new officers are WB6SUP, pres.; W6SPT, vice-pres.; W6OPQ, secy.; K6ANV, treas. The club meets the 3rd Wed. of each month, usually at the Dan Webster School. W6LLR received the Boner Award from the Tulare County Amateur Radio Club. WA6NRV is working on 2 & 8 s.s.b. equipment. W6UEN is on 2-meter 1.m. mobile. W6CD is heard on 75-meter s.s.b. W6DPD has a Com IV 6 & 2 rigs. W6OHT is operating without a final—it burned up. W6BQG has a Galaxy GT-550. W6JUK has a Clegg Zeus. WA6GQP has an HRO-50T. W6DCP is on all bands with a B7I amplifier. K6QOG is on the air with an HT41 amplifier. W6JPS bought a new call book. W6ZTY is on the air with a GT-550. W66MWY is using a GT-550. W6ZBX is on with an HT-32 and an SX-101. W6UTU is NCS of the TARS Net. WN6PRO is on 80 cw. W6GOJ and W6BRZI are active on 2-meter MARS. WN6FDM blew up his rig while trying to load it up. K6KOL was nearly flooded out of his shack. Traffic: W6WGR 326, W66HVA 263, WA6SCE 138, W6ZBX 35, K6KOL 33.

SANTA CLARA VALLEY—Acting SCM, Albert F. Gaetano, W6VZT—SEC: W6VZE. RM: WA6LFA. Many thanks to all the sleuths who found out that I was acting as SCM until an election can be held. I really appreciate those reports. K6BGM has recovered from the flu. At least her OM, Director Gmelin, hopes so. W6AUC is continuing his heavy phone patch traffic with the Pacific Islands in addition with his reappointment as secretary of the Norcal chapter of QCWA. Congrats, Russ. W6ZSE is building an SB-101 kit. W6DEF and his XYL are making plans for a living trip to Japan and plan to stop off at Hawaii on the way. W6RSY again had the largest traffic total for the month. As reported by many, the QCWA Dinner in Feb. was a great success. W6BPT has been working DX on 40 meters. W6FCF gave a fine talk on his a.f.s.k. at the Feb. SCARA meeting. WA6HVN has been real busy with the Red Cross because of the rain. Hal, W6BDWX and W6MIKE spent two days and nights handling traffic for an evacuation because of the flood. W6VZT gave a talk at the SARO Dinner Meeting on how to select a receiver. W6YHM gave a talk at the West Valley Club on earthquakes and the communication problems associated with them. W6TKT had his antenna blow down in one of the recent storms. Traffic: W6RSY 710, W6YBV 316, WA6LFA 155, W6DEF 128, W6ZSE 28, W6ATC 20, W6VK 18, W6ZRJ 10.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: James O. Pullman, W4VTR. SEC: WA4LWE. RM: W4IRE. PAM: W4AJT. V.H.F. PAM: W4HJZ. The Raleigh Amateur Radio Society was organized recently with seventeen members to date. At the kick-off meeting the following officers were elected: WA4PEN, pres.; WA4ZZN, secy.; K4CIA, treas.; WA4OTA, legal advisor. The Robeson/Bladen County ARPS Net has been reactivated on 145.230

The CAI Reliabes in Action...

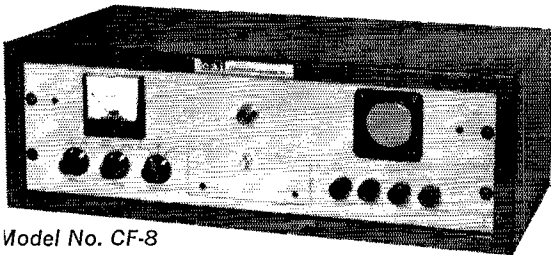


New from CAI SOLID STATE FSK CONVERTER / KEYSER

converts existing SSB units to both voice and "hard copy" RTTY

■ built-in oscilloscope simplifies tuning of radiotele-type signals ■ automatic mode selection reduces detrimental effects of selective fading ■ mark hold circuit prevents machine from running open when no signal is present ■ internal service adjustments concealed behind hinged front panel, eliminates tampering ■ reliable, high quality chassis fits standard 19" rack—desk top cabinet style optional

From CAI—the specialists in SSB systems and col-lateral equipment—comes the new Model CF-8, ca-pable of rapidly converting your conventional SSB radio to radioteletype. *With no modification required for CAI transceivers.* Specially designed for light duty RTTY, the CF-8 has many applications including pet-roleum data transmission from offshore oil rigs... shipboard use where "hard copy" of traffic is a must, and unattended operation an asset... aviation cir-cuits handling flight, weather and operational data... and others. Latest state-of-the-art transistorized cir-cuitry and many exclusive CAI innovations assure high reliability performance, automatic conven-iences, and quality well beyond the modest cost. If you need the facility of "hard copy" added to your voice communicators—the CF-8 is for you.



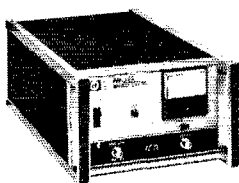
Model No. CF-8

Write or call for Bulletin. Communication Associates, nc. 1208 Third Ave., New Hyde Park, L.I., N.Y. 11040. Telephone: 516-488-2323. TWX: 510-223-0400.



SINGLE SIDEBAND GROUND STATIONS ■ VHF & UHF GROUND-TO-AIR TRANSMITTERS & RECEIVERS ■ LOW FREQUENCY NON-DIRECTIONAL BEACON TRANSMITTERS ■ REMOTE RECEIVING SYSTEMS ■ HIGH POWER POINT-TO-POINT SIDEBAND SYSTEMS ■ ADD-ON ACCESSORIES ■ CUSTOM CONTROL CONSOLES

80 MHz WIDEBAND RF POWER AMPLIFIER



MODEL RF-805

- 10 Watts Output into 50Ω
- 0.1 Volts In — 22.5 Volts Out
- .05 MHz to 80 MHz Broadband
- Low Distortion
- Solid State
- Flat 47 db Gain

The RF-805 is a solid state amplifier, broadband from .05 to 80 megahertz, which produces ten watts with — 30 db harmonic and intermodulation distortion. Lower distortion is available at lower output levels. Gain is 47 db minimum, constant within 1 db, so that full output is developed with less than 0.1 volt at the 50 ohm input. Accurate output metering and overload protection is provided.

The RF-805 will raise the power of most manual and swept tuned signal generators and thus extend the usefulness and versatility of available signal generators. Receiver testing, wattmeter calibration, antenna testing, RFI testing, attenuator measurements, and filter and component testing will be aided with the use of this equipment.



R F COMMUNICATIONS, INC.

1680 University Avenue • Rochester, N. Y. 14610

RADIO HANDBOOKS

• **BEAM ANTENNA HANDBOOK** by William Orr, W6SAI. New edition. Theory, design, construction and the installation of rotary beam antennas! SWR data! Multiband beams, 40 meter beams, 20 meter DX beams! How to make your beam work! 200 pages. \$3.95

• **VHF HANDBOOK** by Orr, W6SAI and Johnson, W6QKI. First complete Handbook covering the VHF spectrum! Many VHF construction projects! Design and construction of VHF transmitters, receivers and antennas! Make your VHF station work! \$3.75

• **ELECTRONIC CONSTRUCTION HANDBOOK** by Robert Lewis, W8MQU. All about design—construction—layout and testing of electronic equipment. Non-technical guide for kit-builders and your best key to better performance of your equipment! \$2.95

• **ALL ABOUT CUBICAL QUAD ANTENNAS** by W6SAI. Construction and tuning data. Multi-band Quads. Charts, drawings and photos for your Quad. Full complete data on home-made Quad antennas. The new X-Q Quad. \$3.95

• **5-9 SIGNALS** by William Orr, W6SAI. Inexpensive DX antennas for your station! Multiband ground plane, \$5 beam antenna, 2 and 0 meter beams, Demi-Quad beam, and others! \$1.00

• **NOVICE & TECHNICIAN HANDBOOK** by W6SAI and W6TNS. All about amateur radio in nontechnical language! How to learn the code. How to assemble your ham station. Transmitters! Receivers! DX! How to Get QSL cards. \$2.95

• **BETTER SHORTWAVE RECEPTION**, by Wm. Orr, W6SAI. Your introduction to shortwave radio. How to hear DX. How to buy a receiver. Amateur radio. How to align your receiver. Antennas! QSLs. Getting your ham license. \$3.25

At your radio dealer now!

Add 15¢ per order to the publisher:

RADIO PUBLICATIONS Inc., Wilton, Conn. 06897

Mc. according to EC W4EVN, who made BPL in the traffic department of ARPSC. K4EO says he just got his 50th state confirmed for WAS. WA4KWC has been busy running p.p.s. on 15 and 10 meters. K4TT reports he has finally picked up WAC. K4CIA has been appointed Official Observer.

Net	Freq.	Time	Days	QTC	Mgr.
THEN	3923 kc.	0300Z	Daily	185	W4ZZC
NCN(E)	3573 kc.	0000Z	Daily	121	W4JRE
NCN(L)	3573 kc.	0300Z	Daily	53	W4JRE
(Late, Jan.)					
NCN(L)	3573 kc.	0300Z	Daily	20	W4JRE

Traffic: (Feb.) W4EVN 603, W4IRE 183, K4VBG 1, W4FDV 60, K4EO 45, W44QC 34, W44VNV, W44GMC 25, W44KWC 25, W44JT 22, K4PKE, W44AKX 18, W4VTR 17, W44TV 17, W44CO, W4BGHK 5, W4B4ZE 4, W4BDPI 4, K4TTN, W44RVI 3, (Jan.) W4RWL 69.

SOUTH CAROLINA—SCM, Charles N. Wright, W4PED—SEC: W4AECJ. RML: K6QPH/4. PA: W4BZA.

SCPN 3930 kc. 0830 and 1530 EST Sun. 12 Noon D. SCN 3795 kc. 2345Z and 0300Z Daily Feb. Tfc.: SCSSBN 3915 kc. 0001Z Daily Feb. Tfc.:

W4BJE, an old-timer on SCN, is handling traffic again. W4IKU, in Spartanburg, is now K4IL. W4MCI is QSOing on 3710, 3725 and 1710 kc. in Spartanburg. W4NTO reports that a typing error by the Feb. FMT for him, K6QPH and family will be departing for California and home shortly. W44ZE, W44ICE, W44DOT, W44HFA and W4FV are taking the Amateur Extra course at Greenville Tech. W4AMR is mobile from Anderson. Dates to remember: SSB Net Dinner in Greenville May 3 and Hamfest May 4. Section Meeting in Columbia May 31 at Columbia Hamfest June 1. Traffic: K6QPH/4, K4BSS/4 67, W4PED 38, W4NTO 29, K4QMK, W4FVY 10.

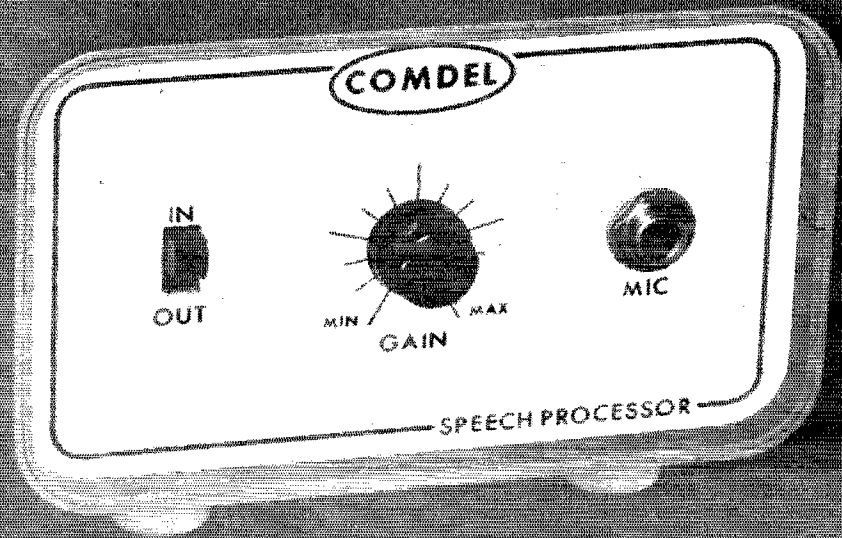
VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB. PAM: W4OKN. RMs: W44EUL, K4MWB4DRB is being heard on VN and VSN with 1-watt QRP rig. W4OKN issued VSN certificate to W4SQQ and K4VCY. Congrats to W4YZC and on the new baby in Feb., OM type. W4JUI may have a record for the number of different contests & QSO parties he participates in. The Roanoke Hamfest will be held the last week end in May. See you there? W4UQ finds DXing good on the low end of meters. W4SQQ has relieved K4KNP of an NCS slot on 4RN and made the BPL in Feb. K6ZQB/4 is active from Annandale and has received his Advanced Q license. K4KNP sends ARRL Bulletins on c.w., W4 and W4BDOY on phone. Listen for them on or near net frequencies. Virginia nets will continue to meet at same local times during Daylight Saving Time. This is one hour earlier on GMT, however. Frequencies: 3680 3935 and 3860. Traffic: (Feb.) W4SQQ 519, W4211, W4NLC 200, K4KNP 194, W4BCVY 140, W4140, W44EUL 119, W4F4DT 113, K4KDJ 109, W4R32, W44OHZ 77, W4ZM 68, W44SJT 67, K4FSS, W4B4GTC 66, W4BDOY 61, W4OKN 58, W4B4DRB, W4SHJ 53, K4JM 49, W44JFP 36, W4BGDO 34, W4B432, K4MLC 22, W4THV 23, W44JFT 22, K4TJSJ, W4KX 19, W41A 18, K4GR 16, W4YZC 16, W4JUI, K4VCY 11, W4F4JJ 10, W4B4FLT 10, W44YBV, W4MK 5, W44WQ 5, W4OP 4, W4WG 4, K4LME, W44YRH 2, (Jan.) W4UQ 390, K4TJSJ 92, W4MIX, 78, W4B4FLT 14.

WEST VIRGINIA—SCM, Donald B. Morris, W8JF SEC: W8EV. RMs: K8MYU, K8TPF, PAMs: K8CF, W8LYD. Net Mgrs.: K8MYU, W8YOF, W8VNC. Meets on 3570 at 0001Z. Phone on 3890 at 2300. W8AKM, with a new four-element quad, worked new countries on 15. W8HZ3 is going mobile with SB-101, W8EQG, W8ASPO, W84SUU, W84YU, W8BEO, W8APDJ and W8Z0J keep W. Va. 4 Club station W8AHZ active. K8QEW operates RT on 80. The WVN C.W. Net, with 28 sessions and stations, handled 88 messages. The Phone Net in sessions with 833 stations, passed 181 messages. Opegun Radio Society and Mountain State Transmitters of Martinsburg and Elkins are starting code and theory classes. W8BBG has a new 70 high antenna. W8EV has an HA-14 mobile in effect from Florida into the WVN phone net. San Diego celebrates West Va. Week July 7 to The Greenbrier ARC of Lewisburg celebrated Novice graduation with a dinner meeting. K8H

For optimum voice power and clarity

Simply connect the Comdel CSP-11 between your audio source and equipment and get instant voice clarity with a 10 dB increase in talk power. Unlike conventional speech processors the CSP-11 tailors the audio bandwidth and introduces no harmonic distortion. It is equally effective in Audio AM, FM and SSB systems. For further information call or write.

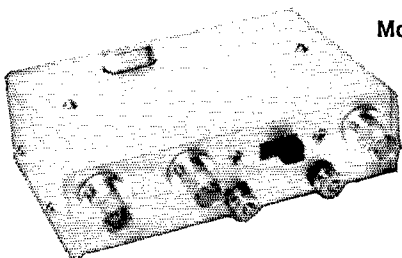
MODEL CSP-11
PRICE \$120



**COMMUNICATIONS
EQUIPMENT**

beverly airport, beverly, massachusetts 01915
tel. (617) 927-3144

... "THE BEST"
**2 METER
 CONVERTER**



Model 407
\$34.95
 ppd.

144-146 MHz in. 28-30 MHz out
 or 146-148 MHz with a second crystal

A full description of this fantastic converter would fill this page, but you can take our word for it (or those of hundreds of satisfied users) that it's the best. The reason is simple—we use three RCA dual gate MOSFETs, one bipolar, and 3 diodes in the best circuit ever. Still not convinced? Then send for our free catalog and get the full description, plus photos and even the schematic.

Can't wait? Then send us a postal money order for \$34.95 and we'll rush the 407 out to you. NOTE: The Model 407 is also available in any frequency combination up to 450 MHz (some at higher prices) as listed in our catalog. New York City and State residents add local sales tax.

VANGUARD LABS

Dept. S-5, 196-23 Jamaica Ave., Hollis, N.Y. 11423

**NEW
 from
 NRI**

**Home
 training in
 AMATEUR
 RADIO**

NRI, leader in Communications, Television, Electronics and TV-Radio home training, now offers the first in Amateur Radio courses, designed to prepare you for the FCC Amateur License you want or need.

Don't lose your favorite frequency

The FCC has said "either-or" on licensing, but to pass Advanced and Extra Class exams, you need the technical guidance as offered by NRI. NRI Advanced Amateur Radio is for the ham who already has a General, Conditional or Tech Class ticket. Basic Amateur Radio is for the beginner and includes transmitter, 3-band receiver, code practice equipment. Three training plans offered. Get all the facts. Mail coupon. No obligation. No salesman will call on you. NATIONAL RADIO INSTITUTE, Washington, D.C. 20016.



..... **MAIL NOW**

• NATIONAL RADIO INSTITUTE 50-059
 • Washington, D.C. 20016
 • Please send me information on Amateur Radio training.
 • Name _____ Age _____
 • Address _____
 • City _____ State _____ Zip _____
 • ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL
 •

moved to Fairmont. W8DUV publicized the Roanoke Division Convention at Huntington Oct. 11 and 12 at the LO meeting in Greensboro. The Northern PanHANDLE ARC of Wheeling will hold its Annual YL-OM Dinner in mid-May. Remember the State Convention at Jackson's Mill July 5 and 6. Traffic: W8AHZ 121, W8BBBG 73, W8BWIX 67, W8BYHH 56, W8HZ 54, K8IYU 51, W8YOF 40, W8CKX 32, W8JM 20, W8DUV 15, K8JEW 11, W8CWY 10, W8RQB 7, W8EV 6, W8LFW 6, W8QOB 6, W8ANDY 5, W8YMD 3, W8YSS 3, W84GCK 3 2, W8AEN 2, W8WCK 2, W8WEL 2, W8WMA 2, W8WFR 2, K8ZDY 2, W8ZNH 2, W8LAL 1, W8LRF 1, W8QEC 1, K8QYG 1, W8THX 1, W8TWR 1, W8UFX 1, W8UNP 1, W8VOL 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Charles M. Catterell, W0SIN—Appointments are being renewed and new requests being received and they will be announced as soon as possible. Please let me have your traffic count and news as soon after the first of the month as you can. SET reports were received from ECs K0SPR (with newspaper article), W0GVT and K0LPI, with W0FA, W0GCH, W0YCD, K0TIV, K0WGC also sending in some dope on this test. K0TIV sports a new TR-4 W0LRN is working on a linear. W0WYX reports that the Forest Service intends to rebuild the lookout tower at his QTH. Colorado Code Net (CCN) invites all who wish to QNI at 0130 GMT, 3780 kc, every night. Hi-Noon Net meets every day at 1900 GMT or 7240. Colorado Emergency Phone Net meets Sun. at 1500 GMT, 3945 kc, and the Colorado Weather Net at about 1630 GMT on the same frequency. The Columbine Net meets at 0200 GMT daily except Sun, local time on 3989 kc. Reports, news and comments are solicited and we hope to fill the column next time. Traffic: K0JSP 134, W0AMNL 94, W0KAU 89, W0LRN 74, K0MNQ 61, W0WYX 52, W0UAT 40, W0SIN 26, K0TIV 26, K0ECR 19, W0LCE 13, W0LRW 5, W0SIZ 1.

NEW MEXICO—Acting SCM, James R. Prime, W8NUI—SEC: W5PNY, PAMs: W5DAG, W5FPL OO: W6QNJ, RM: W5FJK, ORS: K5MAT, OPSs: W5BWY, W5MIY, W5PNY. Thanks to W5WZK for his service to the state and we are sorry other obligations required his resignation as SCM. Several southern New Mexico amateurs upgraded licenses during the Feb. FCC exams in El Paso. Your Acting SCM retired from the Air Force and moved to Los Alamos Mar. 1. Thanks to the excellent support of state nets and the mobile rig, information was collected for this report. The New Mexico Net (NMN) 3760 kc, 0200Z, Tue.-Sat.) has made substantial gains in activity—19 net sessions, QNI 109, QTC 86, W5OTO, W5A5UJ and K5MAT are commended for sustained net activity. Traffic: W5A5UJ 155, K5MAT 96, W5DMC 36, W5AJNC 20, W5NON 8, W5TFRV/5 8, W5MJCX 4.

UTAH—SCM, Thomas Miller, W7QWH—SEC: W7-WKFP, RM: W7OCX. Remember the Rocky Mountain Division ARRL Convention will be held in Salt Lake City July 4, 5 and 6. Keep that date in mind and plan to attend. An outstanding program is being arranged with plenty of activity for YLs. Make it part of your vacation this summer. OO K7ZJS participated in the Frequency Measuring Test on Feb. 8. Stan is aiming at the Class I OO appointment. W7AKUW now has a tri-band quad up 75 feet. W7LQC has been awarded the Beehive Utah Net certificate No. 06. W7LQC is the Army MARS station at Defense Depot in Ogden. The section now has no ECs. All appointments are maintained on the basis of activity determined by monthly reports to the SCM. Traffic: K7HLR 303, W7JSS 105, W7OCX 73, K9BLQ 2, W7AKUW 2.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NXX, RM: K7KSA, PAMs: W7TZK, K7SLN OBSS: K7SLM, K7NXX, W7SDA, K7TAQ, W7FHA Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 0130 GMT on 3610; Jackalope, Mon. through Sat. at 1215 on 7260; Wx Net, Mon. through Sat. at 003 on 3920. W7EYN, one of the oldest hams in the state passed away in Feb. Jay will be missed by many of the old-timers. K7MGM is on the air with a new transceiver. W7AUV is back on with a new rig. K7NXX was in Casper in Feb. and gave a very good talk to the club on AREC, etc. K7AHO is back home and on the air again after a vacation in Florida. K7TKF has moved to Missoula, Mont. W7KWR is on the air from his home in Worland. K7TAL was married in Feb. to the daughter of W7MZV. W7TZI has a new transceiver on the air and recently was appointed as the County Civil Defense Communications Chief by the Civil Defense Coordinator. Traffic

many have tried
but **SWAN SUCCEEDED**

a complete station
for only

\$395.00 Just hook the Model 260 to an antenna and you're on the air.



It's that simple! There is nothing else on the market comparable to the 260. Look what you get for \$395.00.

★ Complete frequency coverage on all five bands ★ 10 meters ★ 260 watts PEP
★ Built-in power supply . . . AC and DC ★ Portable . . . only 26 pounds, complete with handle, built-in speaker and mike ★ Designed and built with the same ruggedness, reliability and craftsmanship that has made Swan a household name the world over.

And coming very soon will be another star in the Swan line, the 270 deluxe. Everything that the 260 has, plus many additional features for those who can pay a little more. The 270 will sell for \$495.00, still a low price for a complete station.

And if you need an antenna, Henry Radio can make that a simple matter with its cost saving Antenna Package Program.

We know it's hard to believe, but come on in to a Henry Radio Store for a demonstration. If you can't come in . . . write or phone. We'll give you more information, terms, and will ship anywhere.

EASY FINANCING • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • GOOD RECONDITIONED APPARATUS • Nearly all makes & models. Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of NEW equipment. Write for bulletin.

TED HENRY (W6UOU)

BOB HENRY (WØARA)

WALT HENRY (W6NRV)

Henry Radio Stores

CALL DIRECT . . . USE AREA CODE

Butler, Missouri, 64730

816 679-3127

11240 W. Olympic, Los Angeles, Calif., 90064

213 477-6701

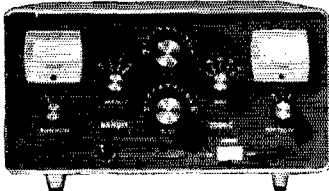
931 N. Euclid, Anaheim, Calif., 92801

714 772-9200

"World's Largest Distributor of Amateur Radio Equipment"

HUNTER

HUNTER BANDIT 2000 LINEAR AMPLIFIER



2000 WATTS P.E.P.

- DIRECT-READING WATT METER
- SELF-CONTAINED POWER SUPPLY
- CW/AM/RTTY/SSB
- ALL BANDS—80-40-20-15-10
- GRAY OR BLACK CABINETS

KIT FORM \$329.00
 (Tubes (8163s) \$60.00 pair
 WIRED AND TESTED \$535.00 Complete

Write For Details

Hunter Sales, Inc.

Box 1128E University Station
Des Moines, Iowa 50311

WRITE FOR QUOTATION

FACTORY SEALED CARTONS
FRANCHISED DISTRIBUTOR
QUICK SHIPMENT

WE GIVE DISCOUNTS ON HAM EQUIPMENT

**EDWARDS
ELECTRONICS
INC.**

1316 - 19th ST.
LUBBOCK, TEXAS
(806) 762-8759

WA7CLF 202, K7ITH 118, W7SDA 82, K7KSA 79
W7TZK 57, K7VWA 51, WA7FKF 19, WA7BDI 10
W7NKR 10, K7SLM 7.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Donald W. Bonner, W4WLG—
 SEC: K4KJD, RM: K4BSK, PAM: WA4EEC, K4WIV
 is the new EC for Morgan County. WA4OCM is the
 new EC for Lauderdale and Barbour Counties, WB4
 LAO, WA4JSM and WN4JRR/WB4LYE all have their
 General Class tickets now. Don't forget the Birming-
 ham Hamfest, which will be held at the National
 Guard Armory on Opporto St. in Birmingham May
 and 4. Let's have an eyeball. The Huntsville ARC
 doing an FB job with its monthly bulletin. It was nice
 to have W4LHW/PAOLHW back with us for a short
 visit. He is in the Netherlands. Please make your
 Field Day plans now because time is growing short
 and this year should be a big one. The Decatur ARC
 is really out to beat the HARC this year. Things are
 going to be tough. Correction: As reported in the
 Mar. column, the 0400Z session of AENB on 3575 kc
 has been cancelled—not 0100Z. Sorry 'bout that! WA4
 AZC is on with a new SB-101, WB4LHO has a new
 TR-3 and an RV-3, W4USM is OPS/ORS now
 WB4EKJ moved to the top on traffic this month
 Traffic: WB4EKJ 82, W4VEK 77, K4BSK 69, K4AO
 62, W4IKU 44, K4WVW 41, WB4KDN 28, WA4RO
 23, WA4JSM 21, K4KJD 21, WA4OCM 15, WA4AZC 13,
 WN4KSL 13, W4DGH 9, WN4JMH 9, K4UMD 7,
 K4KMG 7, WN4LHH 7, WB4DYY 6, K4ADK 5,
 WN4MIN 2, WB4LAO 1, WA4TMY 1.

