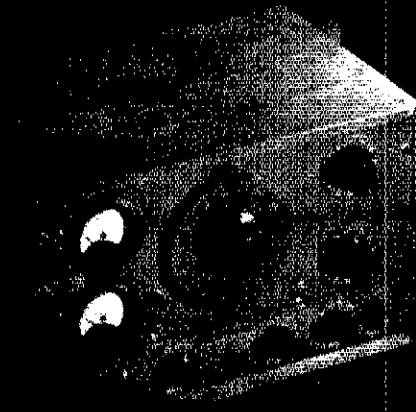


September 1972
75 Cents

QST

devoted entirely to

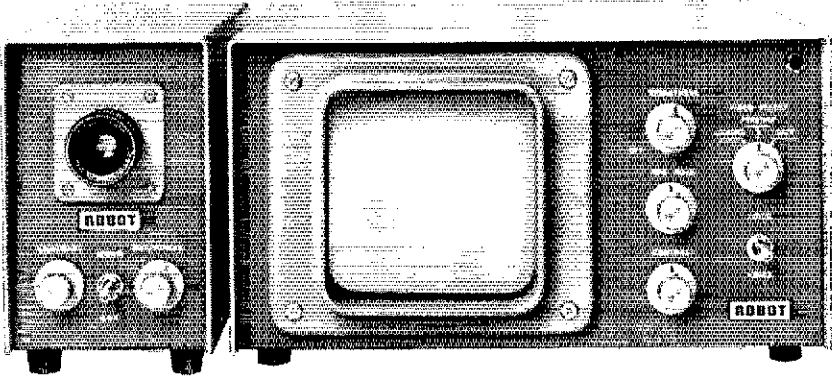
amateur radio



OFFICIAL JOURNAL OF THE ARRL



The most important development since the beginning of SSTV



ROBOT MODEL 70 MONITOR AND MODEL 80 CAMERA

\$295 EACH

Robot Goes Factory Direct

These are the identical camera and monitor that have been selling through dealers for \$495 and \$465. But with our new factory direct marketing program and our substantial growth in sales volume we can now offer our complete line of SSTV equipment at new, low prices.

You can now order your equipment directly from our factory and we will ship freight collect. All prices are F.O.B. San Diego, Ca., and APPLY IN U.S. & CANADA ONLY!

DIRECT EXPORT INQUIRIES TO: MAGNUS OVERSEAS CO.
5715 North Lincoln Avenue, Chicago, Ill. 60645. Cable ULLI.



ROBOT RESEARCH INC.

7591 Convoy Court
San Diego, California 92111

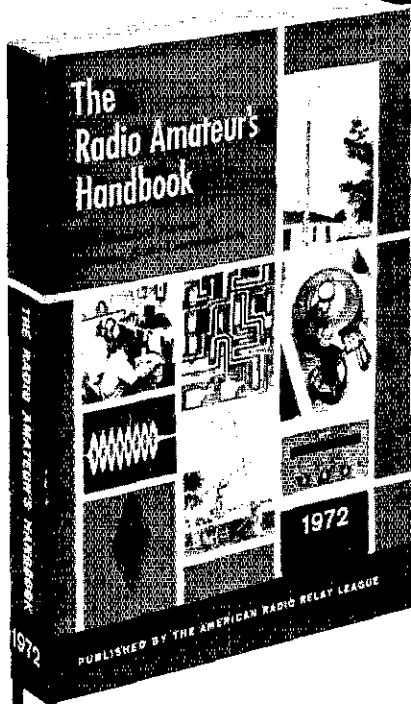
- Please send your new factory direct price list.
- Enclosed \$ _____ . Please send the following equipment via AIR or SURFACE
- Model 70 Monitor \$295
- Model 80 Camera \$295
- 25 mm f1.9 lens \$25

Name _____ Call _____

Address _____

City _____ State _____ Zip _____

California residents add 5% sales tax.



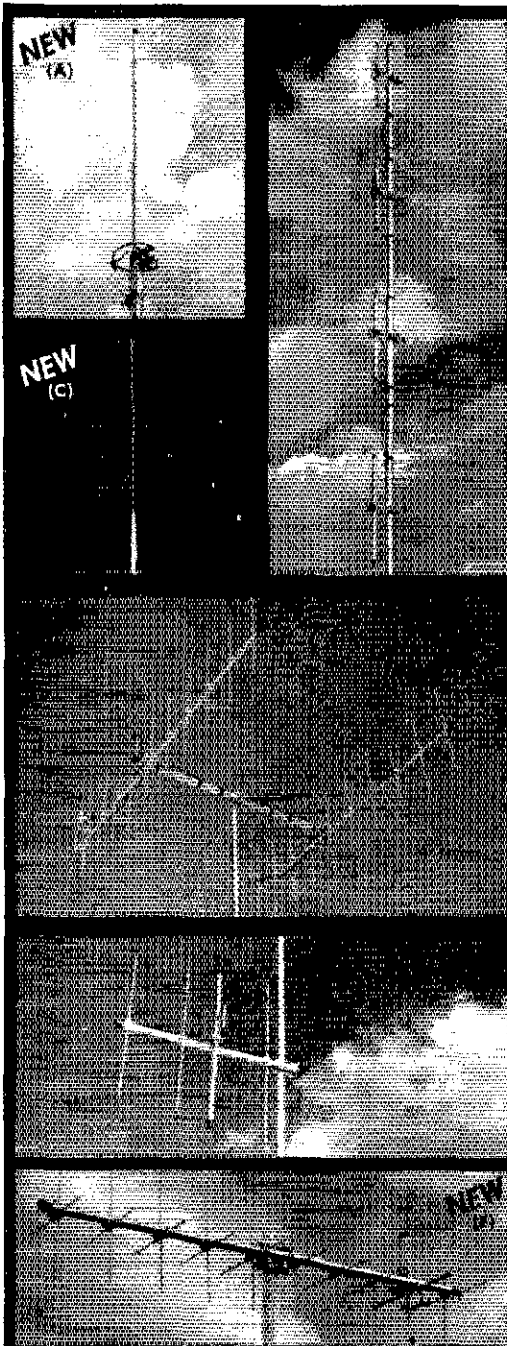
NEW LOOK HANDBOOK

What's so different about *this* HANDBOOK? The type has been completely reset and 47 pages of text have been added. You'll find a new 28 page chapter on FM and Repeaters and 22 pages on specialized techniques: RTTY, SSTV, phone-patching and satellites. There is more emphasis on solid state circuits than ever before. But you'll also find the basics — how to neutralize a final amplifier, how to properly adjust an ssb transmitter, and how to design Pi output tank circuits. There are construction projects covering everything from a one tube novice transmitter to a wide-spaced multielement tri-band beam. The 49th Edition of the HANDBOOK — Read it, you'll really like it.

\$4.50 U.S.A. and Possessions, **\$5.00**
Canada, **\$6.00** Elsewhere. Cloth-
bound Edition, **\$7.50** U.S.A. Posses-
sions and Canada, **\$8.00** Elsewhere.

The **AMERICAN RADIO**
RELAY LEAGUE, INC.

NEWINGTON, CONN., U.S.A. 06111



Cush Craft

2 METER FM ANTENNAS

NEW FROM THE WORLD'S LEADING MANUFACTURER OF VHF/UHF COMMUNICATION ANTENNAS

(A) **FM GAIN RINGO:** The most popular — high performance, half-wave FM antenna. Gives peak gain, and efficiency, instant assembly and installation.

AR-2	100 watts	135-175 MHz	\$12.50
AR-25	500 watts	135-175 MHz	17.50
AR-6	100 watts	50-54 MHz	18.50

(B) **4 POLE:** A four dipole gain array with mounting booms and coax harness 52 ohm feed, 360° or 180° pattern.

AFM-4D	1000 watts	146-148 MHz	\$42.50
AFM-24D	1000 watts	220-225 MHz	40.50
AFM-44D	1000 watts	435-450 MHz	38.50

(C) **FM MOBILE:** Fiberglass $\frac{1}{2}$ wave professional mobile antenna for roof or trunk mount. Superior strength, power handling and performance.

AM-147	146-175 MHz mobile	\$26.95
--------	--------------------	---------

(D) **11 ELEMENT YAGIS:** The standard of comparison in VHF communications, now cut for 2 meter FM and vertical polarization.

A147-11	1000 watts	146-148 MHz	\$17.95
A449-11	1000 watts	440-450 MHz	13.95

(D) **POWER PACK:** A 22 element, high performance, vertically polarized FM array, complete with all hardware, mounting boom, harness and 2 antennas.

A147-22	1000 watts	146-148 MHz	\$49.50
---------	------------	-------------	---------

(E) **4 ELEMENT YAGI:** A special side mount 4 element FM yagi can be fixed or rotated — good gain and directivity.

A144-4	1000 watts	146-148 MHz	\$ 9.95
--------	------------	-------------	---------

(F) **FM TWIST:** A Cush Craft exclusive — it's two antennas in one. Horizontal elements cut at 144.5 MHz, vertical elements cut at 147 MHz, two feed lines.

A147-20T	1000 watts	145 & 147 MHz	\$39.50
----------	------------	---------------	---------

IN STOCK WITH YOUR LOCAL DISTRIBUTOR

Cush Craft CORPORATION

621 HAYWARD STREET
MANCHESTER, N.H. 03103

STAFF

JOHN HUNTOON, W1BW
Editor

WM. I. DUNKERLEY JR., WA2INB
Managing Editor

DOUG DE MAW, W1CER
Technical Editor

GERALD L. HALL, K1PLP
DOUGLAS A. BLAKESLEE, W1KLK
ROBERT M. MYERS, W1FBY
THOMAS McMULLEN, W1SL
Assistant Technical Editors

EDWARD P. TILTON, W1HDO
V.H.F. Editor

LEWIS G. MCCOY, W1ICP
Beginner and Novice

WALTER WOOTEN, W1NTH
Editorial Assistant

ROD NEWKIRK, W9BRD
WILLIAM SMITH, K3CER
LOUISE MOREAU, WB6BBO
JOHN TROSTER, W6ISQ
Contributing Editors

E. LAIRD CAMPBELL, W1CUT
Advertising Manager

I. A. MOSKEY, W1MYY
Circulation Manager

JOHN H. NELSON, W1GNC
Assistant Circulation Manager

OFFICES

225 Main Street
Newington, Connecticut 06111
Tel.: 203-866-1841

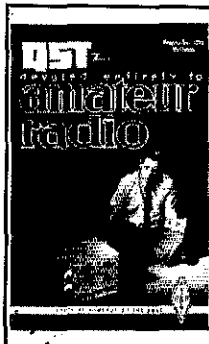
Subscription rate \$7.50 per year postpaid, U.S. funds, U.S. & Possessions; \$8.50 in Canada; \$9.00 elsewhere. Single copies, 75 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U.S. and for an equivalent amount in U.S. funds.

Second-class postage paid at Hartford, Conn. and at additional mailing offices.

Copyright 1972 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.

QST is available to the blind and physically handicapped on magnetic tape from the Library of Congress, Division for the Blind and Handicapped, Washington, DC 20542.

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



COVER BOX
W1NTH contemplates the differences in size, weight and complexity between a tube-type function generator and the miniature IC generator which is described on page 11 of this issue.

QST

SEPTEMBER 1972

VOLUME LVI NUMBER 9

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 —

A Simple Function Generator	Douglas A. Blakeslee, W1KLK	11
A 4000-Channel Two-Meter Synthesizer	Derwin H. Stevens, W1UYK/WA2DHA	17
Four Bands on a Pole . . .	E. W. Ljungquist, WADWK/W1CQS	26
Fundamentals of Solid-State Power-Amplifier Design	J. H. Johnson, ex-K4WYQ, and R. Artigo, W6GFS	29
The Pip-Squeak Gets Smaller . . .	Doug DeMaw, W1CER	37
A Universal Power Supply for the Amateur Station	Robert M. Myers, W1FBY and Augustus M. Wilson, W1NPG	42
Synthesis of a Varicap	Edmund S. Cromartie	44
A "State-of-the-Art" Approach to Multiband Fm	Lynn A. Gerig, WA9GFR	46
Recent Equipment:		
Heath Company IM-103 Line Voltage Monitor		54
KW Electronics Model KW 103 SWR/Power Meter		55
Technical Correspondence		56

OPERATING —

1972 Novice Roundup Results	Rick Niswander, WA1PID/WA8VRB	64
12th RTTY DX Sweepstakes		69
Is the PSHR Too Easy?		70

BEGINNER AND NOVICE —

Some Plain Facts About Multiband Vertical Antennas	Lew McCoy, W1ICP	14
--	------------------	----

GENERAL —

Amateur Activity in South Dakota Flood Disaster		59
7031 kHz	Ray Larson, W0GHX	62
ARPS	70	"It Seems to Us..." 9
ARRL QSL Bureau	41	League Lines 10
Coming Conventions	68	Operating Events 107
Correspondence	87	Operating News 102
Feedback	58	Silent Keys 93
Hamfest Calendar	68	Station Activities 108
Happenings of the Month	75	World Above 50 Mc. 89
Hints & Kinks	52	YL News & Views 94
How's DX?	97	W1AW Schedule 103
Index of Advertisers	158	25 and 50 Years Ago in QST 41



Complete packaged Multi-Band Antenna Systems employing the famous Bassett Sealed Resonators and a special Balun. Air has been evacuated from both and replaced with pure helium at one atmosphere.