EASTERN FLORIDA—SCM, W. G. Blasingame
 WA4NEV—SEC: W4IYT, Asst. SEC: W4FP, RM:
 W4ILE, K4EHY, W4RWL, PAM 75M; W4OGX, PAM
 40M: W4SDR, V.H.F. PAM: WA4BMC. Official Bulletin
 reports were received from K4DAX, K4LPS, W4
 OGX and WA4EYU. W4DUG operated portable at the
 Tampa Fair again this year. This must have set a new
 record in the number of pieces of traffic handled.
 Congratulations to all who participated. Also from the
 Tampa Bay area comes the news that K4GT is the
 pres. of the Tampa Amateur Radio Club, K4IE.
 reports he has just acquired a Twoer and should be
 active on v.h.f. soon. W4IYT and family report they
 were on vacation and toured the Kennedy Space
 Center. Those of you who did not make the Broward
 Amateur Radio Club Annual Auctionist really missed
 some good bargains. W4YNM is the new EC of
 Columbia County. He has appointed W4CYG as his
 assistant. They now have a 2-meter emergency net
 going and are getting the communications headquarters
 set up in the c.d. office. The North Florida
 Amateur Radio Society gang is busy getting the club
 station on the air and the RACES program in opera-
 tion. The club now has 2-meter f.m. and teletype
 operation and plans to have the other bands on soon.
 The 2-meter repeater is soon to be a reality here.
 Hope to see you all in Orlando. Traffic: Feb
 WA4JH 1316, WB4AIW 1121, WA4SCK 1079, K4EH
 1025, WA4NEV 499, WA4FGH 396, WB4JHW 13
 W4SDR 130, W4KRC 120, WB4IER 90, WA4HD 7
 WA4TWD 78, WB4EPD 68, W4ZAK 64, K4DAX 5
 W4FP 48, WA4CJQ 44, W4ILE 44, WA4FJA 4
 WB4FLW 40, W4EHW 39, W4SMK 39, W4YYP 3
 WB4ADL 34, K4IEC 33, W4DVO 29, W4NGR 2
 W4AKB 28, WA4NBE 27, K4LPS 26, K4QCG 2
 K4LEX 18, WA4BGW 17, W4IAD 17, W4BKC 1
 WA4EYU 14, W4TJM 13, W4BPK 12, W4IYT 1
 W4VQP 10, W4LEP 8, WB4DSP 7, WA4OHO
 WA4SM 5, W4LK 4, K4EBE 3, WB4JNL/4 3, WN4IIV
 WN4JH 1. (Jan.) W4LEP 25.

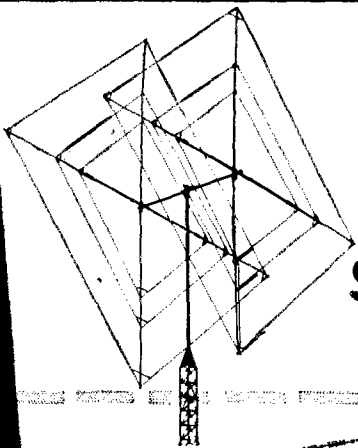
GEORGIA—SCM, Howard L. Schonher, W4RZL
 SEC: WA4WQU, RM: W4FDN, PAMs: K4HQI, W
 YDN. Apologies are due the Georgia Single Sideband
 Net. Its report was filed Feb. 5 but not delivered un-
 til the 10th. The net had a fine SET with 931 check-
 ins and 91 messages. K4HQI submitted his usual re-
 port on v.h.f. activity indicating weak openings
 50 Mc. based on many hours of patient listening
 W4LRR has a new linear on 2. WB4EYY is operati-
 ng 2-meter s.s.b. Most activity was a bit on the lig-
 side after the SET. W4LRR is holding 2-meter sched-
 ules with WA4BVW in N.C. running a 450-watt fm
 W4HYW is as active as possible when work will permit
 WB6UTC only totaled 201 because of rig trouble. F
 W4TYE has been relatively inactive because of the
 and church work. WA4UQQ lost his mother. WA4BV
 participated in the Arizona and Vermont QSO Part
 WB4GOJ is building an SB-301. Our section nets we
 active during the month with GSN handling 3
 messages with 392 check-ins for 62 sessions, while t
 S.S.B. Net had 931 check-ins handling 91 messages
 31 sessions. Traffic: (Feb.) WB6UTC/4 201, WA3RA
 125, W4FDN 112, W4CZN 102, W4PIM 85, W4NSO 1

ARROW says, "Do your thing" with **Hy-gain**

NOTE: These HY-GAIN items shipped pre-paid in the continental United States.

The Hy-Quad 3 Band/2 Element

10 Meter • 15 Meter • 20 Meter



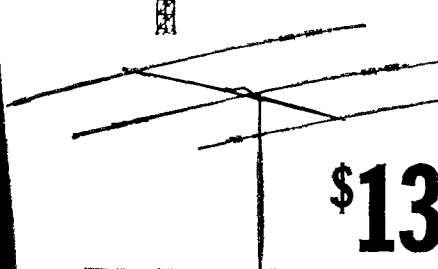
\$99⁹⁵

- Complete. Nothing more to buy.
- All aluminum structure stays up.
- Single feed line and diamond shape simplifies feed line routing.
- Heavy Cyclocac insulators.
- Individual factory pre-tuned gamma matches for each band.

New, improved, super 3 Element THUNDERBIRD

Model TH3Mk3

10 Meter • 15 Meter • 20 Meter

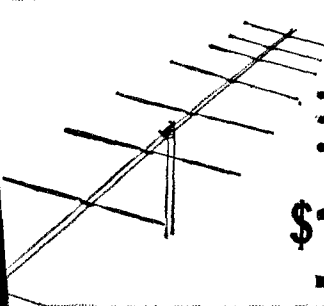


\$132⁹⁵

- New "Hy-Q" Traps
- High Forward Gain
- High Front-to-Back Ratio
- Takes Maximum Legal Power

Hy-Gain 2 Meter/8 Element Model 28

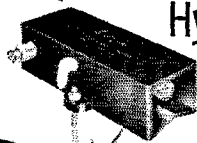
- Scientifically staggered optimum spaced elements
- Exclusive Hy-Gain Beta match • Coaxial balun
- Mechanically Reliability



\$19⁹⁵

Gain	High
Front-to-Back Ratio	High
Maximum Power Input	1 KW
VSWR at Resonance	1.5:1
Impedance	52 ohms
Uni-directional Pattern	

Hy-Gain Broad Band Ferrite Balun BN-86



Can be used with any beam type antenna in the range of 3 to 30 MHz. Comes complete with all hardware, including U-bolt not shown, for beam and doublet installation.

\$14⁹⁵

ARROW ELECTRONICS INC

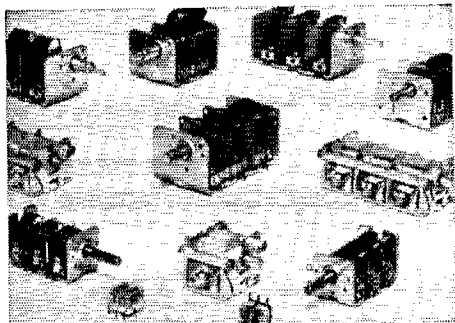
• 900 Rte. 110, Farmingdale, N.Y. 11735 516-694-6822

• 97 Chambers St., N.Y., N.Y. 10007 212-349-4411

• 525 Jericho Tpke., Mineola, N.Y. 11501 516-742-2290

• 18 Isaac St., Norwalk, Conn. 06850 203-838-4877

• 225 Rte. 46, Totowa, N. J. 07012 201-256-8555



Variable capacitors with ranges from 3-19 pf through 10-365 pf

All models in stock for immediate delivery — 1, 2 and 3 sections... PC board and chassis mounting types... direct and 6:1 turning ratios. Prices from \$2.31-\$9.75.

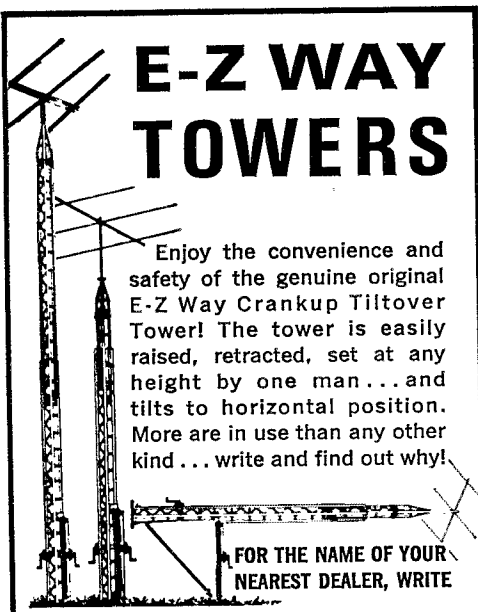


Write for full line catalog.

J.W. MILLER COMPANY

5917 So. Main St. • Los Angeles, Calif. 90003

AVAILABLE NATIONWIDE FROM DISTRIBUTORS AND MAIL ORDER HOUSES



E-Z WAY TOWERS

Enjoy the convenience and safety of the genuine original E-Z Way Crankup Tiltover Tower! The tower is easily raised, retracted, set at any height by one man... and tilts to horizontal position. More are in use than any other kind... write and find out why!

FOR THE NAME OF YOUR NEAREST DEALER, WRITE

E-Z WAY
Products, inc.
P. O. Box 17196
TAMPA, FLORIDA 33612

W4TYE 61, W4DDY 35, K4FLR 27, W4RZL 23, W44UQQ 9, K4PIK 6, W44BVD 4, (Jan.) K4JFY 128, K4TXK 112, W44UQQ 21, WB4GOJ 1.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB, PAM-V.H.F., K4NMZ. RM: K4UBR, RM-RTTY: W4WEB. Nets:

Net	Freq.	Time	Days	Sess.	QNI	QTC
WFPN	3957 kc.	2300Z	Daily	28	626	62
QFN	3651 kc.	2330/0300Z	"	56	—	—

Pensacola: W7BNR/4 received appointment to the U.S. Naval Academy. The FARA set up a TVI committee at the request of the Mobile FCC office. K4OSE, K4CFS and WB4JCV were active in the ARRL DX Contest. Fort Walton: Members of the FM Assn. are designing tone oscillators to use with the tone decoder installed on the f.m. repeater. WB4KAN, WB4HEM, W4FRF, WB4GMH and W4APR are looking for more local 6-meter stations, but TVI still is a problem! Two-meter a.m. activity is up, with 10 or more stations on the 7 p.m. Wed. Net on 145.2 Mc. F.m. activity was boosted by a large quantity of 1-watt handie-talkies recently received. W4RKH and W4APR have theirs going. W4BYE was appointed historian of QFN, the All-Fla. C.W. Net. Panama City: W44VY built a navistar pre-amplifier and a navistar converter for 2 meters. Chipley: W4IKB moved to a new QTH with a 2½ acre antenna farm. W4GTA is active on all bands from New Hope, Tallahassee: W4MQQ is the new Leon County EC. Traffic: (Feb.) K4VFY 256, K4LAN 140, WB4DJV 45, WB4HKM 29, W4WEB 21, W44EQ 19, W4KCA 16, W4IKB 11, W4RKH 8. (Jan.) WB4EQU 27.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Gary M. Hamman, W7CAF—SEC: K7GPZ, PAM: W7UXZ, RM: K7NHL. A recent appointment is K7GPZ as SEC. He is State Radio Officer for Civil Defense and has been active in organizing the state RACES program. K7GPZ appointed W7CAF, SCM, as an Alternate State RO and both will attempt to organize Arizona amateurs in the best way for emergency communications utilizing RACES and AREC members. The Old Pueblo ARC held an auction Apr. 27 at Randolph Park in Tucson. The 75-meter transmitter hunt of the Arizona ARC was won by W7UXZ. Field Day is coming June 27 and 28 so get your plans laid to participate either with a club or individually. W7CFJ operated the c.w. part of the ARRL DX Contest from Mexico as XEØGEN and scored real well on all bands. W47CYB has 100 countries confirmed. W7OIF has a new camper on his pick-up. Sierra Vista amateurs are setting up a 2-meter f.m. repeater that will cover most of Cochise County. K7NOS ran about 200 phone patches in Feb. with Peru and Alaska. K7UGA and K7HQF continue to run over 1000 overseas phone patches per month. The Copper State Net handled 234 messages and the Arizona Post Office Net handled 22 messages. Traffic: W7GEP 396, K7NHL 236, W47HF 84, W47CYB 37, W7UXZ 33, K7NOS 30, W7OUE 30, W7YXA 24, W7LLO 20, W47FEG 18, K7DHL 10, W7CAF 15, W7WGW 15, W7SBZ 8, W47FD 6, W7KYM 6, K7UOY 6, K7JFY 2.

LOS ANGELES—SCM, Donald R. Etheredge, K6UMV—Asst. SCM: Harvey D. D. Hetland, W46-KZI, RM: W6BHG. The West Valley ARC (W46LXN) has been chosen to be in the ARRL film being made about amateur radio. *Didi-dumdum-didi*, the new L.A. section news bulletin, is going strong after a warm welcome initially by section appointees and clubs. Lockheed's Burbank Hamfest is scheduled for May 17 and 18. Write LERC Radio Club, 2814 Empire, Burbank, Ca., for more information. New Southern Calif. Net Mgr. is W6MN, and new Asst. Mgr. is W6TQS. Crescenta Valley RC reports K6INY, prexy; W6DRH, vice-pres.; W6INH, secy.; WN6TJF, treas. W6TXJ reports he has a new QTH. 205 countries worked was the first year total with the new call from W6QB! The ARRL SET in Jan. went over extremely

We probably have the best inventory of good lab test equipment in the country, and an exc. assortment of communic. equip., all line-power regulation & freq.-changing equnt., but please do not ask for catalog! Ask for specific items or kinds of items you need. We also buy! What do you have?

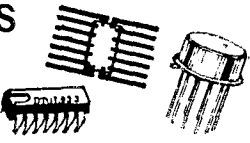
WANTED: GOOD LAB TEST EQUIP & MIL COMMUNI

R. E. GOODHEART CO. INC

Box 1220-QST, Beverly Hills, Calif. 90213
Phones: Area 213, office 272-5707, messages 275-54

POLY PAKS BIGGEST "ONE DOLLAR" SALE*

ON PLASTIC TRANSISTORS & INTEGRATED CIRCUITS



★ Fairchild ★ Texas ★ Sperry ★ National ★ GE

EPOXY SILICON TRANSISTORS

5 for \$1

Type	Sale
<input type="checkbox"/> 2N2222	5 for \$1
<input type="checkbox"/> 2N2368	5 for \$1
<input type="checkbox"/> 2N2711	5 for \$1
<input type="checkbox"/> 2N2368	5 for \$1
<input type="checkbox"/> 2N3396	5 for \$1
<input type="checkbox"/> 2N3565	5 for \$1
<input type="checkbox"/> 2N3568	5 for \$1
<input type="checkbox"/> 2N3638	5 for \$1
<input type="checkbox"/> 2N3641-3	5 for \$1
<input type="checkbox"/> 2N3645	5 for \$1
<input type="checkbox"/> 2N3662	5 for \$1
<input type="checkbox"/> 2N3683	5 for \$1
<input type="checkbox"/> 2N3793	5 for \$1
<input type="checkbox"/> 2N4248	5 for \$1
<input type="checkbox"/> 2N4284-5	5 for \$1
<input type="checkbox"/> 2N4288-9	5 for \$1
<input type="checkbox"/> 2N4290	5 for \$1

OVER \$500,000 worth of valuable EPOXY TRANSISTORS & RTLs, DTLs, & LINEAR AMPLIFIER INTEGRATED CIRCUITS... sold to you at giveaway prices. Each and every item guaranteed or your money back. We include technical data, schematics & diagrams with all "EYE SEES". *Buy now while this special limited time offering is going on.

3 for \$2.75

Fairchild No.	Sale
<input type="checkbox"/> 900	Buffer \$1.00
<input type="checkbox"/> 903	3 Input Gate Nand/Nor 1.00
<input type="checkbox"/> 904	Half Adder 1.00
<input type="checkbox"/> 910*	Dual Two Input Gate 1.00
<input type="checkbox"/> 914	Dual 3 Input Gate 1.00
<input type="checkbox"/> 915	Dual 3 Input Gate Nand/Nor 1.00
<input type="checkbox"/> 923	JK Flip Flop 1.00
<input type="checkbox"/> 925	Dual 2 Input Gate, Expander 1.00
<input type="checkbox"/> 927	Quad Inverter 1.00
<input type="checkbox"/> 930	Dual 4 Input Gate Nand/Nor 1.00
<input type="checkbox"/> 932	4 Input Nand/Nor Buffer 1.00
<input type="checkbox"/> 933	Dual Input Gate, Expander 1.00
<input type="checkbox"/> 944	Dual 4 Input Power Gate 1.00
<input type="checkbox"/> 946	Quad 2 Input Gate Nand/Nor 1.00
<input type="checkbox"/> 952	Dual 2 Input Inverter Gate 1.00
<input type="checkbox"/> 953	2-2-3-Input and Gate 1.00
<input type="checkbox"/> 954	Dual 4 Input and Gate 1.00
<input type="checkbox"/> 955	8 Input and Gate w/2 outputs 1.00
<input type="checkbox"/> 961	Dual 4 Input Gate w/expand 1.00
<input type="checkbox"/> 962	Triple Gate 1.00

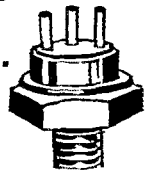
We can match up any number you desire.

Same as 914 but Milli-Watt type

400 mc **2⁹⁹** ea.

NPN HIGH POWER UHF TRANSISTORS

2N3632 23W. 3A.



LOWEST PRICES ON LINEAR AMPLIFIERS

Guaranteed! With Spec. Sheets! 3 for \$6

Type	Use	Sale
<input type="checkbox"/> 702	D.C. Amplifier	\$2.22
<input type="checkbox"/> 709	Operational Amp	2.22
<input type="checkbox"/> 710	Differential Comparator	2.22
<input type="checkbox"/> 711	Sense Amplifier	2.22

FREE! ANY \$1⁰⁰ *
WITH ANY \$10 ORDER ITEM FREE

1.5 AMP **\$1**
2000 PIV

\$1.49

1 AMP
4000 PIV
RECTIFIERS



1 AMP TOP HAT AND EPOXIES

PIV	SALE	PIV	SALE	PIV	SALE
50	.05	800	.19	1800	.87
100	.07	1000	.31	2000	1.05
200	.08	1200	.44	3000	1.60
400	.11	1400	.62	4000	1.90
600	.16	1600	.72	10000	4.80

GE	PIV	Sale	PIV	Sale
	50	5¢	600	20¢
	100	7¢	800	25¢
	200	9¢	1000	31¢
	400	12¢		

Terms: add postage. Rated: net 30, cod's 25%
Phone Orders: Wakefield, Mass. (617) 245-3829
Retail: 211 Albion, St., Wakefield, Mass.

2 AMP **800 PIV** **RECTIFIERS** **6 \$1** for 1

COUNTING DIGITAL CIRCUIT

8 Bit memory cell T0-5 case **2⁸⁸**

POLY PAKS

P.O. BOX 942 M
LYNNFIELD, MASS
01940

VHF COMMUNICATIONS IS

an international, English language quarterly magazine for amateurs interested in VHF, UHF, & Microwave technology. VHF COMMUNICATIONS devotes most of its 60 pages in each issue to practical construction articles. Featured are Transmitters, Receivers, Converters, Antennas, Test Equipment, etc. The designs reflect the latest advances in electronics, with emphasis on solid-state and printed circuitry. Special components, such as P.C. Boards are made readily available. Subscriptions: U. S. \$3.00 per calendar year. Single issues, U. S. \$1.00.

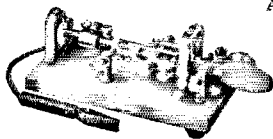


VHF COMMUNICATIONS

TOPSFIELD, MASSACHUSETTS 01983

ENJOY EASY, RESTFUL KEYING

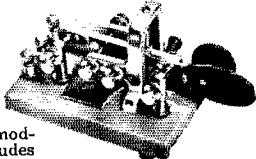
With **VIBROPLEX**



Sending becomes fun instead of work with the SEMI-AUTOMATIC Vibroplex. It actually does all the arm-tiring nerve wrecking work for you. Adjustable to any desired speed. Standard models have polished Chromium top parts and gray base. DeLuxe models also include Chromium Base and red finger and thumb pieces. Five models to choose from. Priced at \$25.95 to the 24K Gold Plated Base "Presentation" at \$43.95.

VIBRO-KEYER

Works perfectly with any Electronic Transmitting Unit. Weighs 2 1/4 lbs., with a base 3 1/2" by 4 1/2". Has Vibroplex's finely polished parts, red knob and finger, and thumb pieces. Standard model \$20.95; DeLuxe model includes Chromium Plated Base at only \$27.50.



Order today at your dealers or direct
THE VIBROPLEX CO., INC.
833 Broadway New York, N. Y. 10003

FREE Folder

The NEW TYMETER®

"Time at a Glance"

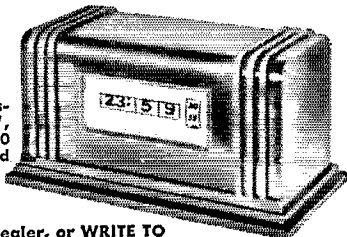
#100-24H 1/4

\$15

Walnut or ebony plastic case. H4", W7 3/4", D4", 3 lbs. 110V 60 cy. A.C. Guaranteed 1 year.

Made in U.S.A.

At Your Dealer, or WRITE TO



TYMETER ELECTRONICS

PENNWOOD NUMECHRON CO.

7249 FRANKSTOWN AVE., PITTSBURGH 8, PA.

24 HOUR CLOCK

well considering that present disaster conditions were in effect in reality in many locations because of water/rains. L.A. City RACES was involved for the first time ever in the ARRL SET and L.A. County RACES also participated. To all participants, we done! BPLers for Feb. include W6GYH, WB6BBO and W6MLF. W6BHG spent a short spell in the hospital but is now out and recuperating. New Extra Class man is WB6UHF. Congrats. Welcome back to W6ORS, who had been /1 for some time. An Advanced Class licensee now is WA6TYR! W6FTQ is a new OO in the section and is with the WB6WPO group in Redondo Beach. Rain damage was reported by W6TN at /6 location and OO W6RW reported many antennas down and various poles damaged. New members of the W6LS crew include WN6s PJC and TJE. W6SD reports that WN6TNP is a new recruit. The Rocketdyne AR reports new officers in the form of WA6IGU, prexy WA6OTV, vice-pres.; W6ZZN, secy. WB6SSZ reports she blew her final tubes recently. K9ZMS/6 has new antennas up and an Extra Class license. WB6OUD by a Drake R4 and T4X combo going. OBS W6RCV looking for a Matchbox. WB6USX reports the Call Novice Net, CNN, on 3737 kc. at 0200 GMT daily. Silent Key: WA6TIL. The TRW RC has installed OR WB6WDS as prexy; W6QKI, vice-pres.; W6PM secy.; K6AWO, treas. The WB6WPO gang records W6BUH and WB6GBC as new members. Jan. BPLs included W6MN/6, WA6LWE, W6GYH and W6MLL. The PARC has WB6USB as its new activities chm. The ITT San Fernando RC's new call is WB6LKM. The Southwestern Division ARRL Convention will be held in Oct. this year in San Diego. Write P.O. Box 1469, San Diego, Cal. 92112 for more information. Ten-Ten Net has W6FFN as pres.; W6TXJ, vice pres.; W6OI, secy.; W6FFEY, corr. secy. Traffic (Feb.) W6GYH 707, WB6BBO 546, W6MLF 348, W6QKI 253, WB6USX 93, WB6TQS 68, K6CDD 47, W6MLL 37, W6DQX 33, WB6OUD 33, K6ASK 26, W6BRG: W6USY 20, WA6KZL 19, WB6WDS 16, WB6UHF: K6UAV 11, K6CL 10, W6DGH 9, W6HUJ 9, WB6GBC 6, K6EA 5, WB6KCK 5, W6TN 5, W6FD 2, W6FTQ

ORANGE—SCM, Roy R. Maxson, WA6DEY—T San Bernardino Microwave Society, Inc., meets 1930 the first Thurs. of each month on the second floor of the Security Pacific National Bank, 204 E. Sixth St., Corona, Calif. Entrance is to be made at the rear stairway. K6MBL is corr. secy. New OR W6ELW/6. W6EYI notes we need much improvement on our sectional net activity. He currently has to messages within a 100-mile radius. K6OT reports he back on the air after a falling tree took out the transmission line and control cable to the quad. The Annual Banquet of the Newport Amateur Radio Society was held Feb. 23 at Sams Sea Food. Pres. W6CF was MC, WA6OET was the featured speaker. A good time was had by all. Please note that the Anaheim Amateur Radio Assn. holds breakfasts at 9 A.M. the 2nd Sat. of each month at Denny's on Euclid, 311. The AREC again furnished communications and service for the Orange County Heart Fund. Traffic: W6SRV 229, W6ELW/6 90, W6BNX 56, W6EYI 46, W6WRJ WA6TAG 14, K6OT 1.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: K6GY. RM: W6UJ. The regulars on 3 were delighted to hear W6BJM back on the air after long absence. Seems his KWM-2 went sour and it took several attempts to get it back in shape. WA6D is building a beam for 20 and a "V" quad. W6UJ is up emergency communications for Lompoc and provided communications for the Mayor during the recent flooding of the Santa Ynez River. Actually, most of the rivers which lead to the ocean within the section have flooded twice in as many months and all emergency communication groups have had an exercise. W6KZ sold his 2-meter f.m. gear and is putting up a tri-band beam to use with the Drake R4, T4 and 3-100 linear. WN8ZWM has a small QRP rig and plans long motorcycle trip into Baja, Calif. K6AAK let cook go on vacation and now has to eat at the Country Club. Traffic: WA6DEI 181.