Highly efficient system packages including all hardware, insulation, coax cable, and copperweld elements assembled at the factory. Complete installation instructions included.

Multi-frequency models available for all amateur bands and for commercial use, point to point ground to air, military and government.

MODEL DGA-4075 — \$59.50

A complete system package for primary use in the 40 and 75 meter bands at power levels up to 4KW-PEP with secondary operation in other bands at reduced power levels.

MODEL DGA-152040 — \$79.50

A complete system package for primary use in the 15, 20, and 40 meter bands at power levels up to 4KW-PEP with secondary operation in other bands at reduced power levels.

MODEL DGA-2040 — \$59.50

A complete system package for primary use in the 20 and 40 meter bands at power levels up to 4KW-PEP with secondary operation in other bands at reduced power levels.

MODEL DGA-204075 — \$79.50

A complete system package for primary use in the 20, 40, and 75 meter bands at power levels up to 4KW-PEP with secondary operation in other bands at reduced power levels.

CONTACT YOUR DISTRIBUTOR OR WRITE FOR DATA

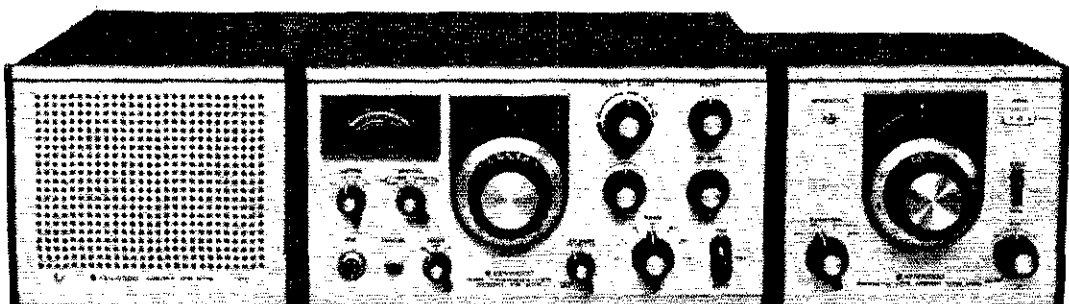


Savoy Electronics, Inc.

P.O. Box 7127 - Fort Lauderdale, Florida - 33304

Tel: 305-566-8416 or 305-947-1191

IF YOU CAN FIND A BETTER TRANSCEIVER FOR \$415... BUY IT! BUT WE KNOW YOU CAN'T



Superb Kenwood quality, unsurpassed performance, value you'll find hard to believe, proven reliability of both vacuum tube and solid state technology

The Kenwood TS-511S is a five band SSB and CW transceiver packed with power and performance... offering features never before available in its price range. For example: built-in VOX, crystal calibrator, noise blanker, receiver incremental tuning, 1 kHz frequency read-out, 8 pole filter, stable FET VFO, dual conversion and accessory CW filter.

FREQUENCY RANGE:

80 meter band 3.5 - 4.1 mHz
 40 meter band 7.0 - 7.6 mHz
 20 meter band 14.0 - 14.6 mHz
 15 meter band 21.0 - 21.6 mHz
 10 meter band 28.0 - 28.6 mHz
 28.5 - 29.1 mHz
 29.1 - 29.7 mHz

MODES: LSB, USB, CW

INPUT POWER:

500 watts PEP, 300 watts CW nominal.

SENSITIVITY:

3.5-21.6 mHz band: 0.5 uv S/N 10 db
 28.0-29.7 mHz band: 1.5 uv S/N 10 db
 and less than 100 cps frequency drift

per 30 minutes after warm-up

SELECTIVITY:

SSB more than 2.4 KC (at 6 db) with
 2 to 1 slope ratio
 CW more than 0.5 KC (at 6 db)
AUDIO OUTPUT: more than 1 watt
 (10% distortion)

TUBE & SOLID STATE COMPONENTS:

10 Tubes, 1 IC, 37 Transistors, 4 FET,
 52 Diodes

PRICE: \$415.00

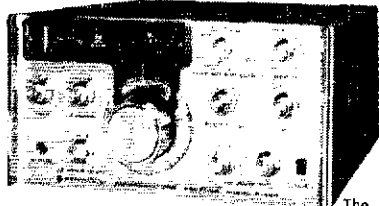
ACCESSORIES:

Power Supply with built-in speaker

\$105.00

External VFO \$105.00

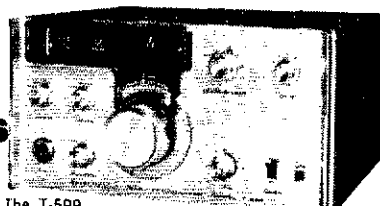
CW Filter \$39.00



The R-599

The R-599 Solid State Receiver: 1.8 to 29.7 mHz (amateur bands) • 5 microvolt sensitivity nominal • Dial readout to 1/2 kHz • Special detectors for SSB, AM, and FM • Transceiver operation with T-599 • Built-in 100 kc and 25 kc crystal calibrator and 500 cycle CW filter • 2 and 6 meter coverage with optional accessory self-con-

**Kenwood's
winning
pair**



The T-599

tained converters • Adjustable threshold squelch. \$349.00 • S-599 speaker \$16.00 • CC-29 2 meter converter \$31.00 • CC-69 6 meter converter \$31.00

The T-599 Transmitter: Clear, stable, selectable sideband, AM and CW • 4-way VFO flexibility plus Receiver Incremental Tuning (RIT) when used with the R-599 •

Amplified ALC • Built-in VOX • Full metering, including cathode current, plate voltage, ALC and relative Power Output • Built-in CW Sidetone monitor and semi-automatic break-in CW • Built-in power supply • Maximum TVI protection • Employs only 3 vacuum tubes • The price... \$395.00

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
 931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
 Butler, Missouri 64730 816/679-3127

Henry Radio

AVAILABLE AT SELECT DEALERS THROUGHOUT THE UNITED STATES

Section Communications Managers of the ARRL

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 OVS, 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	W3DKX	Roger E. Cole	345 E. Roosevelt Ave.	New Castle 14720
Eastern Pennsylvania	W3HK	George S. Van Dyke, Jr.	4807 Convent Lane	Philadelphia 19114
Maryland-D.C.	W3FA	Karl R. Medcrou	1320 1	Davidsville, MD 21035
Southern New Jersey	W2YPZ	Charles E. Travers	State Police Drive	Leonton 08128
Western New York	K2KTK	Richard M. Pitzeruse	407 Woodland Rd.	Syracuse 13219
Western Pennsylvania	W3NEM	Robert E. Gawryla	1463 N. Allen St.	State College 16801

CENTRAL DIVISION

Illinois	W4PRN	Edmond A. Mettger	1530 South 4th St.	Springfield 62703
Indiana	W9BUQ	William C. Johnson	2838 Hillside Ave.	Indianapolis 46218
Wisconsin	W9OMT	Joseph A. Taylor	1952 Mulberry Ln.	Green Bay, WI 54303

DAKOTA DIVISION

Minnesota	WA9VAS	Casper Schroeder,	10971 Quincy Blvd. N.E.	Blaine 55434
North Dakota	W0DM	Harold L. Sheets	21 Euclid Ave.	Grand Forks 58101
South Dakota	WA9CPK	Ed Gray	3306 So. Maple	Rapid City 57701

DELTA DIVISION

Arkansas	WA5VWH	Jimmie N. Lowrey	2818 N. Albert Pike	Fort Smith 72401
Louisiana	K5AGI	John R. Riviere	Box 766	Slidell 70458
Mississippi	W5NCB	Walker J. Coffey	8410 No. 2	Oxford 38845
Tennessee	WA4GLS	G. D. Keaton	Rt. 1, Medearis Dr.	Old Hickory 37138

GREAT LAKES DIVISION

Kentucky	W4CID	Ted H. Hudale	604 Amanda Terrace Dr.	Ashland 41101
Michigan	W8ZBT	Ivory J. Olinghouse	1237 Rose Dr.	Niles 49120
Ohio	W8JMT	William E. Clausen	403 Canyon Dr. S.	Columbus 43214

HUDSON DIVISION

Eastern New York	K2SJM	Graham G. Berry	50 Parrot Ave.	New Rochelle 10801
N.Y.C. & Long Island	K2DGI	Fred J. Brunjes	22 Ivy Drive	Jericho, L.I. 11752
Northern New Jersey	W1ZZ	Louis J. Amoroso	180 Pleasant Ave.	Bergenfield 07621

MIDWEST DIVISION

Iowa	K0YVU	Al Culbert	P.O. Box 306	Charles City 50616
Kansas	K0EXF	Robert M. Summers	3045 North 72nd	Kansas City 66100
Missouri	W0BV	Robert J. Pawler	Route 4	Kirkville 63501
Nebraska	K0QAL	V. A. Cashon	334 Pine St., Box 488	Chadron 69337

NEW ENGLAND DIVISION

Connecticut	W1GVT	John J. McNassor	218 Herlin Ave.	Southington 06489
Eastern Massachusetts	W1KFP	Frank L. Baker, Jr.	55 Solar Ave.	Bealton 02185
Maine	K1TEV	Peter E. Sterling	39 Latham St.	So. Portland 04106
New Hampshire	W1SWX	Robert Mitchell	Box 137-A	Chester 03036
Rhode Island	K1AAV	John E. Johnson	30 Fruit St.	Pawtucket 02860
Vermont	W1BRG	James H. Viele	101 Henry St.	Burlington 05401
Western Massachusetts	W1BVR	Percy C. Noble	P.O. Box 5	Lanesboro 01237

NORTHWESTERN DIVISION

Alaska	K1U7VO	Kenneth R. Klopff	265 Steele Cr. Rd.	Fairbanks 99701
Idaho	W7ZNN	Donald A. Crisp	1508 Alder Drive	Lewiston 83501
Montana	W7RZY	Harry A. Roylance	P.O. Box 651	Harlowton 59036
Oregon	K7WWR	Dale T. Justice	1369 N. E. Sunniste Lane	Hillsboro 97123
Washington	W7PI	Arthur Hennang	4516 N.E. 60th St.	Seattle 98115

PACIFIC DIVISION

East Bay	W6DDHH	Paul J. Parker	7236 Whyte Park Ave.	Walnut Creek 94593
Hawaii	K6H8ZF	Lee R. Wical	P.O. Box 9274	Honolulu 96820
Nevada	W7PBV	Leonard M. Norman	652 Utah St.	Boulder City 89005
Sacramento Valley	W6KYA	John F. Minke, II	6230 Rio Bonito Drive	Carmichael 95608
San Francisco	W6JPU	Ralph Saroyan	6204 E. Townsend Ave.	Fresno 93702
San Joaquin Valley	W6SLFA	James A. Hauser	13085 Franklin Ave.	Mountain View 94040

ROANOKE DIVISION

North Carolina	W4WXZ	Charles H. Brydges	4901 Tiffany Ave.	Winston-Salem 27104
South Carolina	WA5LEFP	Mrs. Elizabeth Y. Miller	1509 Highland Ave.	Camden 29020
Virginia	K4GR	Robert J. Slagle	3514 - 25th St., N.	Arlington 22207
West Virginia	W8JMK	Donald B. Morris	1136 Morningstar Lane	Fairmont 26334

ROCKY MOUNTAIN DIVISION

Colorado	WA0HLQ	Clyde O. Penney	1626 Locust St.	Denver 80220
New Mexico	W8NUI	James R. Price, D.V.M.	P.O. Box 1128	Los Alamos 87544
Utah	K7SOT	Carroll F. Soper	4422 Emigration Canyon	Salt Lake City 84108
Wyoming	W7CQL	Wayne M. Moore	141 South Montana Ave.	Casper 82601

SOUTHEASTERN DIVISION

Alabama	W84EKI	James A. Brashear, Jr.	3002 Boswell Drive	Huntsville 35811
Canal Zone	K73ZZ	James L. McMillan	P.O. Box 2869	Balboa
Eastern Florida	W4ILE	Regis K. Kramer	194 N E. 76th St.	Miami 33138
Georgia	WA4WQU	A. J. Garrison	2529 Blueberry Dr.	Augusta 30906
*West Indies	KP4AST	Pedro J. Piza	Box 2001	Pointe, PR 00731
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	W6INH	Eugene H. Violino	2839 Canada Blvd.	Glendale 91208
Orange	*W6CPB	William L. Weise	1753 Iowa St.	Costa Mesa 92624
San Diego	W6SRS	Paul C. Thompson	731 Hamlet Ave.	San Diego 92120
Santa Barbara	WA6DEI	D. Paul Gagnon	1791 Hedon Cir.	Camarillo 93010

WEST GULF DIVISION

Northern Texas	W5LR	L. E. Harrison	1314 Holly Glen Drive	Dallas 75231
Oklahoma	W5PML	Cecil C. Cash	1802 Smith Ave.	Lawton 73501
Southern Texas	K5HZR	E. Lee Ulrey	4215 Dysart Drive	San Antonio 78220

CANADIAN DIVISION

Alberta	VE6FK	Don Sutherland	444-25th Ave., N.E.	Calgary, Alta. T2E 1Y3
British Columbia	V77FB	H. E. Savage	4553 West 12th Ave.	Vancouver 8, B.C.
Manitoba	VE4FQ	Steven Fink	14 Grandcrest St.	Winnipeg 17, Manitoba
Maritime	VE1AMR	Walter D. Jones	79 Waverley Ave.	Moncton, N.B.
Ontario	VE3DV	Holland H. Shepherd	3016 Cowan Cres.	Ottawa K1V 8L1
Quebec	VE2ALE	Joseph Unsworth	163 Mgr. Bourget	Vaudreuil, P.Q.
Saskatchewan	*VE5CU	W. H. Parker	1008-10th St. E. Ave.	Saskatoon, SK