LICENSED ENGINEER • LAB EQUIPMENT

J-J ELECTRONICS

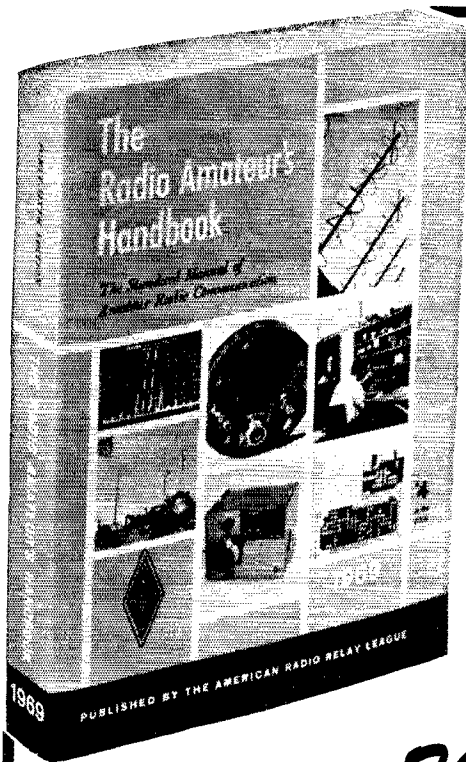
Will Custom-Build Your

MAINLINE TT/L-2

Completely Wired Tested With 850-170 Filter

WISOG, John A. Roache

Windham Road, Canterbury, Conn. 06331



1969 EDITION



THE STANDARD reference work and text for everyone—radio amateurs, students, experimenters, engineers, lab men, technicians.

*W*hat's new in the 1969 HANDBOOK? PLENTY! Considerable revision has been made in both the theory and construction sections. New material has been added to cover such subjects as MOSFETS, solid-state product detectors, transistorized oscillators, audio amplifiers, mixers, i.f. and r.f. amplifiers, and d.c. amplifiers. Numerous brand new construction projects: solid-state transceivers; transmitting and transceiving converters for SSB; universal type power supplies for all voltage ranges from 3 to 1000; transmitting equipment for the 160 meter band; linear amplifiers; transmitting and receiving equipment for VHF and UHF. Treatment has been given to VHF FM repeater stations and to satellite communications.

Many additional changes have been made throughout, and emphasis has again been placed on practical state-of-the-art themes. The HANDBOOK for everyone: students, radio amateurs, engineers, technicians. Even if you have previous editions, you will find it worthwhile to acquire a copy of this great new 1969 Edition.

\$4.00 U.S.A. and Possessions, \$4.50
Canada, \$5.50 Elsewhere. Cloth-
bound Edition, \$6.50 U.S.A. Posses-
sions and Canada, \$7.00 Elsewhere.

The **AMERICAN RADIO
RELAY LEAGUE, INC.**
NEWINGTON, CONN., U.S.A. 06111

PHONE PATCH KIT. Build one of the best phone patches ever designed! We have the transformers for the job. (See March 1969 QST p. 11). Each trans. has 4 wdgs: 150/150/150 ohms and 1 wdg 600 ohms center-tapped. Response: 200-4000 HZ. Max. level is 6.0 MW. Size: 2" x 1 1/8" sq. set of 2 transformers. \$4.95.

REGULATED POWER SUPPLY delivers 250 VDC at 350 MA. input: 115v., 60 cy. output adjustable by means of pot. with 2-5R4GY rectifiers, 2-6AS7G series reg., 1-6SL7 control amp, 2-0B2 volt. reg., and 1-5651 reference tube. Regulation is better than 1%. Has 2-magnetic circuit-breakers for protection against overloads. Std. 19-in. rack panel mtg. 12" h. \$31.95.

EQUIPMENT RACKS Std. 19-inch size. 7 ft. H. with 78 inches of panel space. Heavy-duty mounting base 20" x 15". Complete with back covers. \$22.50.

HI-POWER PACK! 6, 12, 18, or 24 VAC at 240 w. Std. rack-panel only 3 1/2" H. Has 4 transformers, each rated 6.3V @ 10 A. Input 115 v., 60 cyc. All secondary leads go to separate terminals, permitting easy hook-ups. Magnetic circuit-breaker on front panel. \$12.95.

SPECIAL OFFER! All three above items, mounted and assembled in rack. \$59.95.

3000 WATT LOAD. Hi-power resistors rated 3610 ohms, 500 w. Low inductance. Size 15" L x 1" dia. 6 units may be tied in parallel to form a 3000 W, 600 ohm. Dummy antenna. 6 for \$5.00.



PJ's RADIO SHOP, INC.
138 WATER STREET, SO. NORWALK, CONN.
TEL: 203-866-3557

TV BROADCAST ENGINEERS

Full color VHF TV Station needs both maintenance men and operators for our TV master control facilities. If you have an FCC First Class Radiotelephone operators license and are interested in joining an outstanding and growing Broadcast organization, phone collect (313)-239-6611 or write our Chief Engineer, WJRT-TV, Box 12, Flint, Michigan 48501.

GUARANTEED CUBICAL QUADS

QUADS ARE BETTER BECAUSE THEY • Have more gain than flat tops—element for element • Are quieter, less static and less ignition noise • Posses lower vertical radiation angle • Require less space (1/2 the width of a flat top) • Have a greater capture area, so better on weak signals • Have negligible corona losses, even on high power • Have excellent SWR/Freq. characteristics (flatter curve) • Are light in weight (only 34 lbs for 2 el.) • Are less easily detuned by nearby objects.

We cannot boast too much about the exceptional quality of our bamboo spreaders. They are straighter, stronger, and more uniform than is usually found. They came from a bamboo farm. They should fast you about as long as fiberglass if properly treated before erection. Of course they are less than half the cost of our fiberglass.

SKYLANE PRODUCTS 406 Bon Air Ave., Temple Terrace Fla. 33617

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. E. Harrison, W5LR Asst. SCM, E. C. Pool, W5NFO, Asst. SEC: W5JSM, PAM: W5BOO, RM: W5QZZ. We are in the middle of paper work problems, i.e. cancellation of inactive appointments. Your SCM is searching for new OUs, RM W5QZZ is writing letters to all former ORSs searching for recruits. Your OUs continue to make a good showing despite the limited number available. We are processing three new OUs now. Anyone desiring to participate in quarterly ARRL Frequency Measuring Tests are urged to try your luck. Requirements include a frequency meter and a receiver. Remember these guys in Newington run those "decimals" way on out there. Don't feel hurt if you did not get in the ball park. This is one of the most rewarding experiences in ham radio. W5KYD acquired a new Henry 2KD-3, K5RBL resigned as OO but will be back. W5KUC spoke on DX before the DARC. Any of you ever hear of the Intruder Watch? W5NLSG continues to travel. W5RHF, former TCC man, is active in Tex. C.W. W5HVF is on 7290. W5QKM is active Sun. at 0800 on 3970. W5RID applied for OO appointment Class II and III. He has a 800 kc. standard in an oven plus 100 kc. output to direct reading bridge. The Denton group was very active in the SET. W5OJW, of Richardson is interested in an OVS appointment and uses equipment above 1000 kc. W5QJA says Tex. C.W. traffic continues to improve. For those of you who may or may not be interested both 80 and 160 meters has DX running up and down the band late at night and early in the morning. Our West Gulf Division Director and his XYL visited the Dallas Chapter of the QCWA in early March. Some 30 guests attended. I want to take this opportunity to thank the many affiliated clubs who are sending me their club news. May I suggest to each of you that you please take time to mail in your annual forms to Headquarters. This is an absolute "must" as this keeps all address changes of officers up to date. Your club secy. usually has this assignment. Traffic: K5BNH 2281, W5RHF 274, W5QZZ 90, W5HVF 84, W5PCX 71, W5PBN 39, W5JSM 26, W5ACT3/5 22, W5LR 12, W5MSG 2.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—SEC: W5AFSN, RM: W5QMJ, PAMs: W5MFX, K5TEY, W5AJGU, K5ZCJ, W5QMJ reports the Enid Air Force MARS 2-meter repeater is installed and working fine. W5EFM has a new SBE-34 on the air. W5MJA recently underwent surgery on a leg but is doing fine now. K5WPP finally got moved into the new house. W5SECC still is struggling with his 2-meter f.m. rig. W5AOB resigned as SEC because of the over load of work at the University Hospital, and has been replaced as SEC by W5AFSN. Appointment of W5AFSN was made at the Mar. meeting of the ACARC at Oklahoma City. The Lawton-Fort Sill ARC was honored at its 22nd hamfest by the presence of the Vice-Pres. W5NWX and West Gulf Division Director W5EYB. The Lawton-Fort Sill Club station, K5VOZ, has just bloomed out with a new and complete Drake rig. New officers of the Oklahoma Central V.I.F. Amateur Radio Club are K5VRL, pres.; W5OUI, vice-pres. W5HUN, secy.; W5AJGU, treas. Congratulations to W5BDV, Extra Class, W5ATRS, Advanced Class W5VTH, W5AWDS, W5AWYD, General Class. Net reports:

Phone Nets	Sess.	QNI	QTC	C.W. Nets	Sess.	QNI	QTC
OPEN	4	158	6	OLZ	17	56	38
OPON	20	304	64	SSZ	15	42	40
STN	24	670	199				

Traffic: K5TEY 4630, W5QMJ 90, W5TMO 33, W5 LKS 32, K5OOV 32, W5A0B 29, W5AFSN 2, W5KFT 26, W5FKL 23, W5PML 19, W5QBF 11, W5MFX 17, K5SWL 14, W5SECC 13, W5DZP 1, K5CBA 6, W5IQ 4, K5WPP 4.

SOUTHERN TEXAS—SCM, G. D. Jerry Searl W5AIR—SEC: K5QQG, PAM: W5KLV, RM: W5EZY W5QJA is doing a bang-up job with the Tex Traffic Net. Congrats to those who QNI to the Tex Net. Keep up the good work. W5QQR advises a new and different net, the Handicappers Net, now in operation 7270 kc. Mon., Wed. and Fri. from 2000 to 2100 GMT. W5QQR, net Mgr.; W5STK, asst. net mg. W5PCN, equipment coordinator, or W5QZY can furnish further information. EC W5TFW says high wind shook up some antennas and towers in the Nederland area. EC W5TCL advises the Orange County Six Met Net was activated Feb. 24 when an explosion occurred at one of the chemical plants in the Orange area. Stations logged in as participating were W5ND (clt



**A R R L CENTRAL DIVISION
SAT. MAY 24**



Stouffer's

**INDIANAPOLIS INN
CALL COLLECT (317) 924-1241 FOR RMS.**



**LAFAYETTE
SQUARE**



DX HOSPITALITY

**FRI. NITE-HUNT RM.-POOL
(TICKETS-INDIANAPOLIS DX ASSOCIATION)**

BANQUET

SAT. NITE-WINDSOR RM.

**SENATOR BARRY GOLDWATER
K7UGA / K3UIG
HONORED GUEST-SPEAKER**

**STU MEYER - PRESIDENT AMECO
W2GHK / 4**

MASTER OF CEREMONIES

\$10.00 EA./\$18.00 W/XYL—MAY 12 FINAL

**2820 NORTH MERIDIAN
INDIANAPOLIS, INDIANA 46208**

\$1.00 FAMILY

(HAM-XYL-JR. OPS)

**HAM TO TECH. SESSIONS-PROGRAM
XYL TO MALL SHOP ACTIVITIES
JR.OP TO SNACKS AND RIDES
MAY 12 FINAL-\$2.00 AT DOOR**

FREE

**MANUFACTURERS EXHIBITS-DEMO
HAM FLEA MARKET \$1.00 RESERVED**

PREREGISTER

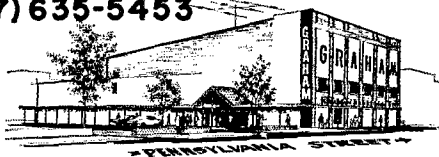
RECEIVE COMPLETE PROGRAMS

All roads lead to Lafayette Square, just minutes from anywhere, located at West 38th Street and Lafayette Road, Indianapolis. Owned, operated and developed by the Edward J. DeBartolo Corp., Youngstown, Ohio.

**1969 INDIANAPOLIS HAM CONVENTION
309 BENTON DR.-INDIANAPOLIS, INDIANA, 46227**

GRAHAM ELECTRONICS

(317) 635-5453



**WRITE FOR
LOWEST MAIL
ORDER PRICES**

**VISIT OUR NEW STORE
-SIGN THE HAM GUEST LOG-
GORDON GRAHAM-W9URF-V.P.
LES ACTON-WN9YUM-GEN.MGR.
ED WHITE-K9MSB- STORE MGR.**

**133 SOUTH PENNSYLVANIA STREET
INDIANAPOLIS, INDIANA 46204**



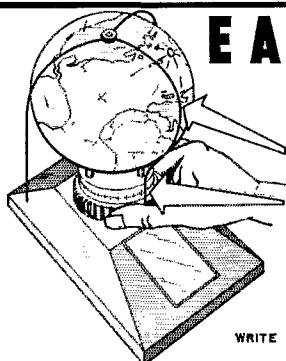
PUT THE POWER WHERE IT BELONGS
LET THE **HI-Q BALUN**
PUT IT IN YOUR ANTENNA

- Full legal power 3 to 30 MC.
- Sealed lightning arrester protects your equipment
- For dipoles—inverted V—Yagis
- Reduced coax radiation—helps TVI—
- 1 to 1 impedance ratio—coax connector
- Small—lightweight—weatherproof
- Replaces center insulator

NET PPD IN U.S.A. **\$9.95**
FULLY GUARANTEED

VANGORDEN ENGINEERING

BOX 513 • BRIELLE, NEW JERSEY 08730



**EASY AS
1-2-3**

DIAL YOUR QSO'S QTH
BENEATH INDICATOR
WIRE. READ BEAM
SETTING ON DIAL.

**AUTOMATICALLY
YOU ARE THERE!**

WRITE FOR FULL INFORMATION

GLOBE PLOTTER POST OFFICE BOX 2097
DES MOINES, IOWA. 50310



**HAM'S
CARIBBEAN RETREAT!**

Go foreign Antigua, W.I.

Hotel Beachcomber

73, Bill Wyer, VP2AZ/Ex-VE3BP,

G2ZB-DXCC

Box 10, Antigua, W.I.

Caribbean DXpedition Headquarters



25KC MARKS!

Locate New Sub-Bands

Accurately! Four wires connect IC-3 Divider to your 100KC calibrator to give 25KC marks. Circuit board 1 1/4" x 1 1/4". Specify supply voltage — 3-300DC, 10 ma. (Lowest is best.) Send for IC-3, \$7.25 postpaid.

PAXITRONIX INC. BOX 1038 (C) Boulder, Colo. 80302



FREE Catalog OF THE WORLD'S
FINEST GOV'T
SURPLUS ELECTRONIC BARGAINS

Now **BIGGER** and
BETTER Than Ever!

MAIL THIS COUPON NOW

NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

For your FREE copy, fill out coupon and mail. Dept. QST

FAIR RADIO SALES
P.O. Box 1105 • LIMA, OHIO • 45802

station), K5UAH/mobile, K5AVN, WA5DIK/M, W QVB, WA5ONZ/M, K5VXP, WA5LFT, W5NMY, W5MOO, WA5GYQ, W5SON, K5ROZ, W5ICL, K5Y along with outlying stations W5HYV, WA5NVH, W WA5SSP operating, K5ZCU, WA5QBX and WA5DV. Luckily only few injuries were reported even though windows were broken out five miles away. EC W. KHE reports the Twin Cities Public Service Net changed its name to the East Texas Traffic Net. It will continue skeds at 1700-1730 local time M through Fri, on 3951 kc. The change was made further participation and the net will function as traffic and emergency net when needed. WA5TXI, Navasota, has been appointed civil defense coordinator for Crimes County. From EC W5KR's bulletin Southmost ARC visited the Port Mansfield State tracking station Mar. 16. Come on, fellows, let's be your traffic reports. Traffic: W5QJA 133, K2EIU/5 WA5QKE 80, W5TFW 64, W5BGE 49, W5ABQ WA5WFR 38, W5AC 23, W5EZY 22, W5KLV 2.

CANADIAN DIVISION

ALBERTA—SCM, Don Sutherland, VE6FK—SI VE6FK. APSN meets daily on 3770 kc. at 01. CPSN meets weekly at 0220 Wed. on 3740 kc. UREN, on 3690 kc. at 0300Z Mon., Tue., Fri., Sat. designed for training purposes. The CARA held a fine Annual Banquet Feb. 22 and honored VE6AO, who has helped many amateurs over the years. It's nice to see a club recognize such service. The Annual Gen Meeting of the ARLA will be held in Edmonton during the Hamfest Aug. 2 and 3. VE6UJ and VE6A have volunteered for the Intruder Watch. Thanks for your help on this project, fellows. The Aurora Net on 7188 kc. at 0200 and 0300, is becoming established. A good number of VE6s are helping the furthering of this net as a daily Trans-Canada Net, or as a Canadian Service Net. This should be a great net during the holiday season for mobiles across the country. Control stations are VE7LL, VE7VE6NW, VE8TG. Traffic: VE6FK 31, VE6SS VE6ATG 7, VE6XC 6, VE6VF 5, VE6WN 5, VE6I, VE6NT 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7

—After a winter for the records we can now repair damage to our antennas and plan for summer activity. At the June 7 and 8 QCWA Party a special evening Sat. is being planned for all of us. FD will be June 23/29. On June 15 the Vancouver Island Picnic will be held and the Okanagan International Hamfest will be held July 26 and 27. The Kamloops Area reports its own club house and HW-100 all in working order. VE7BZ, formerly WOLDJ, is active on 30, and 10 with a TH-3. The Fort George RAC reports 2-meter repeater is working, in 146.58 Mc., out 14 Mc. VE7EC celebrated his fiftieth wedding anniversary. The British Columbia Amateur Radio Public Service Corp. Net, 3755 kc., elected VE7BYB net mgr. VE7BVG as his asst. RCEN summer time is 0300 G on 3650 kc. VE7KZ will handle traffic from 3755 to 3 VE7BGV, in town for a week end, visited the office and obtained his Class A license. VE7BLO recommends that you DXers join the Canada DX. A VE7LL is looking for more to join the Green Keys B.C. Traffic: VE7ZK 62, VE7AC 14, VE7SE 11, VE7E 7, VE7GG 5.

MANITOBA—SCM, John Thomas Stacey, VE4J

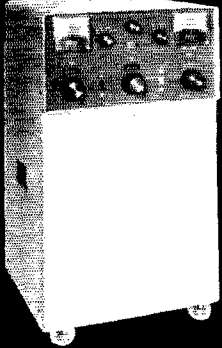
Slow-scan TV is occupying the time for VE4EG VE4EF at Margaret and for VE4CN and VE4FO Dauphin. The Brandon boys are taking to 2-m work with VE4RE, VE4RW, VE4CT and VE4OD the forefront. VE4DQ is off to YA-Land for a month as part of a medical teaching team. VE4NE added the Polar Net on 14.130 Mc. to his tr activities. This is a reminder that reports should come by the fifth of the month for inclusion in column. Both traffic nets report very successful month. The Phone Net had sessions 28, QNI 784 and QTC MTN had sessions 26, QNI 129 and QTC 59. Traffic: VE4FQ 41, VE4YC 32, VE4EI 29, VE4JA 15, VE4E 15, VE4EF 13, VE4QJ 10, VE4CR 7, VE4RL 7, VE4E 7, VE4RB 3, VE4EG 2, VE4JC 2, VE4QK 2, VE4OL VE4OL 1, VE4OL 1, VE4ZP 1.

MARITIME—SCM, William J. Gillis, VE1NR—S

VE1HJ. Our sincere sympathy to the family VE1XK, Truro. Gordon Purdy was one of the timers and will be greatly missed by all. VE1A now is signing VE3GIM, VE1AHL/HB9FC MM on ashore at Saint John. VO1s JH and DF are on the with HW-100s. VO1s GI, BS and EX are warming for 2 in Central Newfoundland. Additional 2-m repeaters are now on at Halifax and Saint John. T active on 2 are reminded of the "Ross Clements Memorial 2-Meter DX Trophy," donated by his wi

NOW, FOR THAT

"Extra Class" 2 POWERFUL LINEARS



Listen for the hundreds of LK-2000 linears now on the air and judge for yourself. Write for free illustrated brochure or send \$1.00 for technical and instruction manual.

Built to Operate Dependably With Plenty of Reserve

- Dependable Operation
- Rugged Eimac 3-1000Z
- Instant Transmit • ALZ
- Fast Band Switching
- Easy Load and Tune
- Real Signal Impact

BTI LK-2000 ... For maximum legal amateur input ... SSB, CW, RTTY. Price \$79500

BTI LK-2000HD ... For heavy duty applications such as MARS, high power RTTY and SSB. Price \$89500

CALL NOW! IN STOCK AT THESE DISTRIBUTORS:

- ARKANSAS . . . "HOSS TRADER" ED: ED MOORY WHOLESALE RADIO
Box 506, DeWitt, Arkansas 72042(501) 946-2820
- CALIFORNIA . . . BYMOND ELECTRONICS 501 Blackstone Street,
Fresno, Calif. 93701(209) 266-9644
- HAM RADIO OUTLET 999 Howard Avenue, Burlingame,
California 94010(415) 342-5757
- L.A. AMATEUR RADIO SUPPLY 2302B Artesia, Redondo
Beach, California 90278(213) 376-4455
- MISSION ELECTRONICS 910 East Highland Avenue,
San Bernardino, California 92404(714) 882-3784
- MISSION ELECTRONICS 3316 Main Street, Riverside,
California 92501(714) 683-0523
- WESTERN RADIO & TV SUPPLY CO. 1415 India Street,
San Diego, California 92101(714) 239-0361
- COLORADO . . . CW ELECTRONIC SALES COMPANY, 1237 16th St.,
Denver, Colorado 80202(303) 244-5523
- CONNECTICUT . . . HATRY ELECTRONICS 500 Ledyard Street,
Hartford, Connecticut 06114(203) 527-1881
- FLORIDA . . . INTERNATIONAL ELECTRONICS SYSTEMS, 280 Aragon
Avenue, Coral Gables, Fla. 33134(305) 447-6207
- MINNESOTA . . . ELECTRONICS CENTER, INC., 107 3rd Avenue N.,
Minneapolis, Minnesota 55401(612) 338-5881
- NEW YORK . . . HARRISON RADIO CORPORATION, 8 Barclay Street,
New York, N.Y. 10007(212) 227-7922
- HARRISON RADIO CORPORATION 139-20 Hillside Avenue,
Jamaica, L.I., New York 11435(212) 739-4101
- HARRISON RADIO CORPORATION 20 Smith Street,
E. Farmingdale, L.I., New York 11735(516) 293-7990
- STELLAR INDUSTRIES 10 Graham Road W.,
Ithaca, New York 14850(607) 273-9333
- NORTH CAROLINA . . . FRECK RADIO & SUPPLY, 38 Biltmore Ave.,
Asheville, North Carolina 28801(704) 254-9551
- OHIO . . . BAKER SUPPLY COMPANY
McComb, Ohio 45858(419) 293-3363
- WASHINGTON . . . HCJ ELECTRONICS E. 8214 Sprague,
Spokane, Washington 99206(509) 924-2343
- WISCONSIN . . . AMATEUR ELECTRONIC SUPPLY, 4828 W. Fond du
Lac Avenue, Milwaukee, Wisconsin 53216(414) 442-4200

BTI AMATEUR DIVISION

Hafstrom Technical Products

4616 Santa Fe, San Diego, Ca. 92109



Can give you personal service on helping you select better gear per dollar for your operating pleasure. Over 30 years experience. Big trades, easy terms. Used bargains.
VAN SICKLE RADIO SUPPLY CO.
Gene Van Sickle, W9KJF Owner
4131 N. Keystone Ave.
On the northeast side of
Indianapolis, Indiana 46205

ENGINEERING AMATEUR STATION and EQUIPMENT

Design, Development, Construction
for INDIVIDUALS and MANUFACTURERS

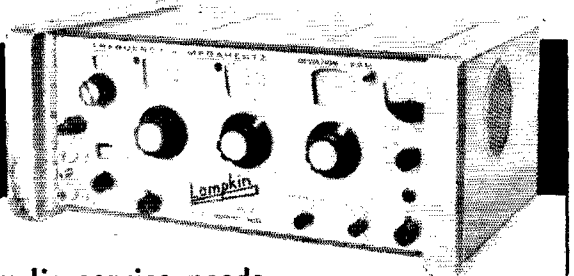
Carl N. Brooks, P.E.
Consulting Engineer

P.O. Box 4367B

Inglewood, Calif. 90309

NEW! . . . from Lampkin Laboratories

TYPE 107 DIGITAL FREQUENCY METER



FAST - ACCURATE - PORTABLE

Designed to meet today's mobile-radio service needs -

The Ultimate in Frequency Meter Performance

- ★ ONE PART PER MILLION ACCURACY!
- ★ ALL-CHANNEL COVERAGE - TO 500 MHZ
- ★ DUAL POWER - 12 V DC OR 115 V AC
- ★ EASIER - MORE FLEXIBLE - FASTER!

\$2,390 F.O.B. Bradenton, Florida

For complete specifications - Mail coupon today

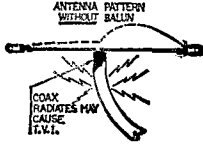
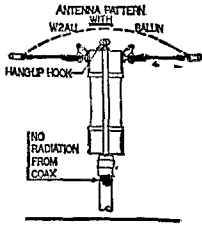
Name _____

Address _____

City _____ State _____ Zip _____

LAMPKIN LABORATORIES, INC.
MFG. Div., Bradenton, Fla. 33505

W2AU BALUN LETS ENTIRE ANTENNA RADIATE!



STOP WASTING YOUR SIGNAL! REMEMBER, YOUR ANTENNA IS THE MOST IMPORTANT PIECE OF GEAR YOU OWN.

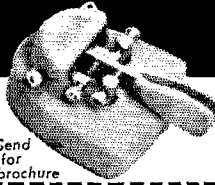
- No Radiation from Coax
- No Center Insulator Needed
- Perfect for Inverted Vees (Use Hang-up Hook)
- Built-in Lightning arrester
- Broad-Band 3 to 30 Mc.
- Takes Legal Power Limit
- Two Models:
 - 1:1 50 ohm coax to 50 ohm balanced
 - 4:1 75 ohm coax to 300 ohm balanced
- A must for Inverted Vees, Doublets, Quads, Yagis and Multiple Dipoles.

\$12.95 AMATEUR NET

W2AU Complete pretuned Fiberglass Quad\$99.95

W2AU Complete pretuned Vinyl Quad.....\$64.95

UNADILLA RADIATION PRODUCTS
Unadilla, New York 13849



Send for brochure

**Faster CW-
BETTER READABILITY**

AUTRONIC KEY 19.95 AUTRONIC KEYSER 79.50

Preferred by better operators

ELECTROPHYSICS CORP.
898 W. 18th St., Costa Mesa, Calif.

RADIO OFFICER TRAINEES

A limited number of openings are available to men willing to train for the interesting and well-paid career of Marine Radio Officer aboard U. S. Flag merchant vessels. An F.C.C. 1st or 2nd Class Commercial Radiotelegraph license is required. These openings will be particularly appealing to younger men who have completed their military obligations. Write to The Radio Officers' Union, AFL-CIO, Room 1315, 225 West 34th Street, New York, N.Y. 10001.

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way — with an Instructograph Code Teacher. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready. No QRM. Beats having someone send to you.

ENDORSED BY THOUSANDS!

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the Instructograph System. Write today for full particulars and convenient rental plans



INSTRUCTOGRAPH COMPANY

1746-Q WEST BALMORAL, CHICAGO, ILL. 60640
4700-Q Crenshaw Blvd., Los Angeles, Calif. 90043

and administered by the Moncton Club. Competition is open to all in the section and reports of DX call should be addressed to MAARC, Box 115, Moncton, The Greenwood, N.S. Club extends an invitation to all visitors. APN: QTC 97, QNI 369, sessions Traffic: VEIRO 89, VEIAMI 83, VEIAUD 78.

ONTARIO—SCM, Roy A. White, VE3BUX—BPR (of moonbounce fame) tells me he is VE3NA. VE3AU has a new HW-100 percolator has VE3BEB, and VE3CQD blew himself to an 101. Trans-Caanda ARPSC Net certificates have to VE3s APM, AML, ANZ, AWU, AYW, AYW, C. COL, CUC, CRW, CXU, CYL, DOB, DQG, FBZ, FGH, FHQ, FWC, CO and CU. VE3DE again active. He is one of the old-timers who held call 3HB back in 1917 and, incidentally, was at first Canadian ARRL Convention held in Toronto 1922. I'm told Bell Telephone is initiating amateur radio classes right across Canada. I also hear that DOT is requesting that amateurs not send in license renewals until notified "as the matter is under review. The Ontario Trilliums is working hard on its convention to be held in Toronto May 16-17-18. Peel provides living proof that hams can work in harmony with EMO if they really want to. The scuttlebutt that Ontario hams may have call-letter license year in 1970. I'm struck by the frequent complaint of bulletin editors that they can't get members to submit material. Dryden ARC has a good idea. They suggest the individual who is required to send in an autobiography for the next issue—or else! How some people assume that they have squatters right their particular net frequency? It just ain't. Another point is that the language just below sometimes sails a little close to the wind so let's it, fellows! VE3CTJ tells me that the RSO is sponsoring its first QSO Party July 19-20. Congrats VE3ACH and GUM, who are now ECs. Some of our OPN Controllers have been absent from their post for many weeks and haven't even bothered to the PAM know. This makes it rough on the fans so how about it, boys? Traffic: VE3ERU 211, V 168. VE3DPO 101.

QUEBEC—SCM, J. W. Ihey, VE2OJ—SEC: ALE, RM: VE2DR. We expect renewed activity some frequencies during the summer. VE2EC reports good activity from Trois Rivières and VE2BVY finishes good work for the nets. It's like old times listen on 3700 Sat. and Sun. One hears VE2HJ control old-timers like VE2II, VE2DR, VE2JS, QE, VE2GK, VE2BG and many more. What a world of amateur radio in those old heads! We have newcomers. VE2DKJ, VE2DIH, VE2BHH, VE2E are making great strides. VE2BKA is operating VE3-Land. VE2CRT sponsored a successful amateur radio exhibit at Technical School. VE2AT has inactive recently. VE2AOX maintains many American keels. VE2BGJ has a very impressive meter report. He can be proud of his home kilowatt on 144 Mc. VE2WM has laid all the plan the forthcoming VE2 Contest. VE2DEK again arranged amateur communication for the dog sled. VE2APT did likewise for the Annual Rally dies N Traffic: VE2BVY 106, VE2AJD 86, VE2OJ 84, V 74, VE2BRD 56, VE2ALE 46, VE2CP 38, V 27, VE2DKJ 2.

SASKATCHEWAN—SCM, Gordon C. Pearce, HP-Field Day will be held the week end of 28-29. All Saskatchewan participants will like taking up the challenge of VE5NN, the winner of the coveted "QC" Trophy in 1968. Then the week of July 5-6 the Saskatchewan Hamfest will be at Moose Jaw, Sask., at Wild Animal Park. If it rains we will retire to the spacious and beautiful Saskatchewan Technical Institute. The ARRL Contests were enjoyed by all. The 40-Meter N 7.188 kc. (two sessions, 0200 GMT and 0300 GMT) working out better than anticipated by its origin. There are over 180 registrants so far. Several VE5s are now involved in RTTY and surplus equipment and the same applies to slow-scan TV. Saskatchewan did very well in the SET Exercise. Our count was 328; this year it totalled 615. Any travelling through Saskatchewan this year should watch for stations on 2 and 75 as well meters. (Frequencies 3785 etc., transmit 146,400, 1 147,330; receive 146,940, 147,330.) A repeater is atop our SPC Building enhances coverage in province. Traffic: VE5GL 69, VE5LO 36, VE5P VE5XL 17, VE5SC 11, VE5KZ 7, VE5CF 6, VE5C VE5KI 5, VE5QZ 5, VE5FA 2, VE5PZ 2, VE5 VE5UT 2, VE5YR 2, VE5CA 1, VE5

BARRY ELECTRONICS

Selsyn Checker Ind. Test Equipment Co. Model PS-400. Unused, Rack mounted. Mint-condition. **\$110.00.**

Westinghouse Tube Caddy. 300 Tube Capacity. Lift-out tool tray. **\$15.00.** (New.)

Transistor Power Supplies (Regulated and Adjustable) R/K Lab Model 100A @ **\$95.00**; Model 110 @ **\$115.00.** Both operate from any 115 VAC line. 50-2000 Hz/Model 100A: 2, 6, and 12 VDC @ 200 Ma. Model 110: 6, 9, 28, and 45 VDC @ 200 Ma.

Heathkit Model B-1 Balun Coil set. **\$9.95.**

Ameco (540 Khz-54 Mhz) **Receiver Model R-5.** Transistorized. All Ham Bands 160-6 and 11 Meter CB. Factory wired. (Reg. \$89.95). Sale price at only **\$69.95.**

2.5 KVA. Isolation Transformer. Pri: 115 VAC @ 50/60 Hz., 1 Phase. Sec: 115 VAC @ 2.5 KVA (22A.) 2 Transformers may be combined to obtain the following: **5 KVA (115 VAC) Isolation Xfmr.** 115 VAC input to 115 VAC output. (Parallel secondaries). **5 KVA. Isolation Step-Up Xfmr.** 115 VAC in. to 230 VAC out. (parallel primaries; series secondaries). **5KVA (220 VAC) Isol.xfmr.** 230 VAC in. to 230 VAC out (Series Primaries; series ser.). **5 KVA Step-Down xfmr.** 230 VAC in. to 115 VAC out. (series pri.; parallel sec.). Packed in orig. wooden boxes unused. Excel. cond. FOB. Georgia warehouse. Cat. #20-34GA. **\$29.95** each. (Net wt. 75 lbs. 100 lbs. in wood box).

Hy-Gain Antennas TH3 Jr (3 element Tri-Bander) 10, 15, 20 Meter. **\$84.50.**

203BA (20 meter 3 element Beam) **\$89.95.**

204BA (20 meter 4 element Beam) **\$119.95.**

TH3Mk2 (3 element Tri Bander) 10, 15, 20 Meter **\$114.95.**

DB 10-15 (10-15 Meter Duo Band Beam) **\$85.95.**

14RMQ (Roof MTg Kit for 14 AVQ) **\$14.95.**

12RMQ (Roof MTg Kit for 12 AVQ) **\$12.95.**

GENERAL RADIO Type 720A Het. Freq. Meter Covers freq. bet. 10 Mcs-3,000 Mcs. Like new. With instructions. **\$165.00.**

BARRY ELECTRONICS 512 BROADWAY, N. Y., N. Y. 10012 (Tel.: (A.C. 212) WALKER 5-7000 DEPT. Q-5

CDC-3 Decade Capacitor. Accuracy plus or minus 3%. Gives you standard capacities, from 1-10 Mfd. in steps of 1 Mfd. Brand new C.D. boxed. (Reg. net \$27.25). Special **\$17.25.**

Westrex Cavity for 2C39A/3CX100A5. Operates straight through as 1296 Mc. amplifier or can triple to 1296 Mcs. from 432 Mcs. Exciter. With test notes from ARRL. (\$300. value) only **\$24.95.**

SILICON EPOXY RECTIFIERS — 1,000 P.I.V. @ 1.2 AMPS — 30¢ each.

Plate Xfmr: Pri: 207 to 253 VAC. 50/60 Hz. Single Phase. Sec: 14000 V.C.T. (2.67 KVA). **\$125.00.**

SPECIAL!

Jennings Vacuum-Variable Capacitors:

Ucsl-250 (4 to 250 Mmfd @ 3 KV.) Compact! 2½ Diam. Overall Length with tuning shaft 4¼". **\$49.00.**

UCSXF-1000 (12 to 1000 Mmfd @ 10 KV.) **\$175.00.** Special . . . a few of our UCSXF-1000 test only at 7500 volt voltage, we offer these at **\$125.00.**

UCSXF-1200 (15 to 1200 Mmfd @ 7.5 KV) **\$175.00.** Special . . . a few of our UCSXF-1200 test only at half voltage, we offer these at **\$125.00.**

UCSXF-2000 (50 to 2000 Mmfd @ 7.5 KV) **\$195.00.** Special . . . a few of our UCSXF-2000 test at half or more than half voltage, we offer these at **\$135.00.**

Eimac AIR SYSTEM SOCKET SK-500 (for 4-1000A tube) **\$22.00.**

Eimac SK1400A Socket (for 4CX3000A) Special price **\$50.00.**

Cornell-Dubilier Rotators "Ham-M" @ **\$129.95**; TR-44 @ **\$69.95**; AR-22R @ **\$34.95.**

Come in and Browse . . . Thousands of unadvertised specials. Mon. to Fri: 9 AM to 5:30 PM. Sat from 10 AM to 2 PM. . . . Ham and Electronic equipment and TUBES. Semiconductors. TUBES immediate quotes. We purchase UNUSED tubes and equipment (equipment may be used, but must be in very good physical & electrical condition). **Send List!** . . . Foreign orders expedited efficiently by our Export Dept. Write for #19 catalog — 10¢

YOU BET!



I would like to become a member of ARRL and help support its many services to amateurs and amateur radio. Here's my \$6.50 (in the U. S. and Canada, \$7.00 elsewhere). Sign me up for a year's membership and twelve big issues of QST!

My name Call.....

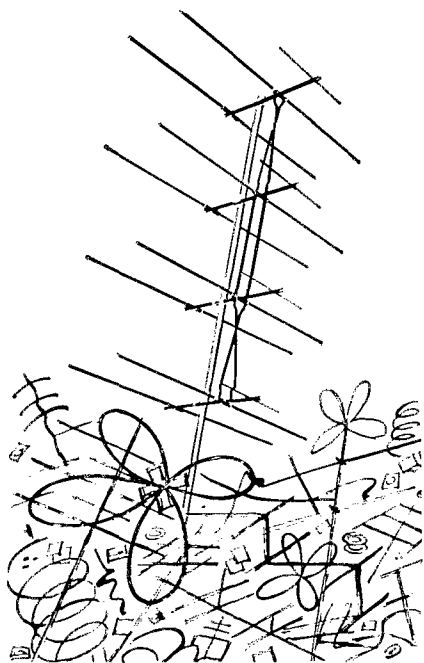
Street

City State..... Zip.....

(Please see the other side of this page for a list of available League publications.)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

QS 5-69



idea mill

Look at that pile of ideas! It represents only a small portion of the many potential new antenna designs considered and rejected by our chief engineer, W1AWZ/W1BX. When he does find an idea that is right it is a real standout like our fantastic new UHF/VHF DX-Arrays.

We have 20 element models for 2 meters \$29.50, 1 1/4 meters \$22.50, 3/4 meters \$17.50, plus 40 and 80 element DX-Array stacking kits.

Write for our free literature and get a whole pile of specifications, or see your favorite distributor. He has DX-Arrays in stock.

**Cush
Craft**

621 Hayward Street, Manchester, N.H. 0310

Iwould like the following League publications shipped to me postpaid. I am enclosing payment of \$_____. (These prices apply only to the USA.)
Ship to this address:

NAME CALL

STREET

CITY STATE ZIP

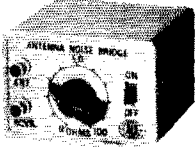
- | | |
|--|---|
| <input type="checkbox"/> ARRL HANDBOOK \$4.00
The standard comprehensive manual of amateur radiocommunication | <input type="checkbox"/> A COURSE IN RADIO FUNDAMENTALS \$1.00
Use this in conjunction with the Handbook |
| <input type="checkbox"/> UNDERSTANDING AMATEUR RADIO \$2.50
Written for the beginner—theory and how-to-build it. | <input type="checkbox"/> ANTENNA BOOK \$2.50
Theory and construction of antennas |
| <input type="checkbox"/> VHF MANUAL \$2.50
A new and thorough treatment of the amateur v.h.f. field | <input type="checkbox"/> SINGLE SIDEBAND FOR THE RADIO AMATEUR \$2.50
The best s.s.b. articles from QST |
| <input type="checkbox"/> LICENSE MANUAL \$1.00
Complete text of amateur regs, plus Q&A for amateur exams | <input type="checkbox"/> THE MOBILE MANUAL \$2.50
The best mobile articles from QST |
| <input type="checkbox"/> HOW TO BECOME A RADIO AMATEUR \$1.00
All about amateur radio and how to get started | <input type="checkbox"/> HINTS AND KINKS \$1.00
300 practical ideas for your hamshack |
| | <input type="checkbox"/> OPERATING MANUAL \$1.50
The techniques of operating your amateur station—DXing, ragchewing, traffic, emergencies, etc. |

(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

BRIDGE THE GAP TO PEAK PERFORMANCE

... through either of these antenna noise bridge units, which provide accurate and fast testing of antennas and feed lines at a reasonable cost.



- Model TE 7-01**
- Antenna Noise Bridge
 - Range — 1 to 100 MHz
 - RCA Tip Jacks
 - Resistance Testing: 0 — 100 ohms
- \$24.95**



- Model TE 7-02**
- Extended Range Antenna Noise Bridge
 - Range — 1 to 300 MHz
 - BNC Connectors
 - Resistance Testing — 0 to infinity, calibrated 25-100 ohms
- \$34.95**

Features Applicable to Both Models:

- Test antenna for both resonant frequency and impedance.
- Replace VSWR bridges or other antenna test equipment.
- Optimum performance through alignment and test of mobile or fixed station antennas.
- Test beams, whips, dipoles, quads, or complete tuner systems.

Applications data and operating instructions included. For descriptive literature write:

**omega-t systems
incorporated**



300 TERRACE VILLAGE • RICHARDSON, TEXAS 75080 • (214) 231-5121

LRL-124 BROADBAND REACTANCE BALANCED ANTENNA for 75/80 meters

124' 14-2 copperweld polyeth. ins. wire with clamping blocks so ends can hang down to install in 100' length or less, 25'-40' center height. 2 KW P.E.P.

Price: \$35.00 ppd Cont. USA

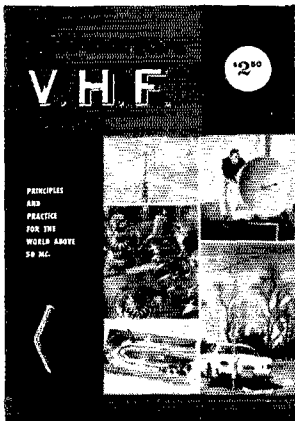


Low SWR 3.5-4mc 2:1 or less
Vertical shorted stub to be grounded, also is DC ground for ant. Center block has coax connector for PL-259 male plug. Use RG-8/U or 58/U feeder.

LATTIN RADIO LABORATORIES

Box 44

Owensboro, Ky. 42301



VHF

1250

PRINCIPLES AND PRACTICE FOR THE WORLD ABOVE 50 MC.

TIRED OF QRM?

What with inexpensive transistors and other components available, you could put together a simple VHF converter and transmitter in very little time, using information from *The Radio Amateur's VHF Manual*.

In just a few evenings, you could be enjoying QRM-free QSOs in the World Above 50 MC.

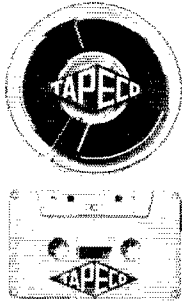
\$2.50 USA

\$3.00 Elsewhere

THE AMERICAN RADIO RELAY LEAGUE, INC.

NEWINGTON, CONNECTICUT 06111

LEARN CODE THE EASY WAY!



REELS and CASSETTES

Speeds:

- A—3 wpm to 6 wpm
- B—5 wpm to 8 wpm
- C—6 wpm to 10 wpm
- D—10 wpm to 16 wpm
- E—16 wpm to 25 wpm

Up to 40 wpm on request.

Prepare for a career in telegraphy, merchant marine, aviation, army, navy, air force, or ham operator.

PERFECT CODE TRANSMITTED FROM YOUR TAPE RECORDER. LEARN OR IMPROVE — EVEN WHILE IN YOUR CAR.

SEND CHECK OR MONEY ORDER
(Fla. residents add 4% sales tax)
State speed(s) desired.

Reels \$4.95-Any two \$ 8.95
Cassettes \$5.95-Any two \$10.95

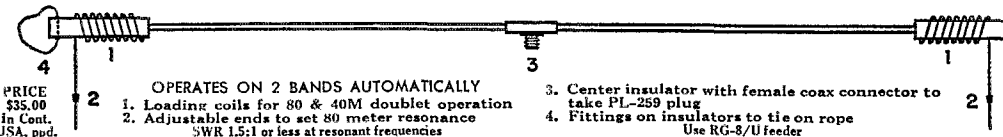


TAPECO 6290 S.W. Third Street • FORT LAUDERDALE, FLORIDA 33314

LRL-70 ANTENNA

70' LONG, 80 & 40 M

Power rating 2 Kw. P.E.P. or



PRICE
\$35.00
in Cont.
USA. ppd.

OPERATES ON 2 BANDS AUTOMATICALLY
1. Loading coils for 80 & 40M doublet operation
2. Adjustable erids to set 80 meter resonance
SWR 1.5:1 or less at resonant frequencies

- 3. Center insulator with female coax connector to take PL-259 plug
- 4. Fittings on insulators to tie on rope
Use RG-8/U feeder

LATTIN RADIO LABORATORIES

Box 44

Owensboro, Kentucky 40301

CQ de W2KUW BEST OFFER!!

Paid for any piece of aircraft or ground radio units, also test equipment. All types of tubes. Particularly looking for 4-250 • 4-400 • 833A • 304TL • 4CX1000A • 4CX5000A et al. 17L • 51X • 390A • ARM • GRM • GRC • UPM • URM • USM units.
TED DAMES CO., 308 Hickory St., Arlinton, N.J. 07032

EXCELLENT SELECTION—AT EXTREME LOW PRICES—48 HOUR DELIVERY



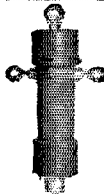
Thousands of frequencies in stock. Types include HC6/U, HC18/U, FT-241, FT-242, FT-171, etc.

SEND 10¢ for catalog with oscillator cuts. Refunded on first order.

2400C Crystal Drive, Ft. Myers, Fla. 33901

"MEET ME in ST. LOUIE"

at
HAM RADIO CENTER
8342 Olive Blvd. St. Louis, Mo. 63132
Amateur Radio Equipment
Sales & Service
(314)-993-6079 Bill, WØQDF



THE "MINI-BALUN"

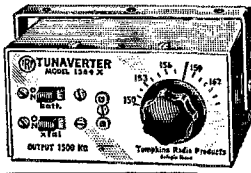
Small — light — efficient — weather proof — have your antenna radiate, not your feed — use for dipoles, doublets, yagis, inverted "V" etc. — has ferrite core. Coax fitting takes full legal power. 1 to 1 impedance 3 to 30 MCs. Now with built-in lightning arrester. NET PPD in U.S.A.

BILADA MFG. CO.
P.O. Box 288 Manssquan, N.J.

NOW—TUNAVERTER WITH SQUELCH!

Tunable and crystal controlled RF converters for monitoring Police, Fire, Amateur, CB, CD, VHF weather, etc. on your broadcast radio economically! See models listing in Feb. QST, page 114. Write for details:

HERBERT SALCH & CO.
Woodsboro Q5, Texas 78393



SURPLUS EQUIPMENT WANTED TO BUY

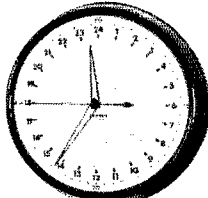
THE FASTEST GUN IN THE EAST

No horsing around, we pay fast . . . in 24 hours . . . and we pay more. We'll swap or trade new equipment too . . . We quote fast too. We also pay for shipping, insurance, etc. You call fast, now, collect, for fast quote.

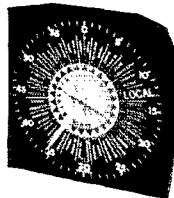
SPACE ELECTRONICS
div. of MILITARY ELECTRONICS CORP.
11 Summit Ave., East Paterson, N.J. 07407 (201) 791-5000

FARMERIE WORLD TIME-ZONE CLOCK

When the clock is accurately set to the correct time in a local time zone, the correct time is automatically shown in each of the other 23 zones.

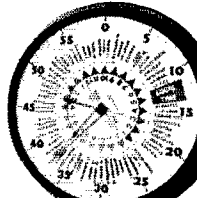


W-150
\$26.00
Conventional 24 hr. clock
CASE: 17" dia.
15" face



D-300
\$12.95
CASE: wall or desk 22
ga. steel 8" x 8" x 2 3/4"
MOTOR: 110-volt,
60 cycle.
Other models available

Shipped PPD U.S.A.



W-100
\$29.00
CASE: 17" dia.
15" face

THE FARMERIE CORPORATION

114 Spencer Lane

Glenshaw, Penna. 15116

DIGI-KEY

INTEGRATED CIRCUIT KEYER

FEATURES:

- All solid state
- Linear speed control 5-50 WPM
- Exact weight and ratio for perfect CW
- Fully self-completing
- Transistor output for most grid block rigs with optional relay available at a slight extra charge for cathode keying
- Small size
- Completely wired and guaranteed—furnished less power supply, chassis, and paddle



PRICE

\$15.00 postpaid
World Wide

WRITE:

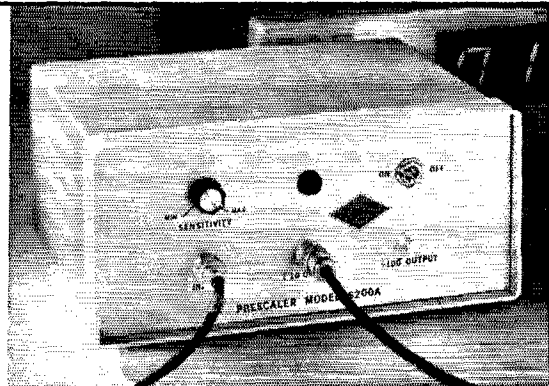
DIGI-KEY

P.O. BOX 27146
MINNEAPOLIS
MINN. 55427

UPDATE your obsolete counter for NEW Marine VHF

Extend the frequency range
of your counter by a factor of
10 or 100 up to 200 MHZ.

Frequency range: .5 to 200 MHZ
Input Sensitivity: Adjustable from 100 MV
Input Impedance: 50 ohm nominal
Outputs: Input frequency divided by 10 and 100
Output Levels: Greater than .5 volt into 50 ohms



200 MHZ for \$450.00

Overall size is 4½" high x 7¾" wide x 7" deep
Weight: 4 pounds
Power Requirements: 115/230 VAC 50/60 HZ



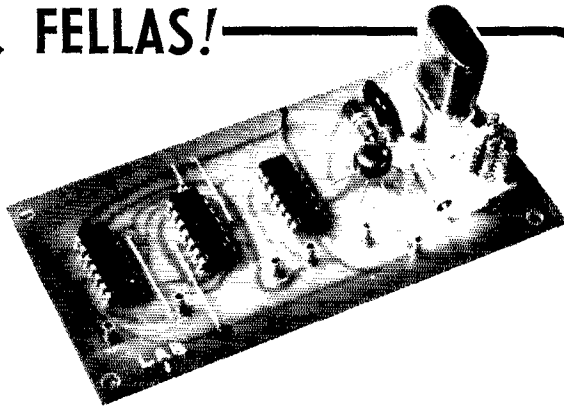
INTERCONTINENTAL
Electronics Corp.

Phone Now: 716-586-7850

**Post Office Box 151
Fairport, New York 14450**

HERE YOU ARE, FELLAS!

YOUR OWN FREQUENCY MARKER YOU MAKE YOURSELF!



You get two things: the pleasure of assembling and checking this Frequency Marker, and the assurance that you can keep your receiver properly calibrated at all times. Fool-proof components are supplied with this kit, and any ham worth his salt can put it together and have a functioning Frequency Marker so necessary to obtain proper operation and behavior of your receiver.