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

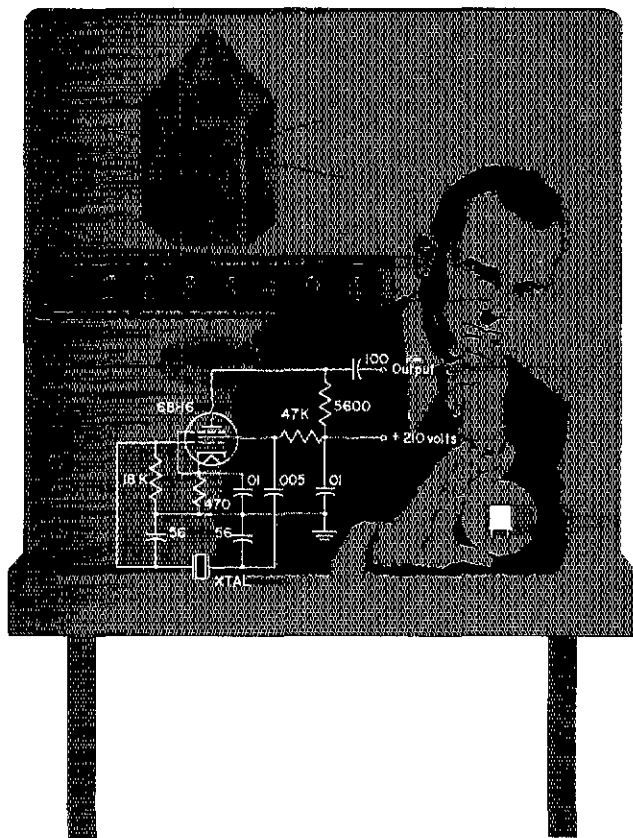
There Is a Difference In Quartz Crystals

Space age communication equipment demands a crystal that meets all standards of technical advancement. Crystals that were acceptable some years ago do not meet present day specifications. As a general rule, your crystal must be selected from the best quartz . . . (no throw off cuts). Tight tolerances demand selected angles of cut. The x-ray is important in making this selection. The crystal should be preaged with stress cycling. It should be checked for frequency change vs temperature change. It must be checked for optimum spurious response. It should be calibrated to frequency with the correct oscillator. International Crystals are manufactured to meet today's high accuracy requirements. That's why **we guarantee all** International crystals against defective materials and workmanship for an unlimited time when used in equipment for which they were specifically made.

WRITE FOR CATALOG



CRYSTAL MFG. CO., INC.
10 NORTH LEE
OKLAHOMA CITY, OKLA. 73102



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 06111.



Past Presidents

HIRAM PERCY MAXIM, W1AW, 1914 — 1936
EUGENE C. WOODRUFF, W8CMP, 1936 — 1940
GEORGE W. BAILEY, W2KH, 1940 — 1952
GOODWIN L. DOSLAND, W0TSN, 1952 — 1962
HERBERT HOOVER, JR., W6ZH, 1962 — 1966
ROBERT W. DENNISTON, W0DX, 1966 — 1972

Officers

President HARRY J. DANNALS,* W2TUK
16 Arbor Lane, Dix Hills, NY 11746
First Vice-President . . . CHARLES G. COMPTON,* W0BUO
1170 E. 90th St., Inver Grove Hgts., MN 55075
Vice-Presidents ROBERT W. DENNISTON, W0DX
Box 73, Newton, IA 50208
ROEMER O. BEST, W5QKF
P.O. Box 1656, Corpus Christi, TX 78401
Secretary JOHN HUNTOON, W1RW
Treasurer DAVID H. HOUGHTON
Honorary Vice-Presidents . . . CARL L. SMITH, W0BWJ
FRANCIS E. HANDY, W18DI
WAYLAND M. GROVES, W5NW
General Manager JOHN HUNTOON,* W1RW
Communications Manager GEORGE HART, W1NJM
Technical Consultant GEORGE GRAMMER, W1DF
Assistant General Manager RICHARD L. BALDWIN, W1RU
Assistant Secretaries PERRY F. WILLIAMS, W1UED
MORGAN W. GODWIN, W4WFL
DAVID G. SUMNER, K1ZND
225 Main St., Newington, Connecticut 06111
General Counsel ROBERT M. BOOTH, JR., W3PS
1150 Connecticut Avenue, N.W., Washington, DC 20036
Associate Counsel ARTHUR K. MEEN, Q.C., VE3RX
7th Floor, Frost Building, Queen's Park, Toronto, ON

DIRECTORS

Canada
NOEL B. EATON* VE3CJ
Box 860, Waterdown, Ontario
Vice-Director: A. George Spencer VE2MS
171 Kipling Ave., Beaconsfield, Quebec
Atlantic Division
HARRY A. MCCONAGHY W3SW
8708 Fenway Dr., Bethesda, MD 20034
Vice-Director: Jesse Bieberman W3KT
Rt. 1, Box 66, Valley Hill Rd., Malvern, PA 19355
Central Division
PHILIP E. HALLER W9HPG
6000 S. Tripp Ave., Chicago, IL 60629
Vice-Director: Edmond A. Metzger W9PRN
1520 South Fourth St., Springfield, IL 62703
Dakota Division
LARRY J. SHIMA W0PAN
11417 Goodrich Rd. S., Bloomington, MN 55437
Vice-Director: Edward C. Gray W0CPX
3306 South Maple, Rapid City, SD 57701
Delta Division
MAX ARNOLD W4WHN
612 Hogan Rd., Nashville, TN 37220
Vice-Director: Franklin Casson W4WBK
925 N. Trezevant St., Memphis, TN 38108
Great Lakes Division
ALBAN A. MICHEL W8WVC
369 Bonham Rd., Cincinnati, OH 45215
Vice-Director: Richard A. Egbert W8ETU
6479 Red Fox Rd., Reynoldsburg, OH 43068
Hudson Division
STAN ZAR K2SJO
13 Jennifer Lane, Port Chester, NY 10573
Vice-Director: George A. Diehl W2IHA
20 Wilson Ave., Chatham, NJ 07928
Midwest Division
RALPH V. ANDERSON K0NL
528 Montana Ave., Holton, KS 66436
Vice-Director: Paul Grauer WA0LLC
Box 190, Wilson, KS 67490
New England Division
ROBERT YORK CHAPMAN W1QV
28 South Road, Groton, CT 06340
Vice-Director: Roger E. Corey W1AX
60 Warwick Drive, Westwood, MA 02090
Northwestern Division
ROBERT E. THURSTON* W7PGY
7700 31st Ave., N.E., Seattle, WA 98115
Vice-Director: David O. Bennett W7QLE
Box 455, St. Helena, OR 97061
Pacific Division
J. A. "DOC" GMELIN W6ZRJ
10835 Willowbrook Way, Cupertino, CA 95014
Vice-Director: Albert F. Gastano W6VZT
115 Old Adobe Road, Los Gatos, CA 95030
Roanoke Division
VICTOR C. CLARK* W4KFC
12927 Popes Head Road, Clifton, VA 22024
Vice-Director: L. Phil Wicker W4ACY
4821 Hill Top Road, Greensboro, NC 27407
Rocky Mountain Division
CHARLES M. COTTERELL W9SIN
430 S. Swadley St., Lakewood, CO 80228
Vice-Director: Allen C. Auten W0ECN
8722 West 67th Ave., Avada, CO 80002
Southeastern Division
H. DALE STRIETER W4DQS
928 Trinidad, Cocoa Beach, FL 32931
Vice-Director: Larry E. Price W4DQD
P.O. Box 2087, Georgia Southern Branch
Statesboro, GA 30458
Southwestern Division
JOHN R. GRIGGS* W6RW
1273 13th St., Baywood Park, San Luis Obispo
CA 93401
Vice-Director: Arnold Dahman W6UEJ
3022 Las Positas Rd., Santa Barbara, CA 93105
West Gulf Division
ROY L. ALBRIGHT W5EYB
107 Rosemary, San Antonio, TX 78209
Vice-Director: Jack D. Gant W5GM
621 Monroe, N.W., Ardmore, OK 73401

* Member Executive Committee

"It Seems to Us..."



FCC WARNING

THE COMBINED DEVELOPMENTS of legalization of phone patches and proliferation of amateur fm repeater operation has opened some entirely new channels of communication, particularly for the mobile operator. "Auto-patch" installations at machine sites are quite within the rules, and members of such repeater groups can — from their moving vehicles — easily communicate with anyone by interconnection to the landline telephone.

At the same time, this new freedom provides us with temptation in our daily routine to overstep the rules prohibiting pecuniary interest in our amateur operation. There's the doctor phoning his office with casual instructions to his nurse. There's the two-way radio service shop owner (usually a principal in the repeater organization, and an architect of the auto-patch setup), forgetting that his conversations as often involve his commercial business as his amateur avocation. There's been enough of this sort of thing to cause the Commission considerable concern that it may jeopardize the proper development of the amateur service. This is particularly true when one considers that the manual patch on hf bands often treads also into sticky territory as concerns business or commercial activities of the individual.

In our interests, therefore, FCC has issued a public notice which describes the anatomy of both hf manual patches and the repeater auto-patch, and points out their susceptibility to mis-use. The Commission says, in fact, that it "has received recent evidence that a number of amateur licensees are engaged in handling business communications directly and indirectly involved in commercial operations."

This is something like the friendly, cooperative notice one might get from an ARRL Official Observer — i.e., to be alert to possible violations before we inadvertently commit them. It is a warning of potential danger, a suggestion that we all be more meticulous in the way we conduct our amateur operations under the rules. It is a warning which cannot and should not be ignored.

THE AMATEUR'S CODE

A GOOD MANY years ago — something like fifty — Paul M. Segal, then 9EEA of Denver and the \$1-a-year General Counsel for the League, drafted a few paragraphs outlining good conduct for amateurs. It shortly became known and accepted as "The Amateur's Code." Believing the concept and most of the substance to be first-rate, but concerned that a few phrases were by now dated and possibly susceptible to misunderstanding in the modern world, the Board of Directors ordered a review of the text; this has now been completed, and we are pleased to present the revision below.

I. The Amateur Is Considerate. He never knowingly uses the air in such a way as to lessen the pleasure of others.

II. The Amateur Is Loyal. He offers his loyalty, encouragement and support to his fellow radio amateurs, his local club and to the American Radio Relay League, through which amateur radio is represented.

III. The Amateur Is Progressive. He keeps his station abreast of science; it is well built and efficient. His operating practice is above reproach.

IV. The Amateur Is Friendly. Slow and patient sending when requested, friendly advice and counsel to the beginner, kindly assistance, cooperation, and consideration for the interests of others; these are the marks of the amateur spirit.

V. The Amateur Is Balanced. Radio is his hobby. He never allows it to interfere with any of the duties he owes to his home, his job, his school, or his community.

VI. The Amateur Is Patriotic. His knowledge and his station are always ready for the service of his country and his community.

— Paul M. Segal.

League Lines . . .

The ARRL Board of Directors at its second 1972 meeting in Hartford on July 20 and 21 adopted specific goals and objectives proposed by its ad hoc committee on long-range planning. Detailed position responsibilities were delineated for officers and the General Manager, to insure continued utilization of all skills and talents. The committee will proceed now to the "development of procedures" phase. The standing committee structure will be revised, effective next January, to fit more logically the five general areas of League organization -- that is, international affairs, plans and programs, membership affairs, management and finance, and legal and regulatory.

The Board registered its opposition to any proposal which would make call sign changes compulsory. It adopted motions seeking regulatory changes to provide a more liberal examination schedule, credit for examination elements already passed, and written exams made available in the Spanish language.

A technical symposium is planned for 1973 in Washington, D.C. Funds were set aside for a professional film team to travel quickly to disaster areas and record amateur performance in emergency communications. A QSL card competition will be held seeking an appropriate design to commemorate the 200th year of the United States, and IARU societies will be invited to participate in amateur activities and events during the anniversary year 1976.

An ARRL display unit will be made available to each division for use at conventions and hamfests, augmenting the present booth exhibit. The 1974 National Convention was affirmed for New York City, with dates of July 19-21. The Board endorsed the initial work of the Amateur Satellite Service Committee, and set up an additional ad hoc group to help in providing guidelines in space communications. The Museum at the headquarters office in Newington, Conn., was dedicated to the memory of the late Roland B. Bourne, W1ANA, whose work in expansion and restoration has made it an historical showpiece.

The Board assigned its present committees a number of study tasks, with reports and recommendations to be forthcoming prior to the January annual meeting. They include the subjects of division reapportionment, purchase of portable repeaters for field use in disasters, an advisory committee on emergency communications, SCM duties, minimum affiliation requirements for clubs, a simple beginner booklet, changes in presentation of minutes in QST, the format of "Recent Equipment" reviews, and an intensive drive for membership. A separate task group will examine present Hq. facilities for suitability to meet present needs. The special committee on a Hoover Memorial will continue its study.

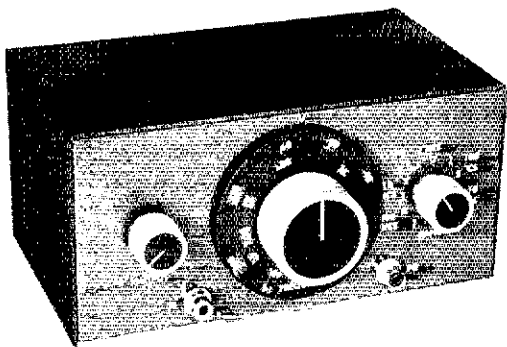
Full minutes of the meeting appear in "Happenings" this month.