PRICE

Kit Form

\$15.00

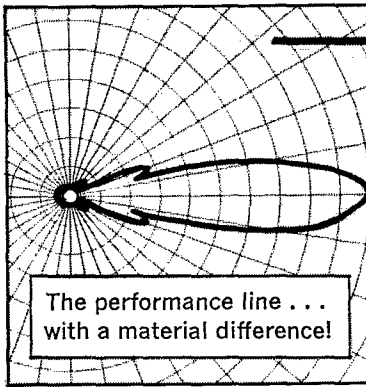
Postpaid Worldwide

FREQUENCY MARKER SPECIFICATIONS

- ✓ 5, 10, 25, 50 & 100 kHz
- ✓ Freq. Spot Band Edge Marker
- ✓ Complete Kit, less crystal
- ✓ No Surplus
- ✓ Compact 1¾-3¼ inches
- ✓ Low power 3-4 volts DC 50 Ma.
- ✓ Easy Assembly. Complete printed instructions
- ✓ Install anywhere

THE RADIO SHOP LAB 1

48 Elm St., New Canaan, Conn. 06840
Tel: (203)-966-3553



The performance line . . .
with a material difference!

telrex

PREFERRED AND SPECIFIED WORLD-WIDE BY
COMMUNICATION ENGINEERS AND ADVANCED AMATEURS

Don't settle for anything less than the very best! Use Telrex Communication products — for long lasting optimum performance and value!

FREE . . . Tech data and pricing catalogs describing off-the-shelf and custom-built antennas, systems, "inverted-vee kits"®, towers, mono-poles and rotatable "Berthas"®

For commercial and military applications write for CM69 . . . for amateur applications write for PL69.

COMMUNICATION SYSTEMS SINCE 1921 **telrex** Laboratories

ASBURY PARK,
NEW JERSEY 07712, U.S.A.

PICKERING RADIO CO.
Post Office Box 29
Portsmouth R.I. 02871

NOW! USE YOUR TAPE RECORDER TO LEARN CODE

Read code like a Pro! It's easy! PICKERING CODEMASTER tapes give professional instruction on your own tape machine from digital computerized tapes! They can't be matched for timing accuracy! Beginners get course of professional instruction at 5-9 WPM right on the tape! Practice for General and Amateur Extra ranges from 11 to 30 WPM. Nothing else like it! See below for CODEMASTER tapes you need. Get up to speed! Order today!



CM-1: For the beginner. A complete course of instruction is on the tape. Practice material at 5, 7, 9 WPM. Prepares you for Novice exam. Includes code groups and punctuation.

CM-1½: An intermediate tape, especially for General Class exam study. No instruction; just practice. ½ hr 11 WPM; 1 hr 14 WPM; ½ hr at 17 WPM. Includes coded groups and straight text.

CM-2: For Extra-Class I study. Mostly straight text; code groups. 1 hour at 20 ½ hour each at 25 and 30 For real QRQ, play this twice speed!

CODEMASTER tapes are 2-track monaural; available in two sizes: 7-inch reel (3¼ IPS) and 3¼-inch reel (1½). Will play on any but full-track machine. SPECIFY both type and size of tape you want. Any tape, \$5.95 postpaid 4th class. Any two tapes, \$11.00; all three, \$15.00 PPD. Immediate delivery. CODEMASTER tapes are made at Pickering Radio Company, P. O. Box 29, Portsmouth, R. I. 02871. Satisfaction guaranteed.

QUALITY MERCHANDISE — QUALITY SERVICE
SO WHY PAY MORE FOR THE BEST!
MERCHANDISE IN STOCK — PROMPT DELIVERY
NATIONALLY ADVERTISED BRANDS, THE LATEST MODELS

INSTANT SHIPMENT on all cash orders of new equipment. TRIGGER ELECTRONICS has the most complete inventory of amateur radio equipment and accessories in stock, for your convenience. Shipment is usually made the same day your order is received!

TRADE-INS: We work much more on trade. (Clean recent vintage equipment.)

\$5.00 DOWN STARTS ANY BUDGET TIME PAYMENT! Order your goodies from this ad!

MIDWEST BANK CHARGE CARDS HONORED

another important TRIGGER service:
WE BUY USED HAM GEAR FOR CASH
 PROMPT SERVICE...
 PROMPT CASH!

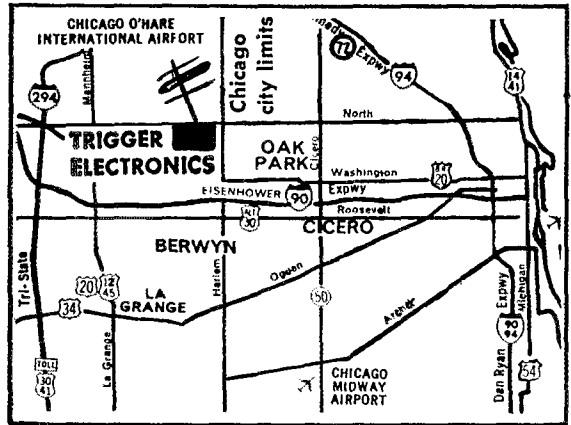
TRIGGER ELECTRONICS An Exclusive Ham Store.

ALL PHONES: (AREA 312) 771-8616

STORE HOURS
 (CENTRAL TIME)

WEEKDAYS 10:00 A.M. - 8:00 P.M.
 SATURDAYS 9:00 A.M. - 3:00 P.M.

TRIGGER ELECTRONICS is conveniently located near the west city limits of Chicago on the main street of North Avenue (State Route #64), 3 blocks west of Harlem Avenue (State Route #43). Just 10 miles due west of downtown Chicago, or 20 minutes southeast of O'Hare Airport. Plenty of free parking. Come in and browse. See the latest in ham gear attractively displayed.



CLEAN AS A WHISTLE LIKE-NEW BARGAIN SPECIALS FOR MAY

KWM-2.....\$795	HT37.....\$239	HAG50 6MTR TSVR\$ 77
CC-2 CASE..... 60	HT44 & AC..... 319	CLEGG 66ER..... 179
312B-4..... 149	5X73..... 399	HQ215..... 399
312B-5..... 275	5X101..... 139	NCX5 5AC..... 329
352D-2 MOUNT..... 90	5K105..... 69	NC135..... 129
516F-2 AC..... 119	HR2000..... 79	HR0500 MINT..... 1250
516E-2 28VDC..... 329	S240..... 99	LF10 MINT..... 249
30L-1 MINT..... 379	SR42A..... 149	HEATH HW12..... 69
DRAKE R4..... 269	SR46A..... 139	HEATH HW32..... 79
DRAKE R4A..... 329	GALAXY V..... 279	HEATH HW32A..... 89
DRAKE TR3..... 379	GALAXY VMK3 NEW..... 339	HEATH SB101..... 395
SWAN 250 W/CAL..... 269	GALAXY VFO..... 54	B-1 BALUN SET..... 9
SBE34..... 279	RV1 NEW..... 64	REGENCY AR136..... 77
SB2 LA LINEAR..... 199	SC-1 SPKR NEW..... 18	JOHNSON RANGER..... 99
GONSET 4 6MTR..... 159	WRL MINI-TUNER..... 15	VALIANT..... 149

SPECIAL SPECIAL LIMITED QUANTITY NEW EICO KITS prices subject to change without notice
 777 VFO W/AC SUPPLY \$55
 751 AC SUPPLY \$60

Write today! Send for FREE Catalog!

TRIGGER Attn: W9IVJ QST 569
 7361 North Avenue
 River Forest, Ill. 60305 Amount Enclosed
 RUSH THE FOLLOWING:
 Send free catalog.
 NAME _____
 ADDRESS _____
 CITY _____ STATE _____ ZIP _____

Trigger Electronics
 7361 NORTH AVE. • RIVER FOREST, ILLINOIS 60305
 (WEST SUBURBAN CHICAGO)

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display or 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 post office box or telephone 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 con- tract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. 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 advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QSTare unable to vouch for their integrity or for the grade or character of the products or services advertised.

HAMFEST—Roanoke, Virginia, Roanoke Valley ARC May 24-25, Saturday, May 24—7:00 PM Rag Chew at Embassy Motor Lodge, Sunday, May 25—8:00 AM to 4:00 PM contests etc. Vinton War Memorial, Vinton, Virginia.

AUCTION: June 8th Manchester Radio Club at Tower Hill, Candia, N.H.—Map and information S.A.S.E. W14PM, Post Office Box 661, Manchester, N.H. 03105.

ROCHESTER, N.Y. is again Headquarters on Saturday, May 10 for one of the largest hamfests in the East. Full day of dual programming covering all phases of amateur radio, plus huge surplus equipment sale. See Hamfest calendar for more information.

SOMERSET County Hamfest—June 8th, Casbeer Church Grove, Route 219, 7 miles north of Somerset, Pa. (9 AM-5 PM) Write Theodore J. Leonberger, K3RCI, Rd 2, Rockwood, Pa. 15557.

A.W.A. National Amateur Radio Historical Conference, Oct. 3, 4, and 5th, East Greenwich, Rhode Island. A weekend of nostalgic memories: Spark transmitters, Crystal sets, Hartley oscillators, and Regenerative Receivers. Everyone welcome! Write W2QY.

ROCHESTER, N.Y. is again Hamfest, VHF meet and Flea market headquarters for one of the largest events in the East, May 9, 10 and 11. Write WNY Hamfest, P.O. Box 1388, Rochester, N.Y. 14603, for program and information.

"SEE your picture and a thumbnail sketch of your life in wireless along with many of your old buddies in Spark Gap Times magazine published by the Old Old Timers Club. Charter membership is offered to all pre-World War I operators, regular membership to any operator licensed 40 years or more ago. Be a recognized pioneer. Join the Old Old Timers by writing the Secretary, W2ZC, Bert E. Gamble, 402 Beck Building, Shreveport, Louisiana 71101."

INVITATION: New York Radio Club invites New York Area hams and SWLS to its regular monthly meetings, the second Monday of each month at the Hotel George Washington, Lexington Ave. and 23rd St. at 8 PM. W2ATT, New York Radio Club. Our April, May and June meetings will be held on the 2nd Monday of the month. Our Annual Auction will be held on March 14, 1969 at the George Washington. (All our meetings are held there.)

HAMFEST: June 8th. Save this date for Annual Starved Rock Radio Club Hamfest at Ottawa, Illinois. Write: George E. Keith, W9OLZ, RFD #1, Box 171, Oglesby, Illinois 61348, or see Hamfest Calendar in May QST.

FANTASTIC—1969 New England ARRL Convention, May 24 & 25, Swampscott, Massachusetts. Save money! Early bird registration \$10.50 including Saturday dinner, dance and night club entertainment. Be a winner! Every major manufacturer will exhibit, plus top speakers from science & industry. Tickets: W1KCO, John McCormick, Berkeley Street, Taunton, Massachusetts.

BROOKLYN New York Ham Auction (no junk) May 16, 1969, 8 PM, at Cummings Brothers American Legion Post Benefit, Ave. D and East 46th St., Brooklyn, N.Y. Coffee, cake, etc. For further info, call a.c. (212)-763-4233. M. Libowitz, K2BDQ.

WELCOME To Maritime Mobile service net, 14313 Khz, daily 2130Z, Amateur Radio's service to the Fleet, Vic Barry, RDC USS Corry, DD817 FPO, N.Y., N.Y. 0950.

OSL'S?? SWL'S?? America's finest!! Personalized made order!! Samples 35 cents, Deluxe 50 cents. Religious 25¢ (retunded). Sakers, W8DED, Box 218, Holland, Mich 49423.

C. FRITZ—OSLs that you're proud to send, bring greater turns! Samples 25¢ deductible. Box 1684, Scottsdale, Ariz 85222.

OSLS "Brownie" W3CJ1, 3111 Lehigh, Allentown, Pa 18103. Samples 10¢. Catalog 25¢.

OSLS stamp and call brings samples, Eddie Scott, W3C Fairplay, Md. 21733.

OSLS—SMS, Samples 25¢. Malgo Press, Box 375, M. Toledo, Ohio 43601.

DELUXE OSLS Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples, 10¢.

10¢ Brings free samples, Harry R. Sims, 3227 Missouri Ave. St. Louis, Mo. 63118.

OSLS, SWLS: Rubber stamps, address labels, and envelope Quality with service. Samples 25¢ (refundable), R. A. La Press, Box 45, Fairport, N.Y. 14450.

OSLS. Free samples, attractive designs. Fast return, W Press, Box 2378, Eugene, Oregon 97402.

OSL, SWL, cards that are different. Quality Card stock, 50¢, 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

CREATIVE OSLS Cards, Personal attention. Imaginative designs. Send 25¢. Receive catalog, samples, and 50¢ re- coupon. Wilkins Printing, Box 787-1, Atascadero, Calif. 92019.

OSLS SWLS Hundred \$2.00, samples dime. Garra, Mahoning St., Lehighton, Penna. 18235.

OSLS 300 for \$4.35, samples 10¢ W9SKR, George V. Rie #1, 100 Wilson Road, Ingleside, Ill. 60041.

OSLS-100 3-color glossy \$3.50; silver globe on front; reform on back. Free samples, Rusprint, Box 7575, Kansas Mo. 64116.

OSLS. Gorgeous rainbows, cartoons, etc. Top quality! prices! Samples 10¢ refundable. Joe Harms, WA4FJE/W3 905 Fernald, Edgewater, Fla. 32032.

OSLS, SWLS, WPE. Samples 15¢ in adv. Nicholas & Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

OSLS, samples, 10¢. Fred Leyden, WINZI, 454 Proctor Ave. Revere, Massachusetts 02151.

RUBBER Stamps. Return mail delivery, postpaid. Basic \$1.00 first line, 50¢ each additional line. Request type chart. Fulton Rubber Stamps, Route 216-A, Fulton, Maryland 20759.

OSLS. Neat, quick, 10¢. Filmcrafters, Box 304, Martin's F Ohio 43935.

OSLS Kromkote glossy 2 & 3 colors, attractive, distinct. Choice of colors, one hundred—\$3.00 up. Samples Agent for Call-D-Cals, K2VOB Press, 457 Chancellor Newark, N.J. 07112.

OSLS, Radio Press, 15008 Orchid Ave., Poway, Calif. 92064.

OSLS, finest YLRL's. OMS samples 10¢. W2DJH Press, rensburg, N.Y. 12885.

RUBBER Stamps \$1.15 includes tax and postage. Clint's dis. W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

OSLS, Cards. Finest quality. Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848, Austin, Texas 78757.

LOW PRICED OSLS!! Free samples!! K. L. L. Press, Box Martinsville, N. J. 08836

OSLS, WSLS, XYL-OMS (Sample assortment approx 9¢) covering designing, planning, printing, arranging, ma- eye-catching, sedate, fabulous, comic, DX-attractive, proto- snazzy, unparagoned cards (Wow!) John Patterson carries in the spirit of the late Warren Rogers, KOAAB, adding own Patterson Printing, 961 Arcade St., St. Paul, Minn. 55108.

3-D OSDS—The modern concept that makes all others fashioned. Samples 25¢ (refundable). 3-D OSL, Co., Me 2, Mass. 01057.

RUBBER Stamps, 3-line address \$1.50. J. P. Maguire & many, 448 Proctor Avenue, Revere, Massachusetts 02151.

OSLS 3-color glossy 100, \$4.50. Rutgers Vari-Typing. See Free samples. Thomas St., Riegel Ridge, Milford, N.J. 0

OSLS by K1FF: \$2.00 for 100. Others at reasonable n Samples 25¢ (deductible). K1FF OSLS, Box 33, Me Mass. 02177.

PICTURE OSLS cards of your shack, etc. from your p raph. 500, \$12.00, 1000 \$15.25. Also unusual non-pictur- signs. Generous sample pack, 20¢. Half pound of samples Raun's, 4154 Fifth St., Philadelphia 19140.

ORIGINAL EZ-IN double holders display, 20 cards ea- plastic, 3 for \$1.00 or 10 for \$3.00 prepaid and guaran- Free samples to Dealers or Clubs, Tepabco, John. K4J Box 198T, Gallatin, Tenn. 37056.

3 Line engraved badges, any color, \$1.25. Special rat- 45013. Fallert's Engraving, 121 N.C. St., Hamilton, Ohio 45013.

PICTURE of yourself, rig, etc. on OSLS made from photograph, 250—\$7.50; 1000—\$14.00 postpaid. Samples Picture Cards, 129 Copeland, LaCrosse, Wis. 54601.

OSLS: 100, \$1.25 and up, postpaid. Samples, dime. Hc R3, Box 649, Duluth, Minn. 55803.

MINI OSLS. Eye-Ball cards. Free information. A. A. Irving Ave., South, Minneapolis, Minn. 55403.

EMBOSSSED QSL's. Free Samples, with cut catalog 25 cents. Ace Printing Service, 6901 Clark Ave., Cleveland, Ohio 44102.

CANADIANS! The best selection of new and used gear in stock at all times. Drake, Swan, Yaesu, Hy-Gain and others. It will pay you to check our deals. The Ham Shack, 1566A Avenue Road, Toronto 12, Ontario (Tel: 416-789-1239).

CANADIANS: DX-60 90 watt phone and cw mixer (power supply built-in) plus HG10 V.F.O. 10 to 80 meters. Total Price \$1000. You pay shipping. I. Lightbody, VE3FQ, 12 Golding Ave., Brampton, Ontario, Canada. PH 459-4171.

CANADIANS! SX-101-A Receiver, used to sell. Sacrifice!! \$150. RC McGill University, 3480 McTavish, Montreal, Quebec.

CAPACITORS For your Linear, 140 ufd at 450 vdc. Brand new at only the giveaway price of 10 for \$9.50. K4IHP, Mehaffey, 6835 Sunnybrook Lane, NE, Atlanta, Ga. 30328.

CHRISTIAN Ham Fellowship being organized for Christian fellowship and witness for license amateurs. Free gospel witness tract samples and details on organization on request. Christian Hamm Callbook for \$1 donation. Write Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

HAMFEST sponsored by Lancaster and Fairfield County ARC at Derby Downs one mile south of Lancaster, Ohio, on BIS Road, Rte 793, June 8th. Gigantic Swap Shop! \$1.00 Registration. Good food at reasonable prices. W. C. Beach, 268 Peters Ave., Lancaster, Ohio 43130.

WANT Early issues RDO News, Science & Invention, Electrical Experimenter, Radiocraft, Modern Electronics, Popular Radio, Radio Broadcast, Wireless Age, 1923-1925 Callbooks. For historical library. Wayne Nelson, W4AA, Box 127, Concord, N.C. 28025.

INVITATION To form a Town Hall group for open discussion, debate and dissent on amateur radio matters. Write WASTSN, 4023 Mackland Ave., Albuquerque, N.M. 87110.

INVITATION. Voudrais "vous un group les français aider dans l'organisation d'un réseau des émetteurs français" Ecrit WASTSN, 4023 Mackland Ave., Albuquerque, N.M. 87110.

QCWA—Quarter Century Wireless Association in a non-profit organization founded 1947. Any amateur radio operator licensed 25 or more years is eligible for membership. Write for information, A. J. Gironada, W2JE, 1417 Stonybrook Ave., Mamaroneck, N.Y. 10543.

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 48104. Tel. Normandy 8-8262.

PROP Pitch rotor, WW2, small, excellent, \$45.00. Link, 1081 Aron St., Cocoa, Fla. 32922.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

WANTED: 2 to 12 304TL Tubes, Callanan, W9AU, 118 S. Clinton, Chicago 6, Illinois.

SELL: New Yaesu FT-DX-400 Transceiver. W8AO, 2912 Riverview Blvd., Silver Lake, Ohio 44224.

NORTHERN California hams: best deals, new and reconditioned equipment. Write, call or stop for free estimate. The Wireless Shop, 1305 Tennessee, Vallejo, Calif. 94590. Tel: 707-643-2797.

HAM Transformers rewound, Jess, W4CLJ, 411 Gunby Ave., Orlando, Florida 32801.

SELL swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna.

DUMMY Loads, 1 KW, all-band, \$7.95; wired, \$12.95. Ham Kits, P.O. Box 175, Cranford, N.J. 07016.

WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test-sets, especially Collins Airborne. We pay cash, and freight. Ritco Electronics, Box 156-0567, Annandale, Va. Phone: 703-560-5480 collect.

WANTED: 2 to 12 304TL tubes, Callanan, W9AU, 625 West Jackson Blvd., Chicago, Ill. 60606.

MANUALS for surplus electronics. List 15¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

HAM'S Spanish-English manual \$3.00 Pod., Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

WANTED: For personal collection: Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 9; The Radio Amateurs License Manual, Editions, 11, 12. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

1916 QST's needed for personal collection. Price secondary. Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey.

FOR Sale: SB-101 and SB-200. Wanted, wits to wire. Heath preferred, 2% of cost, some in stock. Professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y. 11551.

FOR Sale: Asahi transistorized TV camera, \$197.50, Fred Mertin, W5YHT, Rte 2, Fayetteville, Ark. 72701.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, N.Y., N.Y. 10012. Tel: (212) 925-7000.

TOROIDs, 88 mh uncasted, 5/\$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

WANTED: Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S. R388, R390, GRC. Any 51 series Collins unit, test equipment, everything. URM, ARM, GRM, etc. Best offer paid 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING! Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

HEATHKIT SB-300 w/SSB, CW crystals, Mint condx. \$219.00. WB2EVZ, 2154 57 St., Brooklyn, N.Y. 11204.

RTTY gear for sale. List issued monthly, 88 or 44 Mhy toroid, first offer paid. Edott, Buchanan & Assoc. Inc. Buck, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

WANTED: Model #28 Teletype equipment, R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

1000 PIV @ 1.5 amp, epoxy diodes includes diode bypass, caps and bridging resistors, 10 for \$3.75. Postnada USA. With diode purchase, 125 Mf. at 350 volt electrolytic capacitors, 50¢ each. Postpaid USA, no limit. East Coast Electronics, 123 St. Boniface Rd., Cheektowaga, N.Y. 14225.

WE'RE Trying to complete our collection for Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-19347 AARL, 225 Main St., Newington, Conn. 06111.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

SELL, trade or buy Call Books, handbooks, magazines, and old radio sets and parts. Erv Rasmussen, 164 Lowell, Redwood City, California 94062.

SAVE. On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts. 617-598-2530 for the gear u want at the prices u want to pay.

3000 V @ 3mf brand new GE Pyranco oil capacitors, \$3.00 each. Can mail, 3-lbs, each shipping weight. FOB P. Wandell, RD #1, Unadilla, New York 11349.

TELETYPE Wanted—M28 typing units, any condx, keyboard perforators—reperforators, cast aluminum TD bases, all unused parts. Sell, too. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310.

VIKING INVADER 2000 Drake Receiver TA-33 beam, tower as a bonus if I can sell my modern home, air-conditioned, on half-acre. And my radio and TV, business which is located downtown with very good rent. Both for \$27,500. Full details if you are interested, 40 years in same business, same town is enough for me. Want to become a full-time W4. K. Deal, W8THJ, 4755 No. Washington Road, Piqua, Ohio 45356.

VHF-UHF Digest... Sample 30 cents. M. Goldman, Box 5001, Milwaukee, Wisconsin 53024.

TEST Equipment wanted: Any equipment made by Jewlett-Packard, Tektronix, General Radio, Stoddart, Measurements, Bonton. Also Military types with WRM(-), USM(-), TS(-), SG(-) and similar nomenclatures. Waveguide and coaxial components also needed. Please send accurate description to Tucker Electronics Company, Box 1050, Garland, Texas 75040.

WANTED: Early wireless receivers and transmitters prior to 1926 for private collection. Jack Swanson, W5PM, RFD 1, Box 399, Covington, Louisiana 70433.

FOR Sale: T150 \$85.00. Superpro commercial version. \$60; antique Bretting I, \$70; antique jewel meters, \$10 each, 4.250, \$20. QST's 25¢ each. Estate WDDDE, Union, Washington. K. Olson, Star Rte 1, Box 398, Belfair, Washington 98528.

POLICE-Fire radio dispatcher directories! Exclusive official directories; call signs, frequencies of local, county, state agencies, National. For all VHF fans. CD, AREC, RACES, MARCS, VFD's Catalog for stamp. Communications, Box 56-1, Commack, N.Y. 11725.

DAH-DITTER Keyer. Integrated circuit electronic keyer. Fully self-completing on both Dit and Dah with automatic spacing. Built-in SC pwr. supply, relay output, with sidetone monitor and speaker. Completely assembled and tested. Only \$34.95. Dealer inquiries invited. Send your order to M & M Electronics, 6835 Sunnybrook, N.E., Atlanta, Georgia 30238.

WANTED: Electronics Instructor. General indispensable. Theory and workshops. Science Camp, Lake Placid, N.Y. Write Epstein, Apt. 4B, 440 Westend Ave., N.Y. 10024.

COLLINS KWM-1 with 516E-1 12VPS, 351D-1 Mobile mount, 312B-1 Speaker and Home AC PS. All extremely good. \$4.35. Bill Pfeffer, 120 Post, Iowa City, Iowa 52240.

HT37/SSX-111 package only \$300 HW12A \$100. BC221-AK Frequency meter \$65. New Johnson 250-39 TR Switch \$15. K4E0F.

COLLINS Station in new condition, for sale. 75S3C with 800 cycle, 2.1 K.C., 6.0K.C. filters. 3253 transmitter, 516F2 power supply, 312BA station control, 30L1 linear amplifier, 666 mike and TH6D beam, 30% off list price. Pick up only. K8LDC, 738 Truesdale Rd., Youngstown, Ohio 44511.

SALE: Apache X'mtr. w/D104 mike; HQ170C receiver-both mint condition. SASE for many other items. Mrs. Ruth Hornbeck, 3406 Rock Bluff, Dallas, Texas 75221.

SALE: War Surplus items: Command Sets. Send SASE for complete list. C. W. Roberson, W5MBP-Box 218, Terrell, Texas 75160.

TWO Galaxy V Mark 2, One new, one slightly used. A.C. Power Supply, D.C. Power Supply, Speaker, console, and Novice Adaptor, will accept reasonable offer. Arlie E. Paige, 418 Antelope Trail, Parker, Colorado 80134.

SELL: Hallicrafters 18AVQ in superb shape. Looks like new, \$170.00. Will pay base. WA0DKL, 514 North Washington, St. Peter, Minn. 56082.

WANT: Early issues Pioneer Wireless Magazines for W4AA Historical library. Wayne Nelson, Concord, N.C. 28025.

REPAIR and calibration service. Write before shipping. Pantronics, Inc. 6608 E. 1st Rd., Alexandria, Virginia. 22312.