Our Mobile Manual for Radio Amateurs first appeared in 1955, in response to many requests for a compilation of previously published QST material on that subject. Over the years shifting interests, especially to commercial gear and to fm, have markedly lessened its usefulness to the amateur, and so it is being discontinued from the ARRL "library" of publications -- to be effectively replaced, of course, by the special repeater manual now in production.

CATV coming to your city? One club, which is going to try the project, suggests that local programming time may be available for such things as code and theory classes for a ham ticket.

July QST carried suggested frequencies for SSTV, but W1VRK says one was wrong. The full lineup is 3845, 7220, 14,230, 21,340, 28,680 kHz.

Fig. 1 — A Kurz-Kasch S-1004-1-409R knob has been modified to take the skirt from a Millen K10009 knob. The skirt has been painted a flat black and dry-transfer numbers used for the two calibration scales.



A Simple Function Generator

BY DOUGLAS A. BLAKESLEE,* WIKLK

OFTEN NEW COMPANIES are formed to produce state-of-the-art devices. A bevy of new firms have sprung up in recent years manufacturing exotic integrated circuits. One such company, Exar Systems, has introduced a unique IC that contains a wave-form generator, a triangular-to-sine-wave converter (which also functions as a modulator) and a buffer/output stage. Designated XR-205, the IC is contained in a 16-pin dual-in-line plastic package. The generator section of the device resembles the Signetics NE566.¹ The XR-205 can perform many of the function-generator tasks,² and, in conjunction with a second XR-205, can provide a multitude of complex wave forms and modulation modes.³

While the complex functions of the XR-205 will be of interest to some experimenters, a simple application of the IC as the basis of a wide-range function generator will be described in this article. A variable-frequency audio oscillator with sine- and square-wave output is useful when testing amateur equipment. For checking ssb gear, a two-tone test pattern can be generated by feeding a single audio tone to the microphone input of a transmitter or transceiver. The second tone is developed by partially unbalancing the balanced modulator in the rig, as described in Chapter 13 of the 1972 *The Radio Amateur's Handbook*. Another test that requires an audio generator is the deviation adjustment of an fm transmitter using the Bessel-func-

tion procedure.⁴ RTTY and SSTV enthusiasts use audio oscillators to aid in alignment of their receiving gear. The function generator shown in Fig. 1 can also be employed as a signal source for i-f alignment of communications receivers.

Circuit Details

A schematic diagram of the function generator is given in Fig. 2. The frequency of oscillation of the XR-205 is established by the value of a capacitor, C1, and the voltage applied to pin 13 of the IC. Adjustment of R1, a reverse-log-taper control, varies the potential at pin 13. The unusual taper was chosen to give approximately linear dial calibration for the FREQUENCY ADJUST control. The IC generates square and triangular wave forms simultaneously. Square-wave energy is available at a front-panel jack to operate a frequency counter if high accuracy dial calibration is needed. The square-wave pulses are also useful when testing digital circuits. The triangular wave isn't used directly; it is converted to a sine wave in the modulator section of the IC. R2 provides adjustment of the sine-wave converter for minimum distortion, which is typically less than 2 percent

⁴ See ARRL 1972 *Handbook*, Chapter 14 or the third edition of the *Vhf Manual* for details.

One important advantage of an integrated circuit is that it allows a complex task to be accomplished with a minimum of components. The function generator described here, which produces sine-, square-, and triangular-wave energy over a frequency range of 4 Hz to 1.2 MHz, requires only one IC in the generator section and one IC in the power supply.

* Assistant Technical Editor, *QST*.

¹ A complete description of the inner workings of the XR-205 appeared in *IEEE Spectrum*, April, 1972, p. 34.

² Generators which provide sine, square and triangular wave forms in the audio, if and mf range are often called function generators.

³ Exar offers a kit of two XR-205 ICs plus an etched circuit board to make a generator which can produce the complex wave forms shown in the XR-205 specification sheet. A single XR-205 is priced at \$16, and the generator kit costs \$28. Orders for the IC and requests for the specification sheet should be addressed to Jim Shaies, Director of Marketing, Exar Integrated Systems, 733 North Pastoria Ave., Sunnyvale, CA 94086.

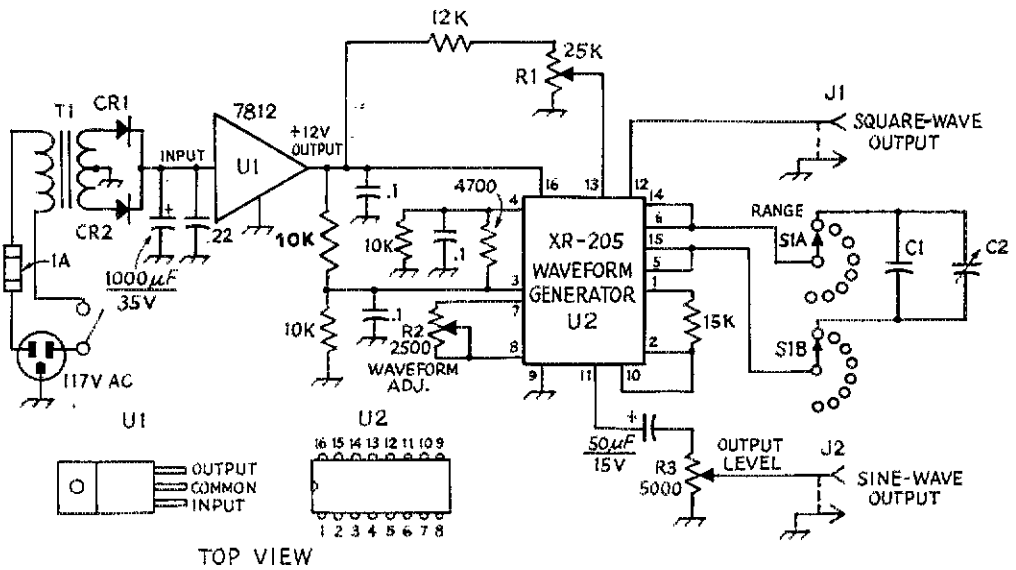


Fig. 2 - Schematic diagram of the function generator. Resistors are 1/4-watt composition and capacitors are disk ceramic, except those with polarity marked which are electrolytic, unless otherwise indicated.
 C1 - See Table 1.
 C2 - See text.
 CR1, CR2 - Silicon rectifier diode, 200 PRV, 500 mA or more.

- J1, J2 - Phono jack, panel mount.
- R1 - Reverse-log-taper composition control, 2 W, panel mount (Ohmite CB2531).
- R2 - Linear-taper composition control, 1/2 watt, pc mount.
- R3 - Linear-taper composition control, 1/2 watt, panel mount.
- S1 - Rotary, 2-pole, 11-position, dual section, phenolic.
- T1 - 117-V primary, 36-V c.t. secondary, 100 mA or more (Stancor P8610, P8611 or P8612).
- U1 - Fairchild IC.
- U2 - Exar IC.

with the circuit of Fig. 2. An oscillograph of the output wave forms obtained with the generator operating at 10 kHz is shown in Fig. 4.

A simple power supply is included within the unit. Regulation of the 12-V dc supply is accomplished by a Fairchild UGH7812393 IC. No heat sink is required for the regulator integrated circuit as the current drawn by the XR-205 is less than 30 mA. A template for the generator circuit board is given in Fig. 3. A homemade 7 x 3-1/4 x 4-inch cabinet encloses the unit, although any commercial housing of suitable dimensions can be employed.

Parts for the function-generator project are not difficult to obtain. The XR-205 IC can be ordered directly from the manufacturer on a sample basis for \$16 (see footnote 2). A specification sheet for the XR-205 should also be requested from Exar, as it describes the many applications for the device. The other components can be ordered from one of the large mail-order houses or through a local distributor. The author obtained the Fairchild IC and reverse-log-taper control from Allied Electronics.⁵

⁵ Allied Electronics, 2400 W. Washington Blvd., Chicago, IL 60612 (free catalog available).

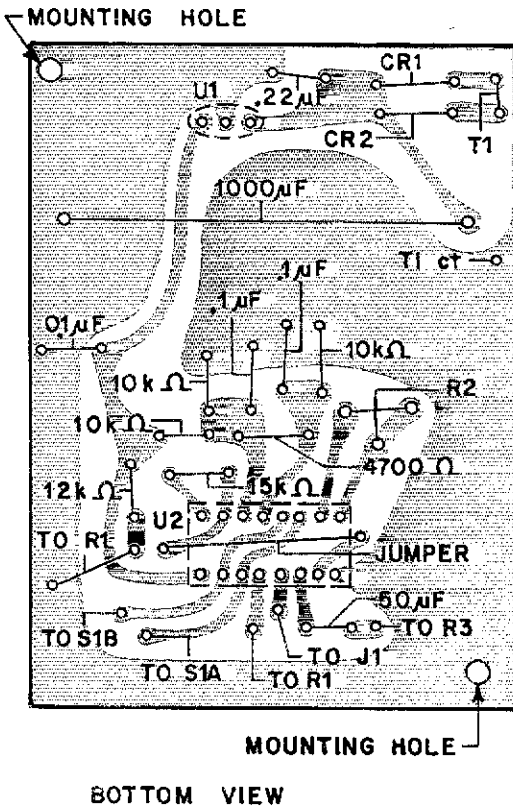


Fig. 3 - Full-size foil pattern and parts-layout diagram for the function generator.

Table 1 — TABLE OF VALUES FOR C1

Range	Value For C1	Manufacturer	Number
3.5 to 13 Hz	68 μ F	Sprague	686X9015R2
12 to 40 Hz	22 μ F	Sprague	226X901B2
35 to 130 Hz	6.8 μ F	Sprague	685X9035B2
120 to 400 Hz	2.2 μ F	Sprague	225X9035B2
350 to 1300 Hz	0.68 μ F	Sprague	684X9035A2
1.2 to 4 kHz	0.22 μ F	Sprague	224X9035A2
3.5 to 13 kHz	.068 μ F	Sprague	683X9035A2
12 to 40 kHz	.022 μ F	Sprague	223X9035A2
35 to 130 kHz	.0068 μ F	Filmite Corp.	192P6829R9
120 to 400 kHz	.0022 μ F	Filmite Corp.	192P2229R8
0.35 to 1.2 MHz	680 pF	CDE	FD681J03

Assembly of the generator consists of mounting the parts on the circuit board, mounting the capacitors on S1, and running leads between the circuit board and the panel controls, output jacks, and T1. Use a socket for U2 so that the power supply can be tested before the XR-205 is installed. The completed circuit board should be mounted in the housing using 1/8- or 1/4-inch high stand-off pillars.

Alignment

Most capacitors have wide tolerance ranges, 20 to 200 percent is typical for inexpensive units. If the dial calibration of the generator is to be correct, the value of C1 must be very close to that given in Table 1. Some experimentation will probably be needed to arrive at the exact capacitance value for each range. A mica trimmer, C2, can be added in parallel with C1 on the higher ranges to aid in alignment. Series and parallel combinations of junk-box capacitors can be employed to obtain the large capacitance values needed on the low-frequency ranges. Table 1 shows the types of capacitors used by the author. In some cases it was necessary to check as many as ten capacitors marked with the same value to find one close to the desired value.

When the generator has been checked for wiring errors, including solder bridges on the circuit board, apply ac power. Connect a voltmeter to the output of U1; a reading of 12 volts indicates the power supply section is functioning correctly. Momentarily shut off the ac power and install U2. If a frequency counter is available, the dial calibration of R1 can be checked on each range, adjusting the value of C1 as outlined above whenever needed to correct the alignment. An oscilloscope, connected to J2, will be needed to adjust the sine-wave

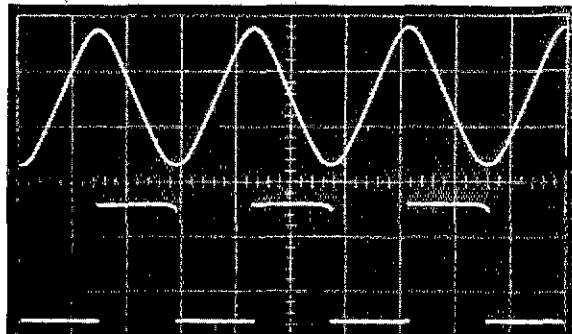


Fig. 4 — Sine- and square-wave output from the function generator displayed on a Tektronix 453 oscilloscope.

converter for minimum distortion. With the scope sweep circuit set to display one sine-wave cycle, adjust R2 until the peak of the wave form is rounded. A sharp peak at the top and bottom of the wave form indicates insufficient input into the converter, while flattening is an indication that the modulator section of the IC is being overdriven. An audio distortion meter can be used as a final check of the setting of R2. If a distortion meter is not available, alignment using an oscilloscope should suffice.