HALLICRAFTER SR-150 Mount, D.C. supply \$375.00. S.X. 117-Speaker \$225.00; SB 300 Linear \$195.00. 1HE4X Tri-bander \$85.00; Tristao CZ-454-FS Tower expecting fixture \$280.00; Both like new. Ham "M" Rotator \$75.00. Tri-ex 60' crank-up tower \$125.00. WAMVC, 10 Carlen Ave., Asheville, N.C. 28804.

LINEAR, new, pair of 4-1000A, in Class B, grounded grid, vacuum capacitor, adjustable filament and plate voltage. 10 thru 80 meters. Bill Brown, W0SYK, 28 Martine Lane, Hazelwood, Mo. 63042.

SELL: Hammarlund SP-600 Receiver, new condition, rack mount with manual \$250. Stancor 300 watt modulation transformer, type A-3898 \$20. W0OHX, Wilford Lane, Kiowa, Kans. 67070.

COLLECTORS! QST's. Complete run 1922 to date in binders. First \$300.00 certified check. Pick up or pay shipping costs. Globe King 500C with HD onboard transformer. 600 Watts Easy. A-1 shaps \$225.00 including spare 4-400A and D-104 Mike. Must pick up. F. B. Charlton, W5WQX, 6824 Lacey Drive, Baton Rouge, Louisiana 70811.

SELL NC. 300, NC. 300/6 converter Ameco 1X62, Elmec AF68A, WA9ZJG, Ted Suddarth, 54868 Quince Road, South Bend, Ind. 46728.

FOR Sale: Hallicrafters SX-100, \$125.00. Hallicrafters S-36A, 27-43 MC, with 250W Stator 300 watt modulation transformer. Type A-3898 \$20. K2SJB, 109 W. Haven Rd., Ithaca, N.Y. 14850.

HT32, Full 10 meter coverage \$225. Collins 75A3 vernier knob, 3.1 and 2.1 mechanical filters, product detector and calibrator, \$250. Art Rauch, WD2DID, P.O. Box 58, Central Islip, New York 11722. Tel: (516) 234-8544.

FOR Sale: Heath DX-60: S-40B receiver; Knight VFO: SWR Bridge; Key; Mike; stals; Antenna relay; Headphones; beam filter \$100.00. Great for novice or General. Write: WA9ZFE, 757 Bonniebrook, Mundelein, Ill. 60060.

SELL: Hy-Gain 18-HT Hy-Tower 50 ft. vertical for 10-80 meters, 6 months old. Less base insulators but six ground rods included \$100. Bob DeLuca, W8B8MG, 14120 Ashton, Detroit, Mich. 48223.

COLLINS 75A-4 Receiver, mint. No. 3540. First \$325.00 gets it. W5MK, 4701 Linden St., Bellaire, Texas 77401.

FOR Sale: TS-452 C/U 5-100 mc RF signal generator with scope, and m sweep marker \$250 or trade. Central Electronics 200V \$400. Drake 3BQ with calibrator \$200. HW-32A Transceiver, 20 Meters, and A/C supply in SB-600 speaker cabinet \$150, all on the air and in excellent condition. Want for Cash late KWM-2. WA4EWA, 10905 Satellite Blvd., Orlando, Florida 32809.

WANTED: Damaged HW 12 or HW 32. State condition and price. H. Reich, K0UBK, 1205 Hall Ave., West St. Paul, Minn. 55118.

RADIO Control: Quadruplex Feedback Proportional, 4 servos, complete, 2.0 MHz. Looking for 2 sets of transmitters for \$100. WB2UHO, Box 104, RD 2, Flemington, N.J. 08822, 201-782-8026.

SELL: 1 KW Ham station with circular console, 100A Eidico Exciter, Linear Amplifier pair of 4-400A, Power supply, 3500 Volt 1 Amp., Collins 75A 1 with SBA 1 Eidico sideband detector, rejection Notch filter, Panadaptor 500 KC IF now in operation at K2PKH Great Neck, N.Y. Many component parts, motors, servos, etc. Price \$395.00. Write: JBI Beam Filter. Moving to Florida. For quick sale, 8 Willow Place, Great Neck, N.Y. Phone (516) Hunter 7-3440 or write.

COLLINS 75A-2 revr w/spkr & xtal calib. \$180.00. Globe Chief 90 w/screen modulator Drake filter, Heath VF-1 VFO, \$40.00. Electro-Voice 664 mike & desk stand \$40.00. All excellent, all w/manuals. George F. Maier, K1GXT, 516 Prospect St., Methuen, Mass. 01844. Tel. (617) 685-0051.

CE-100V. No. 957. one of the last and best. excellent \$395.00. Drake 2B/2A0 full 10 meter coverage \$200.00. HQ-129X plus calibrator, speaker, O-multiplier \$75.00. Knight 1-50 highly ruggedized, stabilized \$70.00. New EIMAC 4-1000A's \$50.00 each. Want mechanical filters F-500B-31, F-500B-08 for \$114. Also need vernier turning knob for 75A series. Carl Huether, RFD No. 1, Box 129, Chester, N.H. 03036.

FOR Sale: KWM-2 No. 15220 (new Oct. 68), 516-F-2, \$895. 312B-5, \$250. F455C-60 (75A-1), 225. HO-13, \$50. 75A-3, \$225. Eidico SSB-1000-F, spare tubes, relay, \$185. Wanta: 30S-1, 30L-1, James Craig, 29 Sherburne Ave., Portsmouth, N.H. 03801. 603-436-9062.

COLLINS 72S3 \$425. 30S1 \$700. KWM2 with CC-2 & PM2 \$900. 75A3 \$400. EZ-Way 60 watt tower \$500. 32S1 \$375. 75S3B \$400. Jack Anderson, W1FDH, 64 Hitchcock Lane, Avon, Connecticut 06001.

NCX-500 with AC power supply. Never used. Will ship prepaid to first money order or \$410.00. W. P. Steinhauer, W3LHZ, R.D. No. 1, Dallas, Pa. 18612.

WANTED: Transformer 800 v 400 ma or close, W7ED, 10304 Hopkins Rd., SW, Tacoma, Washington 98498.

HALLICRAFTERS HT-32, \$225. Mark Timpany, 209 West Racine St., Janesville, Wisconsin 53545.

WANTED: Plug-In (100 mc plus) Converter for 5246L H-P, G3 General Radiotelephone, or Northeastern frequency counter. W8UCG-630, Glenwood, Muskegon, Mich. 49445.

BOSTON-Providence-Henry 753 SSB CW transceiver, AC power or supply, 2000 Hz, Wells \$99. 700 rec. and trans. power supplies \$100.00. Local sale only K1KFE, 617-348-3869.

COLLINS MP-1 12-volt power supply Serial 10259, cables, complete \$125; K4EC, 33561.

DX100 \$75.00. NC300 with speaker \$150.00. K0JOI, Glenn Davidson, P.O. Box 401, Buffalo, Mo. 65622.

HEATH HW-16, \$58.00; Heath HW-32A and H-135.00; All rigs in A1 condition Chuck Schmidt, 306 N. Street, Anna, Illinois 62906.

SWAN 350 with VOX and AC power supply/speaker cabinet all in excellent condition, little use since factory check and Shure 444 mike \$350. WA8HCS, 403 Lincoln, Chesapeake, Michigan 48616.

FOR Sale: Co Mag's 52, 53, 55, 56, 58, 61, 62, 63, 64, \$2.00 per year. Eidico EE-3 Keyer \$20, TME GSB-1 adapter LN \$25. W2HP1, 20 Ash Dr., Neptune, N.J. 08540.

TWO 4-400A's and two 810's \$120; Eico 720 xmitter power supplies, and Heath VF-1, make offer; Heath mint condition \$35. Bill Blum, Broadus Route, Miles, Montana 59501.

WRK's used gear has trial-term-guarantee KWM1, \$32. SR34C, \$149.95; HE45B, \$79.95; Swan 240, \$179.95; U. V. 3229.95; B&W 5100B, \$109.95; HX20, \$149.95; U. 249.95; Ameco R5, \$59.95; SX146, \$189.95; HR20, \$203.00; \$199.95; SB301, \$269.95. Hundreds more. Free "book" list. WEL, Box 919, Council Bluffs, Iowa 51503.

EXCEPTIONAL NCX-5 and NCX-A supply/speaker for. Was factory-converted to Mark II six months ago, and in prime electrical and mechanical condition, all m/s. at source bulletins, Mark II tech sheets and original case. Has never been mobile, and absolutely no modification. \$429.00 f.o.b., Williamsburg, Virginia 23185. Larry Guenther, WA4JIT, 3 Foxcroft Road.

SB620 Spectrum analyzer scope, factory aligned \$11. Loren Hole, Box 2347, Everett, Wash. 98201.

SELL: NCX-5, Mk II; Calibrator; NCX-A Supply; Heath I Keyer; HO-10 Scope; HM-11 Bridge; EV-225SR Mike. Condition, Package deal only. Best offer over \$550.00. R. A. Duntley, K1EVU, 88 Perham Street, Farmington, 04938.

15 Meter Bandsread coil "AC" for HRO-60, \$25.00. FHK, M. W. Minear 703 N. Garfield, Lombard, Ill. 60148.

DELUXE RTTY Station, Model 28-KSR with power supply, tape equipment, including printed reperiator. Excellent covered model 250 keyers, model 100 for 850 shifts. Complete working unit \$2500. Sell cost \$1500. WA2WUV, Phone 516-799-8544.

HEATHKIT: SB-200 Linear \$150.00; SB-400 xmtr \$2. Easy-Way 40 Ft. Tower \$100.00. All excellent condition. little use. No time to operate, and need money. Joe M. WB2QYO, 1034 Estates Blvd., Trenton, N.J. 08690. Tel or Sun. 609-586-6671.

KWM-2 PM-2 \$750. 75A4 Matching speaker \$375. \$275. Jones Micromatch \$25. Eico 147AK tracer \$25, K. RFD 1, Millville, N.J. 08352.

COUNSELORS-electronics, ham radio, male-coed General Agents, A-1 Saphir, 62 Howard Avenue, Tuckahoe, N.Y. 10707. 914-W01-3786.

WANTED: New or used FRR-18, FRR-21, SRR-11, 11A, or URR-45 very low frequency Navy receiver, condition and price. James Williams, 1641 Link Road, Burg, Virginia 24503.

FOR Sale: Eight 4-250A tubes with sockets, approx. 100 hours usage \$5.00 each. Two Stancor P-6468 30 filament transformers \$5.00 each. Elmec AF-67 Tran with voltage regulated power supply, in excellent condition \$45.00. You pay shipping charges. W6WY.

SWAP: Davco DR-30 w/AC/DC PS Spkr, factory overhauled and updated for SBE-33 w/DCPS or SBE-34 or trans. Rankin, W4ZS, Naveodfac Indian Head, Md. 20640.

FOR Sale: KWM2 with noise blanker and power supply 100, 1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000. 11 Lane, Danville, Virginia 24541.

B & W 6100, good, \$250; National HRO-60, good, speaker and 15 meter coil, \$180; DuMont 208-B, good, needs new small tubes \$25; Heath Ham-Scan, good \$50; get, or pay shipping. ARRL-WIAW, 225 Main St., New Conn. 06111.

COLLINS 75A4 serial 2319, 3 filters, Vernier dial, \$425.00. Central Electronics 20A exciter 458 VFO. Both mint condition. W2RQD, 9492 Hayes Rd., Marcy York 13405.

SELL: HT37 with mike and Manual A1 condition \$4. W2TPB, 111 So. Crescent Dr., Rome, New York 13440.

SALE: Hi power linear pair 4-1000A in parallel G.G. has vacuum var. cond. and variable inductance. Power supply 0-5000V, at 12A. 4000V. Solid State RFR 477 cabinet, Not Homebrew. Will ship FOB Littleton, CO. Cost \$2000. In 1966. Send for pictures. P.O. Box Littleton, Colorado 80120. 303-794-7789.

SELL: Drake 2-CT smtr, 2-C revr (100 KC calibrator noise blankers) 2-NJ spkr (O-Multiplier & notch filter). Like new, 18 hrs. tot. use. \$350.00. Tel: TA-4 3281. Z. Mann, 250 Hollywood Ave., Bronx, N.Y. 10465.

EXCELLENT new HW-32A with calibrator, manuals Hy-Gain 18V; all for \$125. Jim Sandberg, K6HE, 1138 Road, Escondido, Calif. 92025.

FOR Sale: Heath Twoer HW30, A-1 condx, w/mike antenna, 100 coax connector, \$30. WA0GHC, E. W. Ann 4206 Lombard St., Duluth, Minn. 55804.

FOR Sale: HR-10 revr, excellent \$50, DX60A needs work \$45. Knight V.F.O. F.B. Condx \$25, and DX relay \$7.50. Tom M. Coburn, WB4LL, Box 38, Te Ridge, Tennessee 37178.

FOR Sale: Collins 75A2 with speaker. Central slicer, model B., HT32 and HT33A, all in excellent HT33A used less than 15 hours, \$675.00 for the lot. Matthews, W3DPA, 921 Stuart Rd., Wilmington, DE 19807. Phone 302-658-3200 evenings.

SELL: Heath Twoer with mike and manual \$40. Leda 483 Eastbrook Rd., Ridgewood, N.J. 07450.

FOR Sale: Hammarlund HQ-170A-VHF, xnt. cond. (213) 375-1731, 5519 Calle De Ricardo, Torrance, 90505.

SELL: Heath SB-301 receiver, purchased and assembled in December 1968. Absolutely mint condition, asking \$250. Pair AMEREX 4-400A, good condition, not pullouts, \$35. Jennings vacuum variable 50 to 250 picofarads at 15,000 volts \$20. Capacitors, 7 microfarads at 4,000 volts, \$5 each. Penton President Mark IV solid state tape recorder, built-in QRP amplifiers and speakers phone jacks for external amplifiers, and high impedance line input. Original cost approximately \$220, asking \$90 complete with 2 microphones. Tom Healy, 303 East John St., Champaign, Illinois 61820.

FOR Sale: SX-140, T-60, Mike relay misc. \$105. Trade? Wanted HEAT, SR46, etc., WA9BHR, 1253 Carriage Lane, Northbrook, Ill. 60062.

NOVICE Station: Eico 720 Transmitter; Lafayette HA-500 receiver; w/speaker, keys and crystals. \$129.95. WA3LEJ, 6917 Chester Ave., Phila., Penna. 19142

WANTED: Very low frequency receiver (MSL-5). Write WA7KIDZ, Box 355, Kent, Washington, 98031.

COLLINS: 7551 rcr with Waters rejection tuning, \$250.00. DX-60 and HG-10, \$75.00. WQRTK, Belfield, North Dakota, 58622. Tel: 575-4404. C. C. Thompson.

RADIO Counselor for upstate N.Y. brother-sister camp. Fully equipped cabin, top camp facilities. Send personal details in a letter requesting further information and application. Camp Seatico, 25 Fenimore Road, New Rochelle, N.Y. 10804.

WANTED: HA-14 Heath Linear. State price and condition. George Cherney, 4986 Leavitt Road, Lorain, Ohio 44053.

WANTED: Heath Q-Meter, G. E. Hall, WITPK, 40th Floor, 299 Park Ave., New York, New York 10017.

HALLCRAFTERS HT44 w/P500 \$295, 2 Meter SR42A Mint, \$125. Galaxy 300 with AC supply \$175, Swan 120 \$95, HP13 \$48, HP23 \$40, HP20 \$28. List Available. W2FNT, 19 Hillcrest Terr., Linden, N.J. 07036 (201) 486-6917.

200V—seldom used—original carton \$450.00, HQ 160 like new \$125.00—cash and carry—WA2RMR, M. DelBaviglio, M.D., 30 Centre Ave., Secaucus, N.J. 07094 (201)-867-8754.

CLEANING SHACK: Sell HW-22 with manual excellent \$80.00. BC25-AK excellent with original calibration book \$60.00. TS-75A/J, VTVM 110V, \$30.00. TS-488A/UP Echo Box 9000-9600 MC \$30.00. General Radio Variable capacitor with standards \$50.00. George Heabler, W8QXO, 121 Parana Drive, Newark, Ohio 43055.

SELL: HW-32A and HP-23A, HRA-10-1 excellent \$145, AN/SRR-13A Revr very FB \$250, Teracraft model 50 converter excellent \$45, Twin City TU all OK \$30. Knight TR-106 good \$70, Teracraft 2mtr. xmitter 20 wts with p.s. \$50. National type NRAO revr good \$30, TCS xmitter needs work \$20, write for details. Wanted: SB-101,620. Tel: 669-8744, WA1EDJ, Gary Confrey, Rt. 80, Killingsworth, Conn. 06417.

DRAKE: R-4A, like new condx. \$250 firm. Ameco CMA allband converter, 1.7-54 mc and 108-174 mc new condx. \$30. Ameco PCL-P, preamp, 1.8-54 mc \$15. Sid Levinson, 3406 Church Ave., Bklyn., N.Y. 11203. Phone: 856-9862.

DRAKE TR3, completely mobile with accessories. WAØHTZ, 4411 Glacier, San Diego, Calif. 92120.

MUST Sell: Like new, Collins 7553, First \$350 or best offer. Also Ham-M Rotator, K01DV, 1732 Ross Avenue, St. Paul, Minnesota 55106.

CUSHCRAFT 2 and 6 antenna, \$150. Heathkit HR-0B receiver with crystal calibrator with instruction book used 1 hour \$74. Clegg 22'er with Ameco VFO both mint condition \$225. Knight P-2 swr meter and Knight compressor amplifier \$15. Channel 3 antenna three antenna and amplifier \$69. Herb Holzberg, W2FCB, Rt. 115 Sandra Drive, Totowa, New Jersey 07512. Tel: 201-256-0826.

WRITE, phone, or visit us for the best deal on new or reconditioned Collins, Drake, Swan, Galaxy, Hallicrafters, Hammarlund, Hy-Gain, Mosley, Waters, SBE, Hertz linear, BTI linear, towers, rotators, or other equipment. We meet any advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

FOR Sale: Mint condition, SBE 34-Shure 404C mike \$275.00. Fred Bickell, W4ZSB, 2160 N.E. 56 Place, Ft. Lauderdale, Fla. 33308.

VIBROPLEX Champion bus one-year old \$14. Adolph Gudzone, WA3GFP, 218 Dumont Rd., Wilmington, Del. 19804.

WANTED: Someone to professionally install tower and beam at my OTH. Work can be done at your convenience. W2OGA, Harold Haylick, 20 Meadow Drive, Woodmere, N.Y. 11598. Bus: 212-LO3-2054. Home 516-295-2116.

HP-13 mobile power supply \$50.00, SBA 100-1 \$10.00. Huster, Bumper mount 20-75 \$15.00, K3UKZ, 305 Elm, Hazleton, Pa. 18201.

SELL: Complete ham station: SB-300, \$180; SB-400, \$220; Telex Tribrander, \$40; YR-44 Rotator, \$35; \$5 ft. crank-up tower, \$50; EV-66 mike, \$20; SWR Meter \$10; Eico Grid Dip, \$15; Simpson 260 VOM, \$20; SWR Meter \$10; Eico Grid Dip, \$15; Simpson 260 VOM, \$20; Simpson 311 VTUM, \$25; Digital Clock, \$10; Cabels, tubes and many misc. tubes thrown in all for \$525. WA1CTJ/3, 1414 Independence Dr., Whitefield, Reading, Pa. 19609 (215)-678-5444.

DRAKE: R-4A receiver, excellent condition \$285.00. Drake AC-3 Power supply, perfect \$50.00. Will ship. REA Collect, M. R. Nettleton, WIKDD, 272 Edgewood Dr., Torrington, Conn. 06790. Tel: 489-8095.

STEREO, Harman Kardon Citation I preamp; Heath AA-121 80W amplifier, AJ-13 tuner AA-32 amplifier. Package only, \$10 shipped. R. Wanat, 443 Atlas Dr., Madison, Alabama 35758.

HT32 and SX10A both for \$300. Come and get them. Alex Ekblad, 161 Evans St., New Hyde Park, N.Y. 11040, 516-FL4-3122.

DRAKE 2C and 2NT, Both are in top shape. Plus 2CS and cables. Asking \$300 for the entire lot. Will trade. Write or call: Edward Benson, 176-16 85 Ave., Jamaica, L.I., N.Y. 11427. Tel: (a.c. 212)-776-3669.

DRAKE 2C, exlnt condx, \$160.00. Gary Kunz, 391 Pascoek Rd., Westwood, N.J. 07625.

HEATH DX-60B transmitter \$50, Matching HG-10B \$25. Both in excellent condition. Don Wile, WB2CGK, 7 Orchard Farm Rd., Port Washington, N.Y. 11050.

SALE: Heath Monawk receiver, matching speaker, in exlnt condx; manuals, original owner! Studor, WA9CCX, 3907 North New Jersey, Indianapolis, Indiana 46205.

BRONICA S-2, with 50, 75 and 135 mm lenses, prism, two 120/220 backs and L grip. All less than 1 year old and in like-new condx; \$720 or trade or Johnson 6N2 Thunderbolt, Concord viewfinder, CCTV camera, or certain Hewlett-Packard and Ikontronix items. Wanting 230A amplifier, H-P 340B, 343A, 349A, 430C, 431, other late RF gear, H. Greenlee, K4GYO, 430 Island Beach Boulevard, Merritt Island, Florida 32952.

FOR Sale: To settle the estate of Otto Smith, W3BOJ. Make offer: HT-37, SX42, B&W model 370, SSB rcvg. adaptor, BC-221D freq. meter, ARCS xmttr 2.1 to 3.1 Mc. and .5 to 8 Mc. Heath sig generator, IG102, Heath sig tracer IG12; set of wave-meters covering 3 to 180 Mc., 100TH tubes, +125 tubes, SCR BC 625 revr and pwr supply, Micro Match SWR bridge, OST maxs 1953 thru 1968. Many items not listed here. Send SASE for complete listing. Albert Godshall, W3SDE, 509 Lansdale Avenue, Lansdale, Penna. 19446.

COLLINS KWM2, PM-2 a.c. supply; 516E1 d.c. supply, mobile mount. Make cash offer. W9ATH, 6533 No. 52nd St., Milwaukee, Wisc. 53223.

SELL: Ranger 2 with PTT, \$170; HQ170C, \$175; Heath T-woer & Beam \$40, CN144 Converter with 6 Mtr IF, \$25; D-104 \$5, Drake 1000 Low Pass, \$8; Dow-Key Relay \$10. All mint or excellent conditions \$395, takes all. K1VMT, Gallo-way, 46 Oak Hill Dr., Arlington, Mass. 02174. Tel: 617-648-5474.

BARGAINS: Hammarlund Superpro SP-400X, free 100 kc. crystal calibrator, \$50.00; new UTC CVM3 125-watt modulation transformer, \$16.00. W8HET, D. R. Gardner, 3800 N. River Road, Port Huron, Michigan 48060.

HALLCRAFTERS HT-44, SX-117, WVW Crystal, Transceiver Cables, PS-150-AC \$425, NCX-3, NCX-A, NCX-D, \$250. All like new. W8FRJ, 5124 Maple Ridge, Kalamazoo, Michigan 49001.

SELL: Clegg 997 \$75.00. Globe Scout \$25.00, "Lamp" K8-ABF, 116 Euclid, Creston, Ohio 44217.

WANTED: An old horn-type speaker, and (5) OIA tubes. State price and condition. Andy Brewer, 4917 Mont Vista Dr., Knoxville, Tenn. 37914.

HAVE Collection antique radios, also 7" Hallicrafters, 3" Pilot TV and National SW3. Swap for SSB transceiver. WØRGD, 1328 E. Barnett, Springfield, Mo. 65804.

GOING to College: Sell Swan 350, 117XC power supply, TAD31 jr. HR-44 rotator, D-104 mike, HM-15 swr, IC keyer, paddle jr. cables, coxk, \$400 firm. WA9RPF, 9328 Parkside Drive, Des Plaines, Illinois 60016.

OPENINGS for Ham Radio Counselor for coed camp Pocoson, July and Aug. Kittatinny Camp, 119 S. Easton Rd., Glenstone, Pa. 19038.

SELL: Swan-400, full-coverage VFO, AC power supply, all in "like-new" condition, not a scratch, \$400. Ronald Schultz, WA2ONV, 114 Blossom Rd., Syracuse, New York 13224. R389, R390, R390A, 5114, 75A4, 75S3A, NC101X, HR050-T1, HR060T1, SP600, KWM-1, KWM-2, 62S1, 312B5, HA-2, and others. List for SASE. W2ADD.

COLLINS 62S-1, KWM-2; TS-323/UR freq. meter; Rttv; Kleinschmidt TT-4A/TG, CV-89A/URA converter; Model 19. Make offer. K5RTI, 1301 Clearfield Drive, Austin, Texas 78758.

SWAP—Almost new Telex 20M546 beam for SSB transceiver, exciter, or linear. Will pay cash difference. K4JC, Route 1, Springfield, Tennessee 37172.

FOR Sale: Swan 500. For college expenses. Late model. Mint condition. \$425 firm. I'll ship. WA7IPT, Rt. 1, Box 629, Ridgefield, Wash. 98642.

SB-34 with microphone, never used mobile, like new. \$250. Drake 2B, Gud Condx. \$145. Will ship. Capt. Fred A. Dorsey, WA4TDC, Box 711, Moody AFB, Georgia 31601.

NEW Mexico: Sell Heath SB-300 receiver. Excellent condition \$170.00, 2.1 KHz and 400 Hz filters. \$100.00. 13113 Lomas Verde NE, Albuquerque, New Mexico 87112.

USED Triplet TV-FM Signal Generator marker model 3434 \$35.00, plus postage. 1-122 Combination Signal Generator & Hetrodvne Frequency Meter 8 to 15 & 135 to 230 MC \$40.00 plus postage. Roache, Canterbury, Ct. 06331.

BTI 2KW linear, 2 yrs old, but used v little, and like new, \$495. Drake KW LP, ftr \$64. Vibroplex Blue Racer \$21. 2 EL 15 mtr beam \$10; D104 w/G stand \$12. K8KCB, 221 Edinburgh, Findlay, Ohio, Ph: 419-423-5890.

"HOSS Trader Ed Moory" says if you don't buy your ham gear from him, you might pay too much. Shop around for your best price and then call the HOSS before you buy. New equipment, factory warranty, Galaxy V Mtr III, \$270; new early Swan Model 500-C, \$379; SB-34, \$339; NCX-500, \$309; FTDX-400 Transcvr, \$459; New Rohm foldover twr, 50 ft., prepd, \$188; new Mosley TA-33 and demo Ham-Motor, \$189. Used equipment: Heath Marauder, \$175; HQ-170, \$149; 2-A, \$139; 75A-4, \$289; TR-4, \$409; 1-4XB, \$339; R-4B, \$319; Ham-M rotor, \$88; Hallic SX-117, HT-44 & supp., \$309; Collins S/Linc. complete, \$899; GT-550, \$298; Swan Cymnet, \$309. Ed Moory Wholesale Radio, Box 506, Tel: (501)-946-2820, DeWitt, Arkansas 72042.