QST

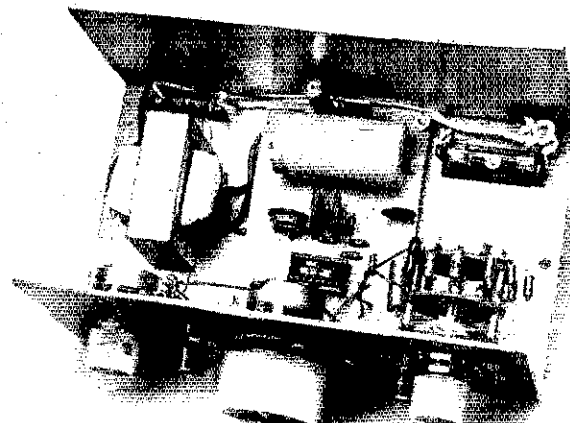


Fig. 5 — The circuit board is bolted to the housing using No. 4 hardware and 1/8-inch-high spacers. The leads from R1 and S1 should be kept as short as possible.

Some Plain Facts about Multiband Vertical Antennas

BY LEW McCOY,* WHCP

DURING DISCUSSIONS with newcomers, and old timers for that matter, it becomes apparent that there is considerable confusion as to what exactly a multiband vertical antenna is. The confusion concerns the method of feed, how much mismatch one can expect, how many radials are required, how the particular antenna is built for multiband use, plus some other points.

This article breaks the subject into simple language and provides the reader with sufficient expertise to assure him that he won't wind up with a system he really doesn't want. Before going into a discussion of the different types of multiband "verticals" we will offer some simple antenna facts.

Some Basic Theory

The term "multiband antenna" has come to mean many things to hams. With trap antennas, tapped coils, random wires, and so forth, there is plenty of reason for the confusion. Simply, a multiband antenna is one that can be used on more than one band. How we make it work on different bands is another story.

Basically, any piece of wire of *any* length can be classed as a multiband antenna. For example, a length of wire four feet long *could* be used on *any* amateur band, from 160-meters on up. However, how well the piece of wire would work is a completely different matter.

In the feed point of any antenna there is *radiation resistance*. The energy supplied to an antenna is dissipated in the form of radio waves and in heat losses in the wire and near by insulating materials. The radiated energy is the useful part,

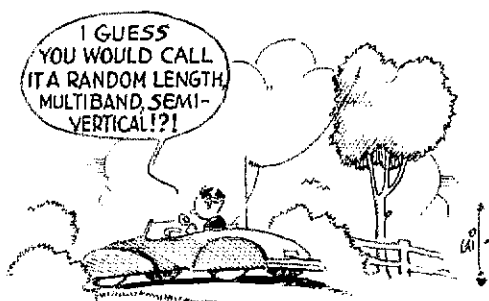
* Novice Editor.

but so far as the transmitter is concerned it represents a power consumption just as much as does the energy lost in heating the wire. In either case the dissipated power is equal to I^2R : in the case of heat losses, R is a real resistance (ohmic losses), but in the case of radiation, R is an *assumed* resistance. This fictitious resistance is the radiation resistance. This brings us to our first important point about multiband antennas.

Whenever one reduces the size (length) of an antenna physically, the radiation resistance is reduced also. As an example, assume we have a 20-meter quarter-wave antenna, which is approximately 16 feet long. Let's imagine we made it out of No. 40 wire, which has a resistance of about one ohm per foot. The radiation resistance, of a resonant quarter-wave vertical operated against a perfect ground is on the order of 35 ohms. In this case, the feed-point impedance of our antenna would be roughly 35 ohms in radiation resistance plus 16 ohms in ohmic resistance. If we were to feed 51 watts into this antenna 16 watts would be dissipated as heat (lost power) and the remainder—35 watts—would be radiated. Now, suppose we use this same antenna on 80 meters. As mentioned above, when we reduce the size of an antenna physically the radiation resistance is also reduced. On 80 meters our 16-foot antenna would have a radiation resistance on the order of one ohm! However, we would still have the ohmic resistance of 16 ohms. It doesn't take much figuring to realize that just about *all* of our power would be lost as heat.

Of course we wouldn't use No. 40 wire for such an antenna. More likely the antenna would be made from aluminum tubing and the ohmic losses would be very low, but probably still more than the radiation resistance. There is an old axiom in amateur radio that offers some pretty good advice: Always make the antenna as long as possible, and erect it as high as possible. Also, there is a joke that goes with that axiom — if such an antenna stays up, it is too small!

At this point we have only mentioned radiation and ohmic resistance in the antenna feed point. These are the two resistances that exist when the antenna is resonant. When the antenna is not resonant, there is reactance present in the feed point. Reactance is also expressed in ohms, but it



isn't a real resistance in the sense that power can be dissipated therein. We won't go into a long discussion on reactance because it would take up too much space. An excellent explanation can be found in the League publication, *Understanding Amateur Radio*. Simply, reactance can be likened to a gate or door that stops or hinders the flow of current into a circuit. When an antenna is operated at some frequency other than the resonant frequency there will always be reactance present. Keep in mind that with *any* antenna, multiband or otherwise, we always have a condition on some band or frequency where the antenna is not resonant. Therefore, there will be reactance at the feed point.

Types of Vertical Antennas

The basic and most popular type of vertical is one that is a quarter wavelength long and is operated against ground or in a ground-plane configuration. The antenna is usually made from tubing and the radials are wire. An ideal ground plane (simulated earth ground) would be a sheet of metal with a radius of one-quarter wavelength or more. However, this is only practical at vhf so the customary method is to use wires as the radials. Probably the number one question asked about ground-plane antennas is, "how many radials are required?" The answer is simply, the more radials used, the better the antenna will perform, at least up to a certain point. This should not be construed to mean that an antenna with only two or three radials won't work. Such an antenna will work, but for *maximum* performance one should consider 40 or more radials. If the reader is interested in performance data for a few radials versus many, he should read the recent article in *QST* by Sevick¹

The feed-point impedance of quarter-wave ground plane is on the order of 35 ohms. The impedance can be raised by drooping the radials down until a 50-ohm match is obtained. Exactly how much droop is required depends on the number of radials.

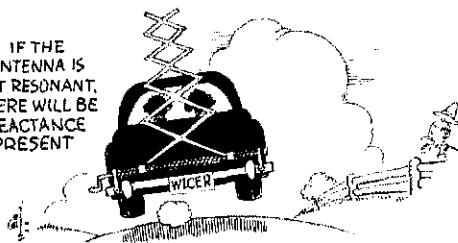
The quarter-wave ground plane is essentially a single-band antenna. However, a 40-meter quarter-wave vertical can also be used on 15 meters, a happy circumstance for the Novice. In this case, a 40-meter quarter wave works out to be three quarter waves on 15 and any *odd* multiple of quarter waves will provide a relatively low-impedance feed.

Multiband Verticals

When we get into the field of multiband verticals we find that considerable confusion exists. As pointed out previously, *any* antenna can be called a multiband antenna, but how we get power into such an antenna is another matter.

Up until the '50s any amateur multiband antenna was a system that usually consisted of an antenna, tuned feeders, and an antenna coupler. In the early '50s more and more amateurs started to

IF THE ANTENNA IS NOT RESONANT, THERE WILL BE REACTANCE PRESENT



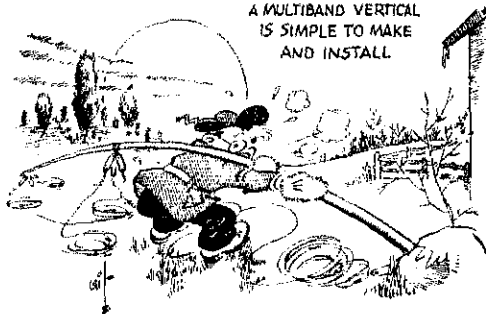
use coaxial cable for feeders, along with band-switching transmitters. The next logical step was the use of a multiband antenna system that required no adjustments and always presented a matched condition to the feed line — in other words, an antenna that had a 50-ohm feed-point impedance on every desired band and frequency within a given band. A logical development was the multiband trap antenna.

By inserting traps in an antenna it was possible to make an antenna "look" like a resonant half-wave dipole in whichever band was used; or, in the case of multiband verticals, making the vertical look like a resonant quarter-wave antenna for the desired band. However, and this is important as far as the newcomer is concerned, to our knowledge there is *no* multiband trap antenna that will provide a perfect match on all bands, *regardless* of what some antenna manufacturers may tell you. Many hams have spent countless hours trying to adjust trap antennas for that "perfect" match when actually, it is just about impossible to obtain such a condition.

Nontrap Multiband Verticals

Several antenna manufacturers sell multiband antennas that consist of a vertical piece of tubing, usually 16 to 20 feet long. The tubing is used with a loading coil at the ground end. By making appropriate taps and adjustments on the coil the antenna can be matched (or closely matched) on any given band. This type antenna has *no* traps. This in turn means that the coil taps and adjustments *must* be altered when one changes bands. Some misguided amateurs buy these antennas expecting all they need do is put them up and the antenna will work on all bands, automatically. Let's make one point clear: such an antenna is a multiband antenna, but requires adjustment *at the antenna* when one changes bands.

A MULTIBAND VERTICAL IS SIMPLE TO MAKE AND INSTALL



¹Sevick, "The Ground-Image Vertical Antenna" *QST*, July, 1971.

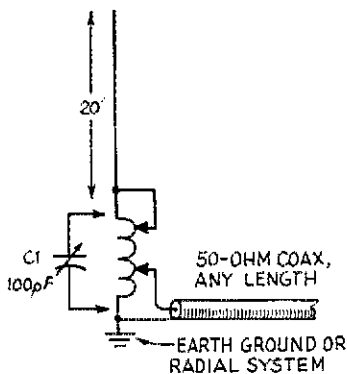


Fig. 1 - This is a typical multiband vertical antenna. A description of the system is given in the text.

Of course, the next question should be, "If the antenna is that simple can't I build my own?" Yes, it is a very simple multiband antenna to make and install. Two or three sections of inexpensive 10-foot TV mast sections can serve as the vertical radiating element. The mast can be supported on an insulator, such as a beverage bottle, and the mast guyed with nylon line. Fig. 1 shows a diagram of the antenna system. L1 should be a coil made of bare wire, No. 12 or 14, so that it can be tapped at every turn. A convenient coil size is 2-1/2 inches in diameter, six turns per inch, such as B & W 3905-1 stock. The number of turns required, assuming 80 meters as the lowest band to be used, should be about 30 turns with an antenna length of 25 feet.

Adjustment of the antenna requires the use of an SWR bridge. Connect the coax line across a few turns of L1 and make a trial position of the shorting tap. Measure the SWR, then try various positions of the shorting tap until the SWR reaches its lowest value. Then vary the line tap similarly. This should bring the SWR down to a low value. Small adjustments of both taps should provide an

SWR close to 1. If not, try adding C1 and repeat the adjustment procedure, varying C1 each time until a match is achieved. Radials will enhance the performance of the antenna. The number of radials is up to the individual amateur.

Trap Verticals

As mentioned earlier, traps can be installed in a multiband vertical. These traps are usually parallel-tuned circuits and the objective is to make each section of the antenna work as a quarter-wave vertical or odd multiple thereof on the desired band. Fig. 2 shows an example of this type antenna.

The purpose in using this type antenna is to provide a system that always presents a matched condition for the feed line. Unfortunately, there is so much interaction between various sections of the antenna that it is impossible to come up with a *perfect* match on each band. What is an *acceptable* match is another story.

Amateurs as a whole are inclined to attach too much importance to an SWR of 1. They feel that if their SWR bridge isn't showing an absolute zero reflected power that something is horribly wrong and they won't work out. The plain fact is that using a feed line such as RG-8/U (assume a 100-foot length) one could have an SWR of as much as 5 to 1 and have *no* appreciable loss in the system. However, there is one clinker in this thinking!

In many instances commercially made transmitters and receivers are designed by the manufacturer to work into a 50-ohm load only. They don't allow much leeway from this figure. When there is a mismatch in the antenna system, it can become impossible to load and tune the final amplifier of the transmitter. There just isn't enough tuning range in the tank circuit of the amplifier to handle the reactance that may be present in the load. There is a way around this problem however, and that is using a Transmatch in the feed line to disguise the mismatch.² The Transmatch can be adjusted so that the transmitter "sees" a 50-ohm load regardless of the mismatch at the antenna.

Elsewhere in this issue is an article by W1CQS/W4DWK describing the construction of a four-band trap vertical. The system is recommended to the Novice because it will work quite well on 40 and 15 meters.

The Harmonic Problems

Another consideration should be mentioned. As pointed out earlier, *any* antenna can be a multiband antenna. By the same token any harmonics generated in the transmitter that reach the antenna can be radiated. It is true that a single-band antenna will reject harmonic energy, but *not* completely. In the case of a multiband trap

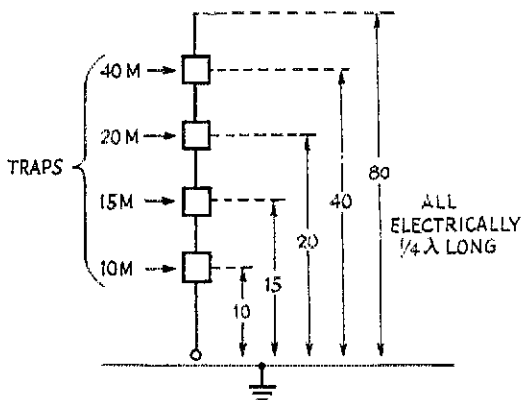
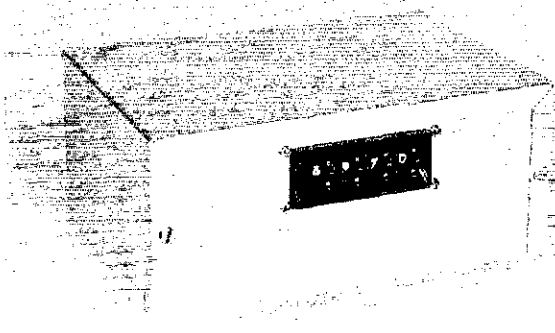


Fig. 2 - Drawing of the theoretical multiband trap vertical. In commercial practice, certain traps may be grouped together giving the impression that only a single trap is used.

(Continued on page 28)

² A suitable Transmatch is described in the transmission-line chapter of the 1972 edition of *The Radio Amateur's Handbook*.

The complete synthesizer except for its reference-frequency oscillator and divider chain is contained in a 7 × 5 × 3-inch metal box. The thumb-wheel switch settings give a direct readout of the last four digits of the 2-meter frequency expressed in kilohertz; the figures "6970" in this photo represent an output frequency of 146,970 kHz.



BY DERWIN H. STEVENS,*

WIUYK/WA2DHA

THE TREMENDOUS growth of activity on two meters, especially that associated with fm and channelized operation, has made more attractive the techniques of frequency synthesis as a versatile replacement for the traditional crystal oscillator. As those active in fm communications and the use of repeaters know only too well, it requires a large stack of crystals in order to be able to avail oneself of the host of repeaters now appearing all over the country. A traditional VFO is a possible alternative to a large supply of crystals but calibration and stability make this approach usually less than satisfactory, especially for mobile operation. Several enterprising builders have included digital frequency counters to facilitate the adjustment of their VFOs and this approach is another possible alternative to frequency synthesis. On the other hand, rapid developments in medium-scale integrated circuits have gone far toward removing the technical barriers that have prevented popular acceptance of synthesis among those amateurs interested in building equipment capable of generating stable and reproducible rf signals.

The synthesizer described here was designed to provide a 6-MHz signal as a substitute for a crystal in a GE Progress Line fm transmitter. The frequency increment was selected so that, following the multiplication factor of 24 necessary to provide a signal on the 2-meter band, any whole-numbered kilohertz can be digitally selected by a set of switches. If the band edges are included, and of course they should not be, that increment gives rise to 4000 discrete frequencies available within the 2-meter band. While this results in far more frequencies than are presently required by fm repeater users, it is comforting to know that no matter what frequency a repeater group selects, it will be possible to generate a signal which is no more than 500 Hz off frequency, well within present amateur tolerances. For those engaged in nonchannelized operation, the advantages of frequency synthesis of every kilohertz may not seem as obvious. As is often the case, however, the advantages become obvious only after use. A VFO may seem adequate until frequency synthesis has been tried. In retrospect, the VFO may not be as attractive or versatile.

* Box 65, Stone Ridge, NY 12484.

A 4000-Channel Two-Meter Synthesizer

Frequency synthesizers, in one form or another, have been available commercially for many years. Although their characteristic of providing a crystal-oscillator-referenced rf output that is variable in discrete frequency steps is ideally suited to "channelized" communications such as 2-meter repeater work, their cost is high — beyond the means of most amateurs. Designing a suitable synthesizer for home construction, on the other hand, is no easy task, involving several interrelated problems concerning short-term stability and spectral purity. The author of this article has successfully solved these problems and presents here a 2-meter synthesizer with a 6-MHz output frequency, one designed for use with an fm transmitter which contains its own times-24 frequency multiplier and phase modulator. The author's basic circuit can also be used to synthesize a receiver local-oscillator frequency for reception. Nor is its application limited to fm; it may be used by a-m and cw operators as well, offering calibration advantages over any ordinary VFO. For a prudent shopper, the cost of parts needed to duplicate this synthesizer is approximately \$100.

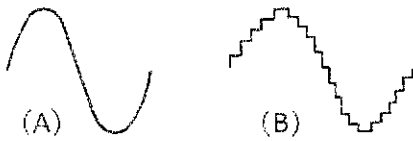


Fig. 1 — At A, a desired sine wave, and at B a sine wave synthesized from pulses of varying amplitudes.

Frequency Synthesis

There are several basic methods to synthesize a signal. One technique, long used in commercial and military areas, is to generate many frequencies from one crystal by dividing and multiplying, and then mixing these signals back together in whatever combination is required for a particular frequency. This technique requires careful design to prevent unwanted signals from appearing along with the desired one.

A second technique is to generate an approximate sine wave of the desired frequency by adding together a set of pulses of the correct amplitude and timing.¹ Thus, as shown in Fig. 1, the desired sine wave is approximated by a set of discrete steps. By varying the amplitude and timing it is possible to generate a well-defined signal. While commercial firms do produce such synthesizers, the techniques required are complex and, at present, not conveniently suited to amateur construction for rf work.

A third technique is to "lock" a VFO to the frequency from a crystal oscillator. Since the output is taken directly from the VFO, the signal has essentially the same characteristics normally associated with those of VFOs. At the same time, the frequency of the output is indirectly controlled by the crystal oscillator, thus providing greater long-term stability than is usually found in most VFOs. Through suitable digital circuitry, it is possible to select the frequency on which the VFO will oscillate. The synthesizer described here is of this type.

In order to understand how all this may be accomplished, consider the very simple synthesizer shown in Fig. 2. For discussion purposes, suppose the frequency of the VFO can be varied from 0.5 MHz to 1.5 MHz by varying the voltage level on the dc control line connected between the phase detector and the VFO. The 1-MHz output from the crystal oscillator and the output from the VFO are both fed into the inputs of the phase detector. This circuit examines the phase difference between the

¹ See, for example, Drake, "An Audio Synthesizer," *QST*, April, 1972.



Fig. 2 — Rudimentary form of a frequency synthesizer.

two signals and generates a dc control voltage proportional to the magnitude and sign of that difference. This control voltage is then used to "steer" the frequency of oscillation of the VFO until its output is in phase with that of the crystal oscillator. For all practical purposes, being locked in phase also implies operating on the same frequency, and the VFO is locked to the crystal frequency, 1 MHz. If the output of the VFO begins to drift off 1 MHz, the phase detector senses the change in phase and alters the level of the dc control voltage to reduce the error. The system acts in the same manner as a servomechanism, analogous to many common mechanical systems.

It is obvious that the synthesizer just described offers no advantages over using the output of the crystal oscillator directly, since both are operating at 1 MHz. In fact, there are some disadvantages, since the output of the VFO will tend to "wander" around the desired 1 MHz as the phase detector reacts to any phase error. In mechanical terms, the system exhibits inertia; corrections cannot be made instantly. In fact, if the system is not properly designed, the VFO will never lock to the crystal oscillator frequency at all, but, instead, will swing back and forth between the limits of 0.5 and 1.5 MHz already assumed. Essentially what happens is that the VFO sweeps through 1 MHz so rapidly that by the time the phase-lock detector has determined that the two signals are in phase, the VFO has already moved either above or below 1 MHz too far to achieve lock. To prevent this, again resorting to mechanical terms, a certain amount of friction is introduced in the output of the phase detector to slow down the rate at which the dc control voltage can be changed and thus facilitate the lockup process. Naturally this technique also tends to prevent any small errors in the output of the VFO from being corrected as quickly as they

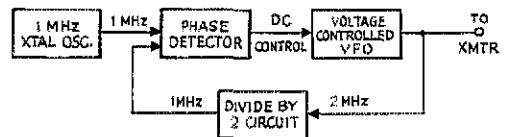
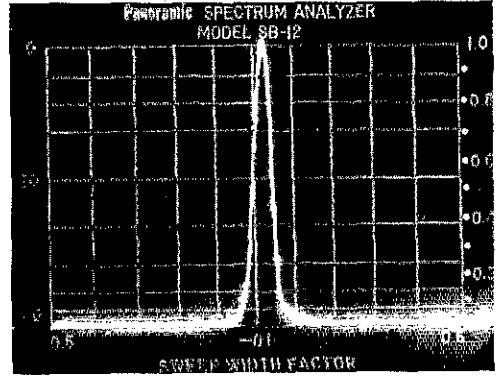
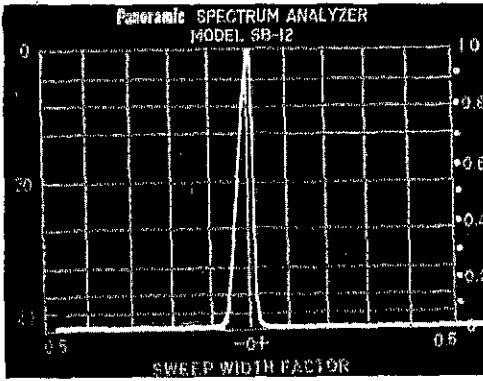


Fig. 3 — A simple synthesizer with divider stage in frequency feedback loop.

would otherwise and the output of the VFO wanders slightly to either side of 1 MHz.

A second disadvantage is that the output frequency of the VFO is the same as that of the crystal oscillator. To change frequency, the frequency of the crystal must be changed, and there is no advantage to the synthesizer. Fortunately this disadvantage can be overcome easily. In Fig. 3 the feedback lead from the output of the VFO to the input of the phase detector has been opened and a binary divider has been inserted. Since the output frequency of the divider is exactly one half the input frequency, the frequency of the VFO must increase to 2 MHz before lock can be achieved. If the previously assumed range of the VFO is modified upward to include a frequency greater



Spectrum analyzer displays of the 6-MHz output frequency of the synthesizer. At the left a total display width of 14 kHz is shown, and at the right 500 Hz (50 Hz per division). As may be seen, the signal is quite "clean," with spurious outputs better than 40 dB down from peak amplitude. Subaudible shifts of the VCO frequency during the sweep time of the analyzer caused the steps which appear on the sides of the pulse at the right, but such shifts could not be detected by ear when receiving a 2-meter unmodulated transmission.

than 2 MHz, the synthesizer will now produce a signal of 2 MHz, still locked to the 1-MHz crystal oscillator. In like manner, if the divide-by-two circuit is replaced by a divide-by-three circuit, the output would be 3 MHz, and so forth. In general, the output frequency of the synthesizer is equal to the frequency of the crystal oscillator multiplied by the division ratio inserted in the feedback loop.

In the above examples, the frequencies available are all multiples of the reference frequency derived from the crystal oscillator. If shifts in frequency of less than 1 MHz are desired, the frequency of the crystal oscillator may be reduced by a digital divider ahead of the phase detector. For example, inserting a divide-by-two stage between the reference oscillator and the phase detector of Fig. 3 would, with appropriate division in the feedback loop, provide for output frequencies in 500-kHz steps, rather than 1-MHz steps. In all cases, the output frequency of the synthesizer at lock is still equal to the reference frequency applied to the phase detector multiplied by the division ratio in the feedback loop.

Circuit Description

Fig. 4 is a block diagram of the 2-meter synthesizer. A 100-kHz crystal oscillator supplies the reference signal. This is divided by 2400 to produce 41.667 Hz, which is applied to one input of the phase detector. The VCO operates between 6.00 and 6.17 MHz, corresponding to 144 and 148 MHz when multiplied 24 times in the transmitter. Two outputs are taken from the VCO. One drives an impedance-matching network which replaces the usual crystal in the transmitter. The other drives a programmable divider in the feedback loop. By means of thumb-wheel switches, this programmable divider can be set to divide by a ratio extending from 144,000 to 148,000. This divided signal and the output of the reference divider chain are compared to control the level of a dc voltage applied to the voltage-controlled oscillator. An out-of-lock detector samples the signals generated in the phase detector and provides a signal which can be used to disable the transmitter should the synthesizer fail to lock up. A power

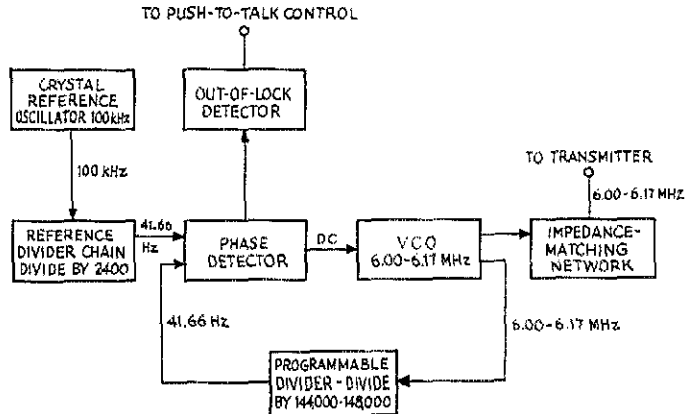


Fig. 4 — Block diagram of the 2-meter synthesizer.

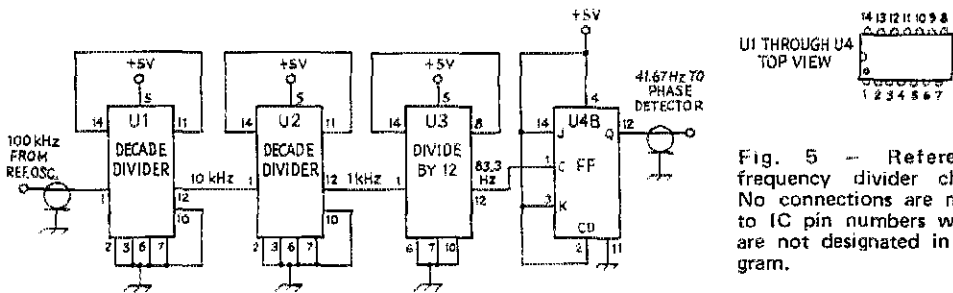


Fig. 5 - Reference-frequency divider chain. No connections are made to IC pin numbers which are not designated in diagram.