QST's for sale from W2AYU estate. Forty years—1925 to date, complete except for 1938 through 1941. Unbound, but in good to excellent condition. Will consider sale of all or by the year. Best offer plus shipping costs. Henry J. Metzner, 206 Glen Street, Glens Falls, New York 12801.

WANTED: HW100 with HP-23A and SB600; might accept SB100 or SB101. Must be guaranteed perfect. M. Kramer, WN9AHQ, Box 6, Fenimore, Wis. 53809.

DRAKE 2C, 2CQ, Calibrator, like new \$225. DX-60 \$35. Cashier check or money order. Will ship in Southeast. Alex Turner, WB4GVP, Univac, Box 10242, Charleston, S.C. 29411.

SBE-34 Guaranteed perfect with mobile mike and mounting plate, \$260. KWPEP, SB2LA also perfect, but needs 6E6 tubes, \$150. Gary Davis, K1LEM, R.F.D. No. 1, Williston, Vermont 05495.

COLLINS 7553B Latest model for sale, includes 500 cycle CW filter. Like new. Asking \$75.00. K6SVT, 18672 Spaulding Avenue, Santa Ana, CA 92705.

HQ-170AC, HT-37, 250 w. matchbox, SWR meter, Shure 444 mike, Dow Key ant. relay, spkr., headphones, pre-amp and more. All gear except matchbox in excellent condx. SASE for list. Make offer. Carl Stecker, 1531 Deer Path, Mountain-side, N.J. 07092. 201-233-6984. weeknights after 9:30.

SELL: Viking II, 122 VFO, new 8298A finals, \$85.00. Hallcrafters SX-96 clean \$95.00. Tapcon XC-144 2-meter converter \$40.00. Donald Conley, 90 Donahue Drive, Manchester, N.H. 03103.

FOR Sale: Going microwave: Collins 51S1 used 50 hrs \$1400. Bronica camera with prism \$400. Marantz model 18 receiver \$300. Marantz 7 preamp \$150. Citation B 100W amp \$150. Revox G36 MKII taperdriver \$350. Professional condenser Mic \$150, with built in power supply. Altec Lansing A-7-500 \$300 with super tweeter to 40 KHZ, scott FM multiplex tuner 340E \$150. Millen Dipmeter 90651 \$40. Videcon 7735A New \$30. Robert Yoshida, 144-59 28th Avenue, Flushing, NY, NY 11354. Tel: 212 INI-9476.

T.V. Cameras—Heavy duty industrial. Trade-ins. These are beefed-up babies that really give "positively the brightest, clearest picture you ever saw!" Complete with schematic lens and vidicon \$250.00. C.C.T.V. Center, Inc., Route 46, Little Falls, N.Y. (201) 256-7379.

IDX AWARDS Log: This 150-page book just published giving number and type of contacts needed for over 100 major awards for hams and SWLs by clubs world-wide includes cost and how and where to apply. Individual logs provided for each award to keep complete record of contacts and confirmations. Required over two years to prepare. Most complete and up-to-date source of DX Awards available, \$3.95 postage paid (\$4.95 foreign). The McMahon Co., (W6IZE), 1055 So. Oak Knoll, Pasadena, Calif. 91106.

SELL: Hammarlund HQ170AC with noise immunizer, and HICO 720 transmitter. Will sell separate. WA2GQW, 63 Park Drive, Warwick, New York 10990.

STAR SR70E sacrifice \$150. First M.O. it goes. Frank M. Rodio, 243 Senator St., Bklyn, N.Y. 11220.

WANTED: Mosley MP-33 beam or equivalent with rotator and 35-50 ft crankup tower. W6EBY, 789 Garland Drive, Palo Alto, Calif. 94303.

DRAKE: TR4 \$395.00. AC4 \$60.00. RV4 \$60.00. DC3 \$60.00. All \$550.00. Hustler mobile whip, ALL bands \$39.00 Heath sixer \$25.00. Keyer HD10 \$25.00. NCT 2000 \$299.00. Trade considered. Vic Barry, WA4LIG, 306 E. Gilpin Ave., Norfolk, Va. 23503.

SELL: Portable, has driven D.C. Generator, 16 volt/150 amp. Bonnton mod 202-D FM sig. gen. H-P mod ZOZ-B audio onc. all excellent with manuals, \$125 each, shipping paid. WB2PLY, Box 207, Princeton Jct., N.J. 08550.

SPRING Specials: KWM-2 \$795.00; 32S-1 \$395.00; 75A-4, Ser. No. 5591 \$375.00; 75A-1 \$149.00; 30L-1 \$395.00; HT-32A \$275.00; HT32A \$275.00; HA6 with A/C \$179.00; B&W LPA with LPS1 \$275.00; B&W 515B \$75.00; B&W 5100 \$95.00. HW12 \$83.00 and NCT270 (New) \$179.00. Free List: Howard Radio, 8235 N. 1st St., Abilene, Texas 79603. Tel: DRAKE 915-677-1335.

DRAKE 2-B, 2BQ, cal. Fl con \$195. DX60A-HG-10 VFO. TR \$85. 4-125A \$10. 1300v 450 ma. Trans P. Supply \$25. E. Hiskes, WA9VIN, 233 W. 106 St., Chicago 60628.

WANTED: Heath DX60A VFO. K1PNL. Tel: ac (203)—583-5433.

NOMINATIONS: Nominations are due for 1969 Illinois Amateur of the Year award, to be presented at the 35th Anniversary Hamfest, Hamfesters, 6000 South Tripp, Chicago, Illinois 60629.

LAMBDA Solid State Regulated Power Supply Moden LA-2005BM continuously adjustable 70-105 VDC at 2A. Voltage and current metered. 3/2" H 19"W 15"D 55 lbs like new. Make offers. Jarvis, 5 Stratford Pla., N. Babylon, N.Y. 11703.

COLLINS: 755-3B-32S-3-516-2. Present production models, High Ser. numbers, orig. cartons, cables, & manuals. \$1190.00. Collins 51J3 Keyer, with manual, orig. condn. consider swap on KWM-2. H.V. Transformers 5000 V. C.T. and 1/2 A. Lower V. Taps, Pri. 115-220 in oil, 9x10 1/2x9". \$35.00. One 4700 V. C.T. 350 ma. Pri 117 V. in oil 7 1/2x7 1/2x8". \$79.00. plus shipping. W9CLN, 1101 N. Elm. Centerton, Ill. 62801. Ph. 618-532-9281. Personal checks not accepted.

SELL: HT44-PS150 and SX117 \$485. All A-1. Dr. C. R. Crosby, Chatham, Mass. W1QP, 02633. (423-1157).

FOR Sale: SR400 transceiver and PS-500-A/C supply, \$580.00. HA-20 remote VFO, \$125.00. Davco DR-30 receiver, \$230.00. All units like new. Jack Yeoman, WBVHY, Rt. 4, Washington Court House, Ohio 43160.

LINEAR Amplifier F1DX-2000 Built-in P/S 1300 PEP. New condition \$165.00. VOX for swan 500 new \$20.00. Will ship within 300 mi radius WB4JDT, C. Heisler, Route 3, Abingdon, Va. 24210. Tel: 703-628-5429.

FOR Sale: OST-5 from Jan. 1947 to present day—no reasonable offer refused. All good condition. Earl O. Fuller, W6-CSS, 1765 N. Puente Ave., Sp 34, Baldwin Park, Calif. 91706.

FOR Sale: Hawkins Electrical Guide vol 1 to 10 2nd edition by Audel. Marconic Victor course in Wireless telegraphy records. Best Offer. Mrs. Glenn Imler, 3016 West 40th Ave., Gary, Ind. 46408.

BEAM, Hy-Gain TH-4, 2 kw, 4 element tri-bander, like-new, has two coats of zinc chromate and aluminum paint. \$65. WA2AEI/1, 48 Offutt Road, Bedford, Mass. 01730.

SWAP & Shop: Biggest in Southeastern Michigan. Sponsored by Hazel Park Amateur Radio Club, May 18, 1969 10:00 to 4:30 P.M., Hazel Park High School, Hazel Park, Mich.

MOVING: Forced to sell QST 1941-1968 complete. Following home-brew gear cannot be packed, for sale only: 500 watt CW buffer and final, 6146 driving 10T with LW and HV supplies incl. uncased pole transformer, 25 watt modulator, \$8. Pair 816 rectifiers with 2 sect. input filter (needs plate xformer), \$5. J. E. Cann, WA1-175 Marsha Dr., Middletown, N.J. 07748.

NOVICES: Heath DX-60A. Mint condition. Professional—includes five crystals \$55.00. Matching HG10VFC separate power supply, \$20.00. Jack Cramer, 240 Mt. V. Place, Newark, New Jersey 07106. Tel: 201-399-2944.

ART13 125 watt transmitter with manuals, calibration transmitter, cable, new tubes \$75.00 or best offer. Sherm I. W3PL, St. Michaels, Maryland 21663.

HEATH: Apache, excellent, \$75. Drake 2-B, \$165. Also Recorder, virus. Make trade for all or part. WA6ZHL, Holmes: 770 Pacific, Alameda, Calif. 94501 (415) 523-8987. HT-32B. Like new \$295.00. HT33A latest factory Mod. 13B specs A-1 \$275.00 Viking II & 123 VFO. Like new \$400. Art Fuzate, W8GFH, 2309 Revere Avenue, Dayton, OH 45420.

SELL: SX101A receiver with R 48 speaker \$200. Converter CN114W \$30. Cush-Craft CL116 Antenna \$10 like new, in original cartons, in use three months. C. Jacklin, W61XJ, 15010 Larga Vista Dr., Los Gatos, CA 95030.

E. H. Scott: All-wave Imperial 23-tube receiver, E cabinet, manual turntable, preamp, tunes to 22.6 MHz. Excellent condition. Complete spare tubes, full reel-to-reel receiver. \$75. Homer S. Davis, 4455 West 60th St., Angeles, Calif. 90043. Tel: (213) 291-6552, evenings.

COUNSELOR: Over 19 General Class Operator—Boys scout camp in Maine (July and August). Bring own rig if possible. Excellent salary and benefits. Write: Director—P.O. Box 100, Carle Place, N.Y. 11514.

TELETYPE wanted—28s etc. all parts. Sell, tool Typetec Box 8873, Ft. Lauderdale, Fla. 33310. W4NYF.

COILS: Want old plug in type coils, 150W, 500w, 1000w, center link; all bands: Cash: K6OB, 2007 17th, Baker, California 94301.

SWAP, sell, buy; I will swap or sell HW-32A, HP-23, money-back, guaranteed perfect; for Drake 2B in excellent condition. WA1GTV, 617-653-0076, 47 Aquebuct, W. Mass. 01778.

SELL: Drake 2-NT, 2-C, speaker, xtal calibrator, cables, best condition, 6 months old. All for \$325. WA3KZS, Marbury Road, Bethesda, Md. 20034.

SELL: SX-117, HT-44 and PS/150 A/C supply. Excellent condition \$450.00. Bill Gregory, K4VCA, 112 Gallivan, Greenville, S.C. 29609. Phone: 803-235-3272.

ONLY \$325.00 gets my like-new Galaxy V Mk. III and 100W speaker console. Purchased in December. Less 12 hours transmitting. Factory cartons, W2DAP, 21 Tu Drive, Lake Grove, New York 11755 Ph. (516) 588-7598.

HEATH HA-14 Mobile Linear, 1 kw with Heath HP-14 mobile supply, both in excellent condition, \$140. P. Sher Jones St., N.Y.C. 10014. 691-3065.

DRAKE 2B, excellent \$150. W2BCB, 24 Pearwood Huntington Station, N.Y. 11746. (516-271-1468)

OSTS 1941-1955. Binders, excellent cond. swap for DX or best offer. Steve, 74 Florence Dr., Syosset, LI 11791.

PREPARE for FCC exams! You need Posi-Check, now addenda to cover latest FCC questions. Multiple choices, diagrams, explained answers, IBM sheets for self-study. Same form as FCC exams. New price—General Class Advanced Class, \$3.75. Extra Class, \$4.00. Each complete specific exam. Basic questions duplicated if they apply. class postage prepaid. Add 2 cents per copy for first mail. 64 cents for air mail. Send check, money order, Posi-Check P.O. Box 3564, Urbandale Station, Des Moines Iowa 50322. Addenda available separately for each of previous purchasers covering new questions. Send 50¢ per copy in coins or stamps.

KWM-2 with Noise Blanker and Waters Rejection \$16F-2 smother. EV-605 Mike, all excellent condition \$745.00. FOB WOODZ, 1030-20th Street, West Des Moines 50265.

CAMERA gear wanted. Will swap Hallcrafters SR-2000 camera, transceiver, power supply, 2000 A/C power supply. HA-20 remote VFO. All under 10 months old, and use only 3 months. Will swap even for items alone or for plus cash such as: 500EL body; SWC; Tele-Tessar f. 8/50. Distagon f. 4/40mm; Beseler CR-7, with power focus, stat. filter, VM, Asfa color head, Rinaldi Photo service, P.O. 1112, Newtonton, Conn. 06111.

MOVING: Must sell, Raner II with D-104 and bug; SX-96 dual conv. wcvr with dynamic speaker \$49. Will swap for 20 meter beam. W4DZB, 31 Franklin Ave., Pompton N.J. 07440.

DRAKE: 2B, calibrator, xtals, excellent condition. Wanted: 20-meter beam. WB6UDW, 1672 Lear Lane, California 92680.

HEATH DX-60 transmitter, HG-10 VFO \$59; Johnson 6N2 Transmitter \$79; Amplicdyne 6N2 transmitter \$125; \$95; 75A4, KWS-1, Cleanup list, stamp. W4API, Box Arlington, Virginia 22204.

WANTED: Schematic, operating instructions, Handbook other information concerning National-built Type S fixed frequency receiver manufactured about 1951. Has converted former 3025, 3kc. to W4WV on 5 or 10 MC. Monahan, 817 Pacific Ave., Manhattan Beach, Calif. 90366.

HT-37 \$175. W2AU quad cut down to 15 meters \$1 finished 432 MC xmt \$25. John Michel, 9 Hennessy Huntington, N.Y. 11743.

WANTED: Johnson 6N2 VFO Factory wired preferred. Tom Brown WB6DZH, 2451 East Glenoaks, Glendale, California 91206.

COUNSELOR: Penna. Brother-Sister camp seeks Ham Radio College man with General License. David Blumstein, 1410 E. 24th St., Brooklyn, N.Y. 11210.

FOR Sale: CE-100V \$300, 75A4 (no. 4566, 2.1, 5 KHz filters) \$430, G5B-101 \$140, 4 El Quad \$100, 88 ft. crank-up tower \$195, J. Walker, 328 Corpio Dr., Diamond Bar, California 91766.

SELL: Clegg Venus 6 mtr. transceiver, AC supply, like new, original cartons, \$300.00, WA8ZUA, 7230 Wilmington Plc., Dayton, Ohio 45459.

VHF! Sell HA-2 two meter trnsvr, P-26, pwr supply, Ameco preamp, \$200, WA3GPL, 2400 Littitz Pike, Lancaster, Pa. 17601. Tel: 717-569-0985.

COLLINS 75S-3B, 5 mos. old No 85376 Orig. carton & Manual—\$500.00, W2HFS, Box 3, 4 Weeks Ave., Cantonville, L.I., New York 11949.

SWAN 350C-550 watt transceiver, 117X powr supply, 4548ss manual, 222A, 222B, 222C, 222D, 222E, 222F, 222G, 222H, 222I, Ship REA, WB2VBI, 7 Bowen Pl, Stony Brook, N.Y. 11790.

FOR Sale: 75A4, Vernier Knob, Noise Blanker 8 & 3.1 KHz filters, external compression amplifier 200Hz filter \$350.00, GPR 90 rcrv xtal calibrator, outboard product detector, vernier knobs, Tapcon converter 50-54 MHz, \$250.00, Tristao xalv. tower 54", 10-15-20 Hygain Beam, rotator, You dismantle, \$150.00. Shipping and packing receivers not included. Carl Thorsell, 1195 E. 77th St., Kansas City, Mo. 64131.

WANTED: An opportunity to quote your ham needs. 30 years a ham gear dealer, Collins, Drake, Swan and all others! Also \$250.00 used gear! Request list, Chuck, W8UCG, Electronic Distributors, 1960 Peck, Muskegon, Mich, 49441.

HIGHLY Corrosion resistant stainless, brass, bronzes, threaded, washer, hardware. Over 1200 items. Antenna accessories—Boom tilting mount, guying hardware, many insulators. Quote your needs. Lists 20 cents, 15 cents credited first order; or Basic list only six cents, stamp. W8BLR, Wail, 29716 Brarbank, Southfield, Mich. 48075.

CRYSTALS Airmailed: MARS, Marine, SSB, Nets, CD, etc. Novice .05% crystals \$1.50. Custom finished etch stabilized FT-243 .01%—any kilocycle or fraction 3500 to 8600 \$1.90, five or more (this range \$1.75 each), (over ten or more same frequency \$1.45), 1750 to 3499 and 8601 to 20000 \$2.95, overtones supplied above 10,000, 10,001 to 13,500 fundamentals \$2.95. Add 50¢ each for .005%. Add 75¢ each for HC-6/u metal miniatures above 2000. Crystals, singles and groups for ARRL-QST, handbook, SSB Manual, Be specific. Write for order-bulletin. Crystals since 1933. Airmailing 10¢/crystal, surface 6¢. C-W Crystals, Marshfield, Missouri 65706.

DDN and Bob new guaranteed surplus lease HMY2000 stethoscope headset 3.95; NB-1 Military headset with new band, cord plug 8.95; -82 indicator 2.95; 100KHZ HC6/U crystal 3.95; 1200W dummy load DA-64B/UP 49.95; 800V/1A. Top-hat 25 cents; Mallory 3000MF/30V. Cap 35 cents; 6V/10A., 12V/6A. Filament transformer 3.95; RG-111 12 cents Ft; RG22B coax 15ft; new specials—Motorola HEP170 2.5A/1000V 19 cents epoxy; Sony 250A rotation recorder 109.95; GE 811A 1.95; GE 6145B 4.95; GE 829B 14.95; Used 75A-4 KWS-1 1000.00 Cash, no trade. Write for new equipment quotes, surplus flyer. We have export facilities, GECC finance. Prices FOB Houston, Madison Electronics, 1508 McKinney, Houston, Texas 77002. (713) CA4-2668.

FOR Sale: Heath HW10 6 meter transceiver, \$100.00, HX20 and HR20 with AC supply, \$225.00, Frank McJannet, 11557 Evanston N., Seattle, Wash. 98133.

GROUNDING Grid filament chokes 30 Amps \$4.00. Plate chokes 800MA \$2.00, PPU3A 48, William Deane, 8831 Sovereign Rd., San Diego, Cal. 92123.

FOR Sale: HW-35A \$85.00, Heath Twoer—\$30.00, K1ZZ1, Dick Wall, 74 Eddy Street, North Attleboro, Mass. 02760.

SB200 immaculate \$190, K2QIL, 1518 Longfellow Drive, Cherryhill, New Jersey 08034.

HEATHKIT HW100 with HP23 power supply, excellent condition factory aligned, used only about 20 hours \$300, going to college. Also ARR rotator, never used \$25. (Columbia Tri-Band quad never used \$25. Whole deal together \$325. Yellin, WB2VIN, 315 Rogers Ave., Bklyn, N.Y. 11225, P.O. Box 11112, Newington, Conn. 06111.

SACRIFICE: Eico 753 Transceiver (Solid State), factory wired, never been used, \$160.00, 751 AC Supply \$30.00, David Wyatt, 96 Bowen St., Providence, R.I. 02912.

SELL: HA-350 used, but good condition, including matching sprk and 100KC calibrator \$95. Mosley MCO-33 Tri-band Quad-damaged parts factory replaced—like new \$85. Cash Pse. You must arrange shipping—WN4MGA, 4307 Wyncliff Dr., Richmond, Va. 23235.

SELL: Drake TR-4, RV-4, AC-3 and Shure 444, all excellent, \$495. HT-32, 1775. Steve Paulson, 716-28th St., Bismarck, N.D. 58501.

HALLICRAFTERS SX71 double conversion receiver, bandspread, speaker, Johnson Challenor, with 80-6 meters 120W C.W., A.M. w/relay. In excellent condx. Both \$130.00. NYC area only. WA2GEW, tel: (212) 763-3537.

FOR Sale: Collins KWM-2, PM-2, and MP-1 Power supplies, Electro-Voice 636 and Shure 505C microphones. All in excellent condition—\$45.00, K4INT, 566 Woodland Hills Dr., Athens, Ga. 30601.

FOR Sale: Collins Station: KWM-1 Transceiver, 516F-1 AC supply; 516E-1 DC supply, 312B-2 station control, 351D-1 Mobile mount, microphones, and Hustler antenna. Prefer to sell as package \$540. Also TH6TD \$90; 60" Tower (Rohn No. 25) and accessories \$130; TR44 Rotator \$25. Call 606-444-4333. Bob Fehler, K4JHR, 247 Blue Grass, Southgate, Kentucky 41071.

SEND OSL for list of goodies by return mail. Ham, audio, test gear, parts. WB2FWS, 31 Penny Drive, Huntington Station, New York 11746. 516-HA1-3824.

MUST sell immediately: Swan 500 P/S, VOX, D104, all perfect condition, year old. Best offer over \$400. Charles Lambert, 314 Jamestown, Williamsburg, Virginia 23185.

FIVE Single Band amplifiers. (SSB, CW, AM). Plate modulator, power and RF control system, 6KV, 5KW supply runs amplifiers simultaneously, Variac, 32MF 10KV Pyranol, 5 KW keyed, vacuum antenna relay. Trade all for 30L-1, similar commercial amplifier, or cash. K1LPL, 108 Whitehall St., Providence, R.I. 02909.

HT-37 Excellent Cond. U-pay shipping \$210.00. W8JCO, 316 Hanson St., Whitehall, Mich. 49461.

SELL: Excellent HT32A and SX101A \$200 each, \$350 the pair. W2AU vinyl clad bamboo tri-band quad, Never used, \$30. Jack Koplun, WA3EXJ, RD 1, Zionsville, Penna. 18092. (215) 679-9745.

SWAN 350 with 100KC calibrator. Exc. operating condition \$285. Local sale preferred. W2HNB, tel: 516-L1-6841

DRAKE 2A receiver with calibrator, built-in speaker, Drake 2-LF 100KC 1800KC converter, Heath Q-mult. All for \$150. W2AC, Harry Greenberg, R.R.1, Box 121, Kerhonkson, N.Y. 12446 Tel: (914) 626-7124.

SELL: SX-101A, perfect, \$175. Cush-Craft 3L 20 mtr Beam—\$40; Mosley 10-40 mtr vertical \$16, 75A-4 speaker plus 6 KHz filter—best offer, Wnt 75A-4 0.5, 0.8 or 2.1 KHz filters. WA2FNY (516) 938-7096.

TORIODS: 88 & 44 mhy., center-tapped, not potted, 5/\$2.00 postpaid, Model 32KSR complete page printer excellent condition \$250. Model 15 page printer \$85. Drake 2B & 2BQ \$185. Hammarlund HQ180C \$200, RME 4350 receiver \$85. Johnson signal gentry \$10. Eico 33FVY brand new VOM \$25. 11/16" reperfertor tape \$3/box/10. Page printer paper \$6/case/12. Wanted: Ham-M RTTY and FM gear. 5 band SSB transceiver, Stamp for list. Van, W2DLT, 302Z Passaic Ave., Stirling, N.J. 07980.

SWAN 500, p/s, like new. No use since September. \$425 or best. Dave Siddall, WA1FED/O, Lindenwood College, St. Charles, Mo. 63301.

SELL: HRO-7 w/xtal calibrator, \$50 local only. It made DXCC for me. Virgil Talbott, W6GTE (213) AN-88868.

HW-16, Eico VFO, best offer over \$100. Also want 811A's, have 813, WA6KYU, Bob Marsolais, 3631 Calmrove, Covina, Calif. 91722.

FOR Sale: Going back to school—T4X-5280, AC4-\$70, R4-\$225, W4-\$39, Tektronics 310 scope (new CRT-\$175.00) all equipment absolutely perfect. Eimac SK410 sockets, linear components (B&W, etc) SASE brings list. All equip. FOB WA3EPB, 212 N. Gov Printe Blvd. Lester, Pa. 19133.

FOR Sale: HT 37 1000 watts and HT 41 1000 watts both \$375.00, Heath SB300 revr. \$175.00. Tel: 516-295-5411.

SWAN 240-AC supply late model, high serial number, excellent condition—complete with spare brand new final tube and p.t.t. mike. Three bands—s.s.b.-c.w. \$225.00 complete. Will ship anywhere collect upon receipt or certified check or m.o. R. Myers, W1FBY, 226 Main St., Newington, Conn. 06111.

WANTED: 2LF low frequency converter for Drake receiver, Claude Sweger, Box 1003 McAllen, Texas 78501.

HP-13 Mobile power supply. Excellent condition. \$50. K0FUF, 1916 Sandusky Kansas City, Kansas 66102.

HEATHKIT HW-16 transceiver for sale. Used one year. Excellent condition. With six crystals, \$70. Write WNOUJO, W4k Maistryk, 1260 So. Fenton, Denver, Colo. 80226.

ANTIQUE Radios: Best offer RCA Radiola circa 1922. Grebe W4L, 192 and RCA/GE amateur receiver year unknown. Grebe and Radiola need tubes otherwise all in very good condition. Arnold Smith, 1433 Marlborough Ave., Plainfield, N. J. 07060.

HT-37 perfect condition, \$220 & shipping. Lachterman, 3 Archer Ln. Scarsdale N.Y. 10583.

CHICAGO area Hams, complete 6N2 meter station, Seneca-Mohawk extras, WA9DHD, 849-450 Riverdale, Ill. 06027.

WANTED: HRO coils—all bands—any year for 5-7 or 50. Also want an HRO 5 for spare parts. Name your price. Wells Chapin W8GI, 2775 Seminole Rd. Ann Arbor, Mich. 48104.