U1, U2 - TTL decade-counter IC, Motorola MC7490P or equiv.
 U3 - TTL divide-by-12 counter IC, Motorola MC7492P or equiv.

U4 - TTL dual J-K master-slave flip-flop (one section unused), Motorola MC7473P or equiv.

supply circuit provides highly regulated sources of +5.0 and +9.5 volts to the various other circuits.

Crystal Reference Oscillator

No specific circuit is provided for this oscillator. The pilot model used a commercial self-contained oscillator module. Actually, almost any good crystal oscillator could be used, provided its output is compatible with the TTL logic used in the divider chain. A higher frequency crystal oscillator could be used to avoid the high cost of 100 kHz crystals. In this case, additional dividers would be required to generate the 100-kHz signal. For example, the 4-MHz oscillator only of Hoff's standard² would require an additional divide-by-ten and a divide-by-four circuit.

Remember that the precision of the synthesizer output frequency depends on the accuracy of the crystal oscillator. Care should be taken to compensate for drift from any external causes.

Reference Divider Chain

Fig. 5 shows the reference divider chain. Two MC7490P ICs, U1 and U2, are each connected to divide by 10, the net result of their interconnection being a division by 100. U3 is connected to divide by 12 and its output is divided by 2 in one section of U4, the other section being unused. The total division of these four stages, U1 through U4, is 2400, reducing the 100-kHz reference signal to 41.667 Hz. This 41.667-Hz signal will control the minimum size of the step by which the VCO can be moved; 41.667 Hz at 6 MHz represents 1 kHz at 2 meters, following a multiplication of 24. Thus, output frequencies that are 1 kHz apart will be available at 2 meters.

The Phase Detector and Out-of-Lock Detector

The phase detector, Fig. 6, employs an MC4044P digital phase-frequency detector IC, U5. This chip contains three separate parts, a phase detector, a charge pump and an amplifier. The phase detector has two inputs, one connected to the output of the reference divider chain and the

other to the output of the programmable divider. The output of the phase detector is connected directly to the input of the charge pump by connecting pins 2 to 4 and 11 to 13. The output of the charge pump is taken from the common connection of pins 3 and 10. R1, R2, and C1 prefilter the output spike from the charge pump and greatly reduce the amount of filtering needed later. The input to the amplifier section, pin 9, is connected to a transistor which acts as an emitter follower. This arrangement reduces the loading on the charge storage capacitor, C2, connected to pin 8, which is the output of the amplifier. This pin is also returned through a 1000-ohm resistor, R3, to +5 volts.

In this circuit the average dc voltage at pin 8 depends on the phase relationship between the two signals applied to pins 1 and 3. If the signals are exactly in phase, the dc level will remain at a fixed voltage. If the signal from the programmable divider is higher in frequency than the signal from the reference chain, the dc level will decrease and if it is lower, the dc level will increase. This changing level is used to steer the VCO in the correct direction to maintain phase lock.

Unfortunately, the output at pin 8 is not pure dc. Present on the dc is a ripple voltage containing, primarily, the frequency of the reference chain, 41.667 Hz in this case. Naturally any ripple of this sort will frequency modulate the VCO and must be removed. This is accomplished by passing the signal through a low-pass active filter, Q1 and associated components, which begins to attenuate frequencies greater than 5 Hz.

Fig. 6 also includes the out-of-lock detector. This circuit is a pulse-width detector; phase lock is indicated by the relative width of the pulses on either pins 2 and 4 or 11 and 13. If the two input signals are in phase, either pins 2 and 4 or 11 and 13 will be at a low logic level for a brief period of time, depending on whether the divider-chain phase is lagging or leading. In either case, the length of time either set of pins remains low depends on the magnitude of the phase difference.

To disable the transmitter if the frequency goes either too high or too low, U6A serves as a NOR

² Hoff, "The Mainline FS-1 Secondary Frequency Standard," QST, November, 1968.

gate for negative logic, the output being high if either input is low. When the output of U6A goes high, U7, a monostable multivibrator, is triggered into its timing state and pin 1 goes low for a period of time determined by the values of R4 and C3. If U7 "times out" or resets before the output of U6A returns to a logical zero, then both inputs to U6B will be high and the output of U6B will be low, indicating an unlocked condition. On the other hand, if the output of U6A goes low before U7 resets, no pulse will appear at the output of U6B. R5 and C4 integrate the signal applied to U7 and introduce a delay to compensate for the delay inherent in U7. Without this there would be a brief pulse from U6B no matter what the phase difference.

U8 is another monostable multivibrator with a useful property. Its timing period can be restarted at any point during the timing process. With the components shown, the timing period is approximately 0.5 second. After U8 has been triggered by a pulse or a series of pulses from U6B, the pulses must cease for 0.5 second before U8 will reset and its output at pin 8 returns to logic-level zero. This feature prevents the unlock output from switching on and off rapidly as the VCO swings back and forth seeking the locked condition. Only after the VCO has stabilized will the detector indicate a satisfactory lock.

The unlock output goes to a high logic level during unlock and can be used to illuminate a warning lamp and disable the transmitter. It cannot supply much current so additional circuitry may be necessary.

The VCO and Output Matching Network

The secret to a successful synthesizer is a stable VCO. Instability or phase noise will result in a noise-modulated signal. Because the feedback correction inherent in the synthesizer will correct for any long-term drift, the VCO need not be carefully compensated for the effects of temperature, thus eliminating one of the biggest problems facing the builder of a conventional VFO. On the other hand, the VCO must be capable of excellent short-term stability. The feedback loop will not react rapidly enough to correct for frequency changes caused by mechanical vibrations and these will appear as modulation. Unless the VCO will stay on a given frequency as determined by the dc control voltage without the feedback loop, the phase detector will be continually correcting the frequency. The result is a signal that wobbles back and forth across the desired frequency. This cannot be avoided completely, but good VCO design and construction will minimize its effect.

Fig. 7 shows the VCO. A lightly coupled Colpitts oscillator is tuned by a mechanically

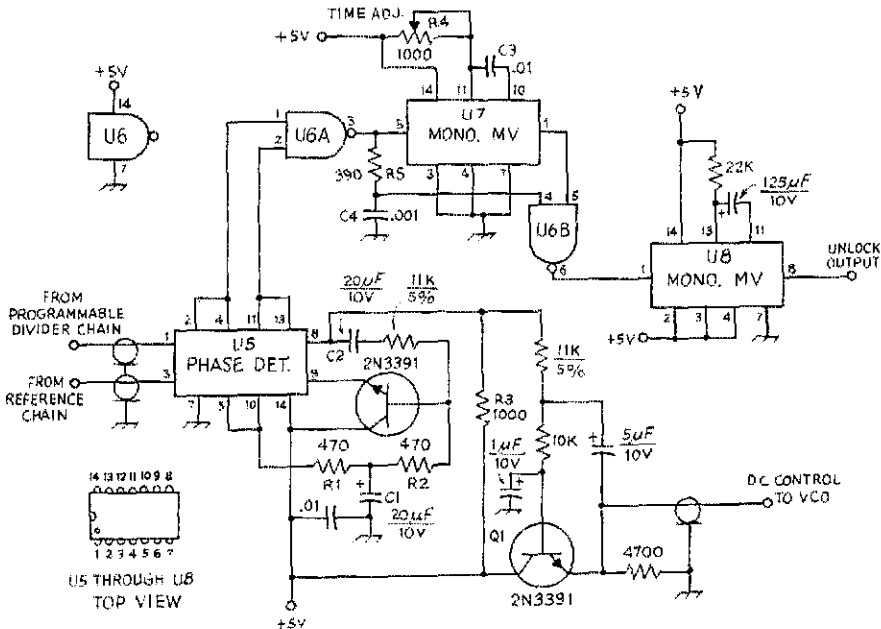


Fig. 6 — Phase detector and out-of-lock detector. Resistances are in ohms, k - 1000. Fixed resistors may be either 1/4 or 1/2 watt composition. All capacitances are in microfarads. Capacitors with polarity indicated are electrolytic. No connections are made to IC pin numbers which are not designated.

- C1-C4, incl. — For text reference.
- Q1 — For text reference.
- R1-R3, incl., R5 — For text reference.
- R4 — Linear taper, low wattage.
- U5 — Phase-frequency detector IC, Motorola MC4044P or equiv.

- U6 — TTL quad 2-input positive NAND gate (two sections unused), Motorola MC7400P or equiv.
- U7 — TTL monostable multivibrator IC, Motorola MC74121 or equiv.
- U8 — TTL retriggerable monostable multivibrator IC, Motorola MC8601P or equiv.

Fig. 7 - VCO and output matching network. L2 - 28 turns No. 22 enam. wire, ct, on Amidon T-68-2 core. L3 - 4 turns No. 22 enam. wire, wound over L2. L4 - 2 turns No. 22 enam. wire, wound over L2. Q2 - Vhf/uhf n-channel FET IGE-FET-2 or Motorola FET F0021 or equiv.). L1 - 23 turns of No. 22 enam. wire on T-68-2 toroidal core (Amidon Associates, 12033 Otsego St., N. Hollywood, CA 91607).

Fig. 8 - Programmable divider. Resistors may be 1/4 or 1/2 watt composition. CR1 - Silicon voltage-variable-capacitance diode, 33 pF (Motorola HEP R2503 or equiv.). C5 - NPO temperature coefficient. C6 - For text reference. U9 - 1-f amplifier IC, Motorola MC1350P or equiv.

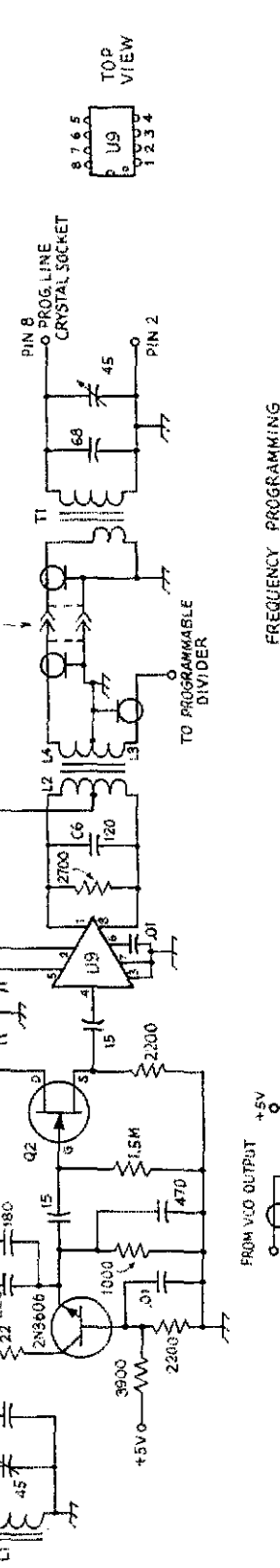
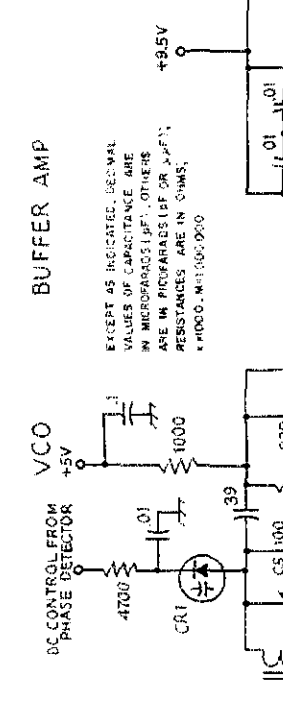
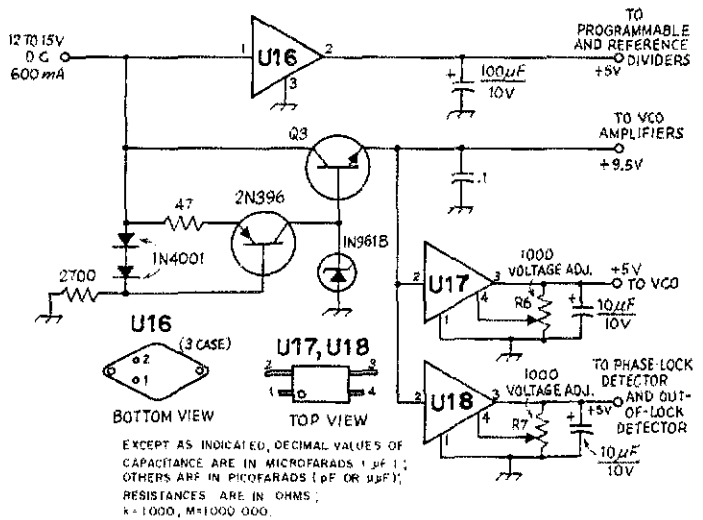


Fig. 8 - Programmable divider. Resistances are in ohms; resistors may be 1/4 or 1/2 watt composition. All capacitances are in microfarads. No connections are made to IC pin numbers which are not designated. U10-U15, incl. - TTL programmable modulo-N decade counter IC, Motorola MC4016P or equiv. S1-S4, incl. - Printed-circuit thumb-wheel switch, 10-position, BCD with complements, single pole, Inter-Market EBC10M1248 or equiv.

N.C. = NO CONNECTION SEE TEXT U10 THROUGH U15 TOP VIEW

Fig. 9 — Regulator portion of power supply, designed for operation from automotive electrical system. This same regulator may be used with an ac-operated supply which provides filtered 12 V dc at 600 mA.

- Q3 — Silicon npn audio power transistor (GE23, Motorola HEF703 or equiv.).
 R6, R7 — Linear taper, low wattage.
 U16 — 5-volt regulator IC, 1 A (National Semiconductor LM309K or equiv.).
 U17, U18 — Voltage regulator IC, 200 mA (Motorola MFC4060 or equiv.).



variable capacitor and a voltage-variable capacitance diode. The output is buffered by an FET source-follower stage and amplified by U9, which provides additional isolation and gain. L2 is tuned to approximately 6 MHz with C6 and broadbanded by the 2700-ohm swamping resistor. Two low-impedance secondaries are used to provide signals to the programmable divider and the transmitter matching network. L4 is of sufficiently low impedance that up to 20 feet of RG-58/U coax can be connected between it and the input of the matching network.

T1 of the impedance-matching network, also shown in Fig. 7, was designed to provide the proper output to drive a GE Progress Line transmitter. It is tuned by a variable capacitor to the center of the normal frequency range to be used. The pin numbers refer to those on an octal plug installed on the end of a Minibox which houses the transformer and capacitors. The plug is inserted into the crystal socket on the transmitter.

The Programmable Divider

The frequency-selection circuit, a programmable divider chain, is shown in Fig. 8. A single MC4016P IC can be programmed to divide by any integer from 0 to 9. (Actually division by 0 is not mathematically defined. Instead the IC is disabled and will not count when so programmed.) The programming is accomplished by ungrounding a combination of four leads, arranged in the usual binary-coded decimal counting system as indicated on the diagram. For example, to divide by 5, pins 14 to 5 would be ungrounded. It is usual in TTL logic to return the ungrounded pins to +5 volts to preserve the noise-immunity abilities. However, this was found to be unnecessary when the leads from the ICs were kept short. A suitable alternative for short leads is to connect 10,000-ohm resistors from the +5-V supply to each division-selection lead.

By interconnecting the six ICs as shown, any division ratio from 140,000 to 149,999 may be

selected. The actual selection of the division ratio is accomplished by binary-coded 10-position thumb-wheel switches. These switches display a single decimal digit while at the same time supplying the BCD equivalent of that digit between the common and the four switch leads. In this particular application, it is easier to use switches with the "complement" output available to unground the proper lead automatically. Since the division ratio also determines the final output frequency at 2 meters, the final output frequency in kilohertz is displayed directly on the thumb-wheel switches (with the exception of the high-order digits 1 and 4, which are never changed and therefore do not require switching). Thus, a thumb-wheel display of 6340, for example, would represent an output frequency on 2 mtrs of 146,340 kHz, or 146.340 MHz.

It is entirely possible to select a frequency falling outside of the amateur band. This might easily happen while selecting a frequency when driving at night. A simple circuit to prevent this can be designed around the fact that in binary notation, the numbers 4, 5, 6, and 7 all require the binary lead with a weight of four to be ungrounded. Therefore, when the synthesizer is programmed to operate within the range from 144.000 to 147.999 MHz, the 1-MHz selection switch, S4 of Fig. 8, will have its 4 lead ungrounded and its 4 lead grounded. Since the 4 lead is not used for any other purpose, it could be connected to a circuit to disable the transmitter if it is not grounded.

Power Supply

As mentioned previously, an extremely well regulated power supply is an absolute necessity. The circuit shown in Fig. 9 was designed to regulate adequately in a mobile installation where supply voltage may vary widely. The programmable and reference dividers are least sensitive to voltage variation and a single LM309K, mounted on a heat sink, will provide good regulation. For the VCO isolation amplifier, a regulated source of

+9.5 volts is obtained by using a 10-volt Zener diode and a pass transistor to boost the current capabilities of the Zener. To further improve regulation, the 2N396 was included as a constant-current source for the Zener diode.

Two MFC4060 IC regulators drop the 9.5 volts to 5 volts for supplying the VCO and the two detectors. The two potentiometers are required to adjust the 5-volt outputs.

Construction

It is impractical to give detailed layouts for the construction of the synthesizer. The one photographed is an experimentally built version (a "prototype"), and little attention was given its aesthetic qualities during construction. Obviously, printed-circuit boards are almost a necessity. Good rf-construction techniques should be used throughout, not only in the VCO but all other circuits as well. TTL switching wave forms will be seriously degraded if there is much stray capacitance in the wiring. The VCO should be built with an eye toward extreme mechanical stability, especially if the synthesizer is to be used for mobile operation. All interconnections should be shielded. For convenience, ICs can be mounted in regular sockets, or Molex Soldercon pins can be used.

A word about bypassing and ground loops is in order. The strangest noises can appear in the output of the synthesizer without adequate bypassing. Rapid TTL switching often causes spikes to appear on the 5-volt supply lines. While not specifically shown in the diagrams, .01- μ F disk-ceramic capacitors should be sprinkled liberally throughout the circuitry to bypass the supply leads to ground as close to the individual ICs as possible. For the same reason, care should be taken to provide low-resistance ground paths between all parts of the circuit. If several pc boards are used, do not rely on a metal chassis as a common ground. If the boards are near enough to each other, the braid used to shield wires makes excellent ground strapping.

Adjustment and Use

The power supply circuit should be checked and the outputs of the MFC4060 regulators adjust-

ed to +5.0 volts before the rest of the synthesizer is connected. The VCO can then be connected and checked for oscillation. With the dc control lead "floating," the output frequency should be adjusted with the trimmer to approximately 5.6 MHz. The output should be stable and free from extraneous noise.

The crystal oscillator and reference-divider chain can now be connected. Zero beat with WWV a harmonic of the crystal frequency (or of one of the frequencies available from the divider chain, if the crystal frequency is not an integral subharmonic of a WWV frequency), and check the output of the divider chain with a scope. The output should be a square wave with a frequency of approximately 41 Hz.

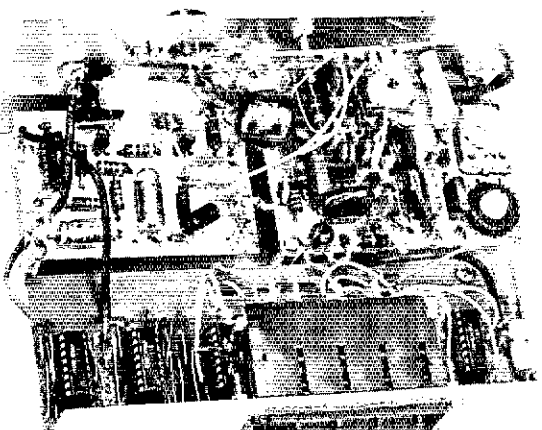
Finally, connect the phase detector and the programmable divider. If all goes well, the VCO will lock to a 6-MHz frequency which, when multiplied by 24, gives the 2-meter frequency displayed on the thumb wheels as described earlier. A frequency counter or well calibrated receiver is indispensable at this point. The output should be switchable from 6.00 to 6.17 MHz by setting the thumb wheels at 4000 and 8000 respectively. If the full range cannot be covered, try readjusting the VCO trimmer capacitor while measuring the dc control voltage to the VCO. This voltage ranges from 1.5 to 4 volts and the 2-meter band should be centered in this range.

R4 of the out-of-lock detector can now be adjusted so that the output pulse from U7 is from four to five microseconds wide. This width should be sufficient to allow minor variations in frequency without unlock and still disable the transmitter in the case of a serious phase difference.

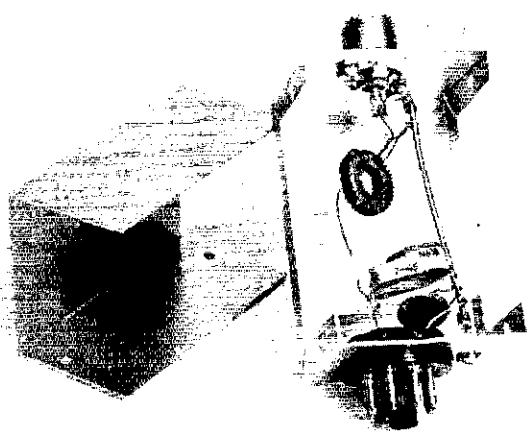
The matching transformer, T1 of Fig. 7, should be tuned for maximum drive to the transmitter. Bypassing the cathode of the oscillator tube in the Progress Line will increase the amplification available.

If a synthesizer works properly, it is a joy to use. If it malfunctions, it may be difficult to trace the cause without expensive test equipment. The VCO, crystal oscillator and power supply should not present any problems for the troubleshooter as the circuits are not unusual. The divider chain and

In the author's synthesizer, circuit boards were made by grinding the desired pattern on copper-clad material with a Dremel Moto-Tool. The board beneath the thumb-wheel switches contains the programmable-divider ICs, and the board visible in the upper left corner of the chassis contains the phase-detector circuitry. At the upper right, below the rear-panel-mounted power supply regulator board, is the VCO board.



The matching-network adapter for the GE Progress Line transmitter is housed in a small metal box. As explained in the text, several feet of coaxial line may be used to interconnect the synthesizer output and the network pictured here.



phase detector require a high-frequency triggered-sweep scope to examine wave forms. If the equipment is available, patience and perseverance will pay off. As a suggestion, check the output of the programmable divider. There should be a pulse 170 nanoseconds wide with a frequency of 41.67 Hz.

Conclusion

Versatile as this synthesizer is in supplying a frequency source equally applicable to any user of the 2 meter band, there is inherent one possible drawback. Because of the 41.67-Hz reference frequency required for the small increments, the synthesizer may require as much as three seconds to achieve lock after a frequency change or application of power. Obviously a delay of this magnitude makes PTT operation impossible. The solution used in the pilot model was to leave the synthesizer running continuously. The output is sufficiently pure so that no signal was radiated into the 2-meter band from the synthesizer. An alternative would be to process the output through a gate and switch the gate on and off.

Most circuits represent design compromises, and this one is no exception. Perhaps a better approach would be to design a complete transmitter with the synthesizer operating directly on 2

meters. On the other hand, there are many transmitters that could employ this "crystal substituting" synthesizer. For this reason it was developed in its present form. I hope others will be encouraged to modify and improve upon the design.

For the builder who wants to synthesize his receiver local-oscillator frequency for reception in addition to his transmitter frequency, this same basic circuit can be used. Rather than building a complete second synthesizer, he can use most of the existing parts in this synthesizer for dual service by switching between transmit and receive. For reception it would be necessary to reprogram the programmable divider stage to provide a VCO output frequency which, when multiplied by 24, would be offset from the received frequency by the amount of the receiver first i-f. This could be arranged simply by adding a second set of thumb-wheel switches and activating the appropriate set for either transmit or receive. Without further complicated circuits, however, this simple scheme would not provide for direct thumb-wheel frequency readout during reception, nor would it be compatible with fast-break operation because of the lockup time required after a frequency change.

Synthesis will undoubtedly become more common in the next few years. Once you have used a synthesizer, you will understand why. QST

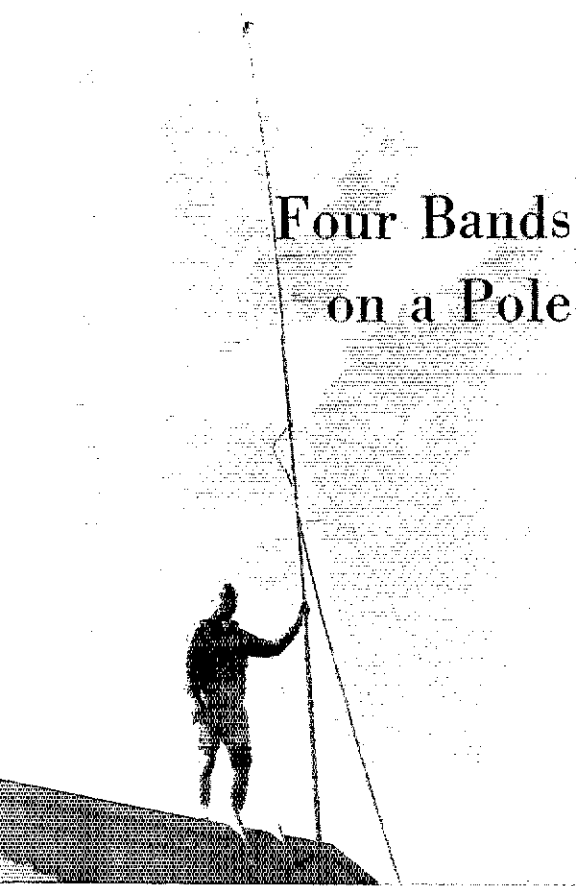
Strays

Commemorating the grand opening of "Opryland" in May, K4CPO took to the air to provide over 500 contacts with the unique site. Opryland is an entertainment exposition located in Nashville. The amateur involvement was organized by the Nashville Amateur Radio Club. The photo shows W4OLE operating, with (from left) WB4NLX, WA4OWD, WB4JHP, WB4BHZ, WA4MZN, and WB4HPQ.



Anyone for DXCC? Here is the vertical installed and ready to go.

Four Bands on a Pole



Elsewhere in this issue is the Beginner's and Novice article which treats vertical antennas. Here is a construction article for a multiband vertical. The antenna is easy to make, inexpensive, and will do a worthwhile job.

BY E. W. LJONGQUIST,* W4DWK/W1CQS

A Simple Trap Vertical

A RECENT PROBLEM presented itself at W4DWK, resulting in a search for a simple but effective antenna. In preparing to move, sell this house, and other considerations