WANTED: HT-20 or HT-32A, and HT-33A in exc. or mint cond. Doug Flagg, 287 Main St., Apt. 1, Northport, N.Y. 11768.

FOR Sale: Viking II, \$75. RME 6900, \$150. National NC-2-40 Revr, \$100. VFO \$10. Dumont 208B scope \$40. WEBCOR Tape Recorder, \$25. SB333 transcv. \$150. Knight CB transcvr C560, \$50. K2AJV, 201-228-4434.

HRO 60 coils, A,B,C,D,F,AD wanted. W. Ewanchyna, 10524 Belair Dr. Pierrefonds, Quebec.

TORIOD COils 88 mh uncased postpaid 5/\$2.00. LaVon Zachry, PO Box 845, Apple Valley, Calif. 92307.

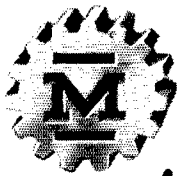
WANTED: SSB transceiver-Hall SR-400 or Swan 500C. State condition and price—75 mile radius from Norwalk Conn. Kikon, 3 Beechwood Rd. Norwalk, Conn. 06854.

SWAN 240 with Heath AC supply, Microphone, all cables, excellent condit on. Call Ron, W6VVU, 5649 Lenore, Arcadia, Calif. 91006 213-448-9498. \$200.

COLLINS 30L-1 linear, \$350; KWM-2 (sn. 10377) with Waters Reception Tuning & 516F-2, \$795; hardwood cabinet/desk custom-made for above. \$50. Jim Catlin, 813 W. Fern, Fullerton, Calif. 92632.

R. L. DRAKE Co. Notice: come say hello to the fellows from the R. L. Drake Company at the following conventions: Dayton, Ohio, Dayton Hamvention, April 25-26; Orlando, Florida, Orlando Hamfest, Apr. 1 25-26; Rochester, N.Y. Western New York Hamfest and VHF Conference, May 9-11; Swampscott, Mass., New England Div. ARRL, May 24-25; Indianapolis, Indiana, Indianapolis Ham Convention, May 24; Sacramento, California, Pacific Div. ARRL, June 13-15; Des Moines, Iowa, National ARRL, June 30-22; Jackson's Mill, W. Va. West Virginia State, July 5-6; Amarillo, Texas, Western Gulf Div. ARRL, August 16-17; San Diego, California, Southwestern Div. ARRL, October 17-19. The R. L. Drake Company will be closed for summer vacation on Thursday, July 3, and will re-open on Monday, July 21.

Designed for



Application



**TRANSMATCH or
TRANSMATCH JUNIOR**

Allows a transmitter to work into the 50 ohm unbalanced load for which it was designed. Converts a multi-band antenna to 50 ohms at all amateur frequencies between 3.5 and 29.7 MC. Match 10 to 300 ohm unbalanced loads.

92200 TRANSMATCH handles a kw.

92201 TRANSMATCH JUNIOR handles 150 w.

**JAMES MILLEN
MFG. CO., INC.**

MAIN OFFICE AND FACTORY
MALDEN
MASSACHUSETTS



Index of Advertisers

Amateur Electronic Supply	104, 10
AAECC, A division of Acotron, Inc.	
American Radio Relay League, Inc.	
<i>Antenna Book</i>	12
<i>Handbook</i>	12
<i>License Manual</i>	12
<i>Membership</i>	14
<i>National Convention</i>	14
<i>Publications</i>	14
<i>Single Sideband</i>	14
<i>VHF Manual</i>	12
Antennas, Inc.	12
Arrow Electronics, Inc.	12
Barry Electronics	14
Bilada Manufacturing Company	14
Brooks, P. E., Carl N.	14
B.T.I. Amateur Division	14
Central Division Convention	14
Collins Radio Company	14
Comdel Incorporated	12
Communication Associates, Inc.	12
Communication Products Co.	14
Cush Craft	14
Dames Co., Theodore E.	14
Digi-Key	14
Drake Co., R. L.	110, 1
Edwards Electronics	14
EIMAC, a division of Varian	101, 1
Electrophysics Corporation	14
Electro-Voice Incorporated	14
E-Z Way Products Inc.	14
Fair Radio Sales	14
Farmerie Corporation, The	14
Galaxy Electronics	14
Globe Plotter	14
Goodheart Co., Inc., R. E.	14
Gotham	14
Graham Electronic Supply Co.	14
Hallcrafters Co., The	Cov.
Ham Radio Center	14
Hammarlund Mfg. Co., Inc.	14
Harrison Radio	14
Heath Company, The	Cov. III, 1
Henry Radio Stores	14
Hotel Beachcomber	14
Hunter Sales, Inc.	14
Instructograph Co., Inc.	14
International Crystal Mfg. Co., Inc.	14
Intratec	14
Intercontinental Electronics Corp.	14
J-J Electronics	14
Jan Crystals	14
Lampkin Labs., Inc.	147, 1
Lattin Radio Labs	147, 1
Military Electronics Corp./Space Electronics Corp.	14
Millen Mfg. Co., Inc., James	14
Miller Co., J. W.	14
Mini-Products Inc.	14
National Radio Company, Inc.	14
National Radio Institute	14
Omega-T Systems Inc.	14
Paxitronix Incorporated	14
Pennwood Numechron Co.	14
Pickering Radio Company	14
P.J.'s Radio Shop Incorporated	14
Poly-Paks	14
Radio Officers Union	14
Radio Publications Incorporated	14
Radio Shop, Lab 1	14
RCA Electronics Components	Cov.
RCA Institutes, Incorporated	14
RF Communication Associates, Inc.	119, 1
Saleh & Co., Herbert	116, 1
Signal/One	116, 1
Skylane Products	14
Spectronics	14
Swan Electronics Corporation	14
Tapeco	14
Tedford Crystal Laboratories	14
Telrex Communication Engineering Labs	14
Tri-Ex Tower Corporation	14
Trigger Electronics	14
Unadilla Radiation Products	14
Van Sickle Radio Supply	14
Vangorden Engineering	14
Vanguard Electronic Labs	14
VHF Communications	14
Vibroplex Co., Inc., The	14
Wickliffe Industries	14
WJRT-TV	114, 1
World Radio Laboratories	114, 1
Xcelite Co., Inc.	14

Now your transmitter can work...

2 or 6 Meters



WITH A

DRAKE TRANSMITTING CONVERTER

Model TC-2

- Full coverage of 2 meter band
- 180 watts input

\$300⁰⁰

Amateur Net

Model TC-6

- Full coverage of 6 meter band
- 300 watts input

\$250⁰⁰

Amateur Net

FEATURES

- All switching between VHF and normal low-frequency operation of the exciter and receiver is accomplished by the function switch on the front panel.
- When used with any Drake exciter, no additional power supply is needed. However, the converters may be powered by an AC-3 or AC-4 power supply when used with other exciters.
- The low level drive required is obtainable from almost any exciter covering 20 meters or from the TR-6 (with TC-2).
- Oscillator injection may be obtained from the Drake VHF receiving converters.
- Transmitting AGC prevents flat-topping and increases talk power.
- Metering is provided for both final amplifier plate current and relative output power.
- Built-in antenna relay.
- Provision for controlling linear amplifier and/or external coax relay.
- Matches Drake 4-Line in appearance.

TC-2 SPECIFICATIONS

Frequency Coverage: 143.9-148 MHz.

Frequency Coverage with TR-6 and SC-2: 143.9-144.5 MHz and 144.9-145.5 MHz.

Modes of Operation: SSB, CW, AM, RTTY; determined by exciter.

Average Distortion Products: The odd order are better than 25 dB below PEP.

Input Power: 180 watts on CW or RTTY. 180 watts PEP on SSB and AM.

Output Impedance: Nominal 52 ohms with adjustable output network (SWR less than 2:1).

Injection Required: 0.25 V. at 130 and 131 MHz (from SC-2).

Excitation Required: 0.25 V. at 13.9-18.0 MHz.

4 Tubes, 4 Transistors, 5 Diodes.

Size: 5½" high, 11½" deep, 7¾" wide. **Weight** — 9 lbs.

TC-6 SPECIFICATIONS

Frequency Coverage: 49.5-54 MHz.

Modes of Operation: SSB, CW, AM, and RTTY; determined by exciter.

Average Distortion Products: The odd order are at least 35 dB below PEP.

Input Power: 300 watts on CW or RTTY. 300 watts PEP on SSB and AM.

Output Impedance: Nominal 52 ohms with adjustable Pi-L network (SWR less than 2:1).

Injection Required: 0.25 V. at 36.0 and 36.5 MHz (from SC-6).

Excitation Required: 0.25 V. at 13.5-17.5 MHz.

6 Tubes, 1 Transistor, 4 Diodes.

Size: 5½" high, 11½" deep, 7¾" wide, **Weight:** 9 lbs.

At your distributors, or write: Dept. 159

R. L. DRAKE COMPANY 540 Richard Street, Miamisburg, Ohio 45342

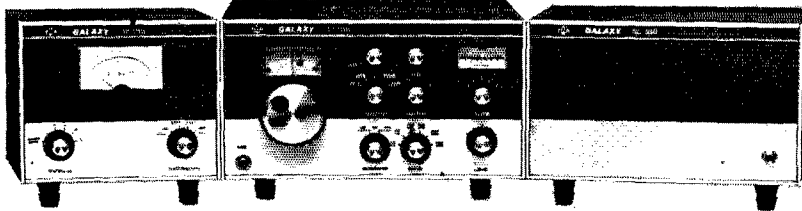
WANT *MORE* FOR YOUR MONEY?

This new Galaxy "550" line of coordinated equipment is winning plenty of plaudits from hams who find it gives plenty of performance for surprisingly few dollars investment.

It's real value, plus Harrison unique services gives you truly *MORE* for your money.

For the very best deal, visit any of our stores, or drop me a line today. TNX

73 *Bil Harrison* W2AVA



THE EXCITING NEW "550 LINE"

GALAXY GT550 TRANSCEIVER. Highest power in a compact design, 550 watts SSB, 360 watts CW, with tune power provisions for longer life — Solid-State circuits where they provide maximum performance and reliability — Selectable Sideband without frequency jump — Audio derived AGC — Sharpest filter for minimum QRM — King size finger-tip VFO tuning knob — Size: 6" X 11¼" X 12½" (HWD) — Weight: 17 pounds
 ... \$449⁰⁰

CAL-25. Plug-in 25KH₂ solide state calibrator \$25.00

VOX35C. Plug-in VOX control unit \$29.95

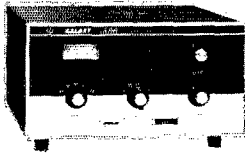
F3. Plug-in 300 Hz CW filter \$29.95

RF550 R.F. CONSOLE. A precision wattmeter in the range of 3.5/30.0 mHz — Contains switch to select 5 antennas or a dummy load (not supplied) \$69.00

SC550 SPEAKER CONSOLE. A matching speaker with headphone jack —

AC400 power supply will mount inside \$19.95

AC400. Full power, heavy duty state supply for 115/230 volts \$89.95

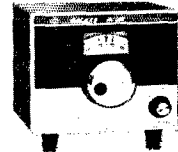


GALAXY LA550 LINEAR AMPLIFIER. 200 watts PEP input on SSB, 1000 watts DC input on CW/RTTY. Band switching 80 thru 10 meters, with some adjacent MARS and special frequencies.

... \$495⁰⁰

GALAXY RV550 REMOTE VFO. A solid state VFO complete with simple plug-in cables. Gives flexibility of a separate transmitter and receiver.

... \$75⁰⁰



PROMPT ORDER DEPT.

We carefully pack and ship ham gear, accessories and parts to most any part of the world.

Address your orders to:

**20 SMITH STREET
 Farmingdale, N.Y. 11735**

Please include ample postage (plus \$1 handling cost with orders under \$10.)

OR, PHONE YOUR ORDERS TO
 (212) BA 7-7922 OR (516) 293-7990

SINCE 1925

Harrison

"HAM HEADQUARTERS, USA"®

NEW YORK CITY • 8 Barclay St. • BARclay 7-7922

JAMAICA, L. I.
 139-20 Hillside Ave.
 REpublic 9-4101

FARMINGDALE, L. I.
 Route 110 at Smith St.
 (516) 293-7990

To Get A \$500 Rig For \$240 . . .



Build The Heathkit® HW-100

When the time comes for a new rig, most hams approach the task with enthusiasm . . . until financial reality invades their dreams. An ordinary 5-band transceiver, wired and ready to go, costs around \$500. Much of the reason for this price, of course, is that you are paying to have someone else wire your rig.

Heath also sells \$500 worth of transceiver — the HW-100 — but our price is a bit more realistic — \$240 — and the performance is better! We reason that if you can handle the FCC exam, you can also handle a soldering iron. And because we don't use any of your money to wire your rig, we can use more of it to provide advanced engineering. Check out a realistic \$500 rig . . . the Heathkit HW-100 . . . another hot one from the hams at Heath.

- Kit HW-100, 18 lbs., no money dn., \$22 mo. \$240.00*
- Kit HP-13A, DC power supply, 7 lbs., \$7 mo. \$64.95*
- Kit HP-23A, AC power supply, 19 lbs., \$5 mo. \$49.95*
- Kit SB-600, 8 ohm speaker, 6 lbs. \$18.95*

HW-100 SPECIFICATIONS — RECEIVER. Sensitivity: Less than .5 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. Selectivity: 2.1 kHz minimum at 6 dB down, 7 kHz maximum at 60 dB down (3.395 MHz filter). Input: Low impedance for unbalanced coaxial input. Output impedance: 8 Ω speaker, and high impedance headphone. Power output: 2 watts with less than 10% distortion. Spurious response: Image and IF rejection better than 50 dB.

TRANSMITTER. DC Power input: SSB: 180 watt P.E.P. (normal voice; continuous duty cycle). CW: (A1 emission) 170 watts (50% duty cycle). RF Power output: 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 Ω nonreactive load). Output impedance: 50 Ω to 75 Ω with less than 2:1 SWR. Oscillator feedthrough or mixer products: 55 dB below rated output. Harmonic radiation: 45 dB below rated output. Transmit-receive operation: SSB: PIT or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. CW Sidetone: Internally switched to speaker or headphone, in CW mode. Approximately 1000 Hz tone. Microphone input: High impedance with a rating of —45 —55 dB. Carrier suppression: 45 dB down from single-tone output. Unwanted sideband suppression: 45 dB down from single-tone output at 1000 Hz reference. Third order distortion: 30 dB down from two-tone output. RF Compression (TALC): 10 dB or greater at .1 ma final grid current. GENERAL. Frequency coverage: 3.5 to 4.0; 7.0 to 7.3; 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 30.0 (meg-

- 80 through 10 meter coverage • Solid-state (FET) VFO • 180 watts input PEP SSB — 170 watts input CW • Switch selected USB, LSB or CW • Crystal filter for sharp 2.1 kHz selectivity • Full coverage on all bands with 500 kHz per band segment • Better than ½ uV sensitivity • Smooth vernier control of frequency with patented Harmonic Drive™ dial mechanism • Outstanding frequency stability • Excellent image and IF rejection • Built-in 100 kHz calibrator • Separate offset CW carrier crystal • Triple Action Level Control™ for reduced possibility of overdriving & distortion • Built-in S-meter • Quiet, enclosed relays • Run fixed or mobile with HP-23A or HP-13A power supplies • Built-in VOX • Easy circuit board — wiring harness construction

hertz). Frequency stability: Less than 100 hertz per hour after 30 minutes warmup from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. Modes of operation: Selectable upper or lower sideband (suppressed carrier) and CW. Dial calibration: 5 kHz. Calibration: 100 kHz crystal. Audio frequency response: 350 to 2450 Hz. Front panel controls: Main tuning dial, Driver tuning and Preselector. Final tuning, Final loading, Mic and CW Level control, Mode switch, Band switch, Function switch, Meter switch, RF Gain control, Audio Gain control. Side controls: Meter Zero control; Bias; VOX Sensitivity; VOX Delay; Anti-trip. Internal controls: Carrier null; neutralizing. Tube complement: OA2 Regulator (150 V); 6AU6 RF amplifier; 6AU6 1st receiver mixer; 6AU6 Isolation amplifier; 6AU6 1st IF amplifier; 6AU6 2nd IF amplifier; 6B8 Product detector and AVC; 6AU6 VFO Amp.; 6C6 2nd transmitter mixer; 6CL6 Driver; 6E8 Speech Amplifier and cathode follower; 6E8 1st transmitter mixer; 6E8 2nd receiver mixer and relay amplifier; 6E8 CW sidetone oscillator and amplifier; 6GW8 Audio amplifier and audio output; 12A17 Heterodyne oscillator and cathode follower; 12A17 VOX amplifier and calibrator oscillator; 12AU7 12AU7 balanced oscillator; 6146 Final amplifiers (2). Diode complement: 6 Germanium Diodes; Balanced modulator, RF sampling, and crystal calibrator harmonic generator; 9 Silicon Diodes; ALC rectifiers, anti-trip rectifiers, and DC blocking; 1 Zener Diode; cathode bias. Transistors: MPF-105 FET-VFO; 2N3393 — Voltage regulator. Rear apron connections: CW Key jack; 8 Ω output; ALC input; Power and accessory plug; RF output; Antenna; Spare. Power requirements: 700 to 850 volts at 250 ma with 1% maximum ripple; 300 volts at 150 ma with 0.5% maximum ripple; —115 volts at 10 ma with .5% maximum ripple; 12 volts AC/DC at 4.76 amps. Cabinet dimensions: 14-13/16" W. x 6-5/16" H. x 13-3/8" D.



HEATH COMPANY, Dept. 9-5
Benton Harbor, Michigan 49022
In Canada, Daystrom Ltd.

Enclosed is \$ _____, plus shipping.

Please send model (s) _____

Please send FREE Catalog.

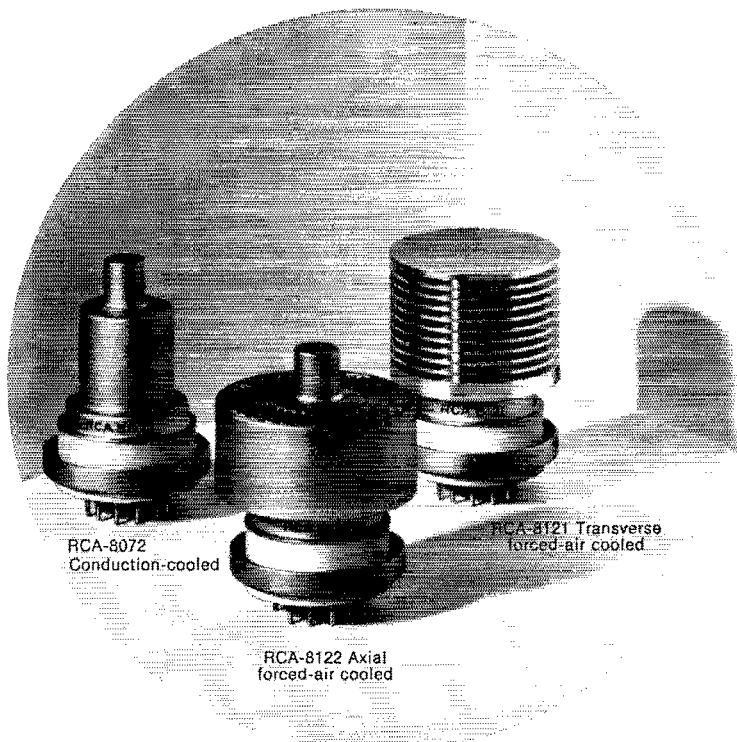
Name _____ (Please Print)

Address _____

City _____ State _____ Zip _____

Prices & specifications subject to change without notice.
*Mail order prices; F.O.B. factory.

When you look into your final, look for the RCA-8122



RCA-8072
Conduction-cooled

RCA-8121 Transverse
forced-air cooled

RCA-8122 Axial
forced-air cooled

Not just because it's an RCA beam power tube, either! We think you deserve power and reliability—and we know, just as leading manufacturers of communications equipment know, that the RCA-8122 has more of both. For a starter, it has more than 50% greater dissipation capability than older tubes of comparable size...and delivers up to full rated output with as little as 5 Watts drive all the way to UHF. It gives you design options, too; the RCA-8122 is usable with coaxial, strip-line, or conventional lumped component tank circuit.

Reliability? This amateur type tube is a member of the same family as the 8072 and 8121 that brings the latest in tube technology to both medium and high power commercial and military equipments.

Ceramic-and-metal construction, exclusive electrode configuration, and precision-aligned grids eliminate mechanically-caused noise even at the high temperatures and severe vibration levels encountered in mobile service.

So whether you plan to buy or build, get the full story on the RCA-8122 as your first step. Write for a copy of the RCA-8122 Data Bulletin to RCA Electronic Components, Commercial Engineering, Section E37M, Harrison, N.J. 07029. Or see your local Authorized RCA Industrial Distributor for a copy of the new Power Tube Product Guide, PWR-506C.

RCA

To Get A \$500 Rig For \$240 . . .



Build The Heathkit® HW-100

When the time comes for a new rig, most hams approach the task with enthusiasm . . . until financial reality invades their dreams. An ordinary 5-band transceiver, wired and ready to go, costs around \$500. Much of the reason for this price, of course, is that you are paying to have someone else wire your rig.

Heath also sells \$500 worth of transceiver — the HW-100 — but our price is a bit more realistic — \$240 — and the performance is better! We reason that if you can handle the FCC exam, you can also handle a soldering iron. And because we don't use any of your money to wire your rig, we can use more of it to provide advanced engineering. Check out a realistic \$500 rig . . . the Heathkit HW-100 . . . another hot one from the hams at Heath.

- Kit HW-100, 18 lbs., no money dn., \$22 mo. **\$240.00***
- Kit HP-13A, DC power supply, 7 lbs., \$7 mo. **\$64.95***
- Kit HP-23A, AC power supply, 19 lbs., \$5 mo. **\$49.95***
- Kit SB-600, 8 ohm speaker, 6 lbs. **\$18.95***

HW-100 SPECIFICATIONS — RECEIVER. Sensitivity: Less than .5 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. Selectivity: 2.1 kHz minimum at 6 dB down, 7 kHz maximum at 60 dB down (3.395 MHz filter). Input: Low impedance for unbalanced coaxial input. Output impedance: 8 Ω speaker, and high impedance headphone. Power output: 2 watts with less than 10% distortion. Spurious response: Image and IF rejection better than 50 dB.

TRANSMITTER. DC Power input: SSB: 180 watt P.E.P. (normal voice, continuous duty cycle). CW: (A1 emission) 170 watts (50% duty cycle). **RF Power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 Ω nonreactive load). Output impedance: 50 Ω to 75 Ω with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 55 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation:** SSB: PTT or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. **CW Sidetone:** Internally switched to speaker or headphone, in CW mode. Approximately 1000 Hz tone. **Microphone input:** High impedance with a rating of —45 to —55 dB. **Carrier suppression:** 45 dB down from single-tone output. **Unwanted sideband suppression:** 45 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB down from two-tone output. **RF Compression (TALC):** 10 dB or greater at .1 ma final grid current. **GENERAL. Frequency coverage:** 3.5 to 4.0; 7.0 to 7.3; 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 30.0 (meg-

- 80 through 10 meter coverage • Solid-state (FET) VFO • 180 watts input PEP SSB — 170 watts input CW • Switch selected USB, LSB or CW • Crystal filter for sharp 2.1 kHz selectivity • Full coverage on all bands with 500 kHz per band segment • Better than ½ uV sensitivity • Smooth vernier control of frequency with patented Harmonic Drive™ dial mechanism • Outstanding frequency stability • Excellent image and IF rejection • Built-in 100 kHz calibrator • Separate offset CW carrier crystal • Triple Action Level Control[®] for reduced possibility of overdriving & distortion • Built-in S-meter • Quiet, enclosed relays • Run fixed or mobile with HP-23A or HP-13A power supplies • Built-in VOX • Easy circuit board — wiring harness construction

hertz). **Frequency stability:** Less than 100 hertz per hour after 30 minutes warmup from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial calibration:** 5 kHz. **Calibration:** 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz. **Front panel controls:** Main tuning dial, Driver tuning and Preset selector, Final tuning, Final loading, Mic and CW Level control, Mode switch, Band switch, Function switch, Meter control, RF Gain control, Audio Gain control. **Side controls:** Meter Zero control; Bias; VOX Sensitivity; VOX Delay; Anti-trip. **Internal controls:** Carrier null; neutralizing. **Tube complement:** OA2 Regulator (150 V); 6AU6 RF amplifier; 6AU6 1st receiver mixer; 6AU6 Isolation amplifier; 6AU6 1st IF amplifier; 6AU6 2nd IF amplifier; 6BN8 Product detector and AVC; 6AU6 VFO Amp; 6CB6 2nd transmitter mixer; 6CL6 Drivers; 6EA8 Speech Amplifier and cathode follower; 6EA8 1st transmitter mixer; 6EA8 2nd receiver mixer and relay amplifier; 6EA8 CW sidetone oscillator and amplifier; 6GW8 Audio amplifier and audio output; 12A17 Heterodyne oscillator and cathode follower; 12A17 VOX amplifier and calibrator oscillator; 12AU7 Sideband oscillator; 6146 Final amplifiers (2). **Diode complement:** 6 Germanium Diodes: Balanced modulator, RF sampling, and crystal calibrator harmonic generator; 9 Silicon Diodes: ALC rectifiers, anti-trip rectifiers, and DC blocking; 1 Zener Diode: cathode bias. **Transistors:** MPF-105 FET-VOX; 2N3393 — Voltage regulator. **Rear apron connections:** CW Key jack; 8 Ω output; ALC input; Power and accessory plug; RF output; Antenna; Spare. **Power requirements:** 700 to 850 volts at 250 ma with 1% maximum ripple; 300 volts at 150 ma with .05% maximum ripple; —115 volts at 10 ma with .5% maximum ripple; 12 volts AC/DC at 4.76 amps. **Cabinet dimensions:** 14-13/16" W. x 6-5/16" H. x 13-3/8" D.



HEATH COMPANY, Dept. 9-5
Benton Harbor, Michigan 49022
In Canada, Daystrom Ltd.

Enclosed is \$ _____, plus shipping.

Please send model (s) _____

Please send FREE Catalog.

Name _____ (Please Print)

Address _____

City _____ State _____ Zip _____

Prices & specifications subject to change without notice.

*Mail order prices; F.O.B. factory.

AM-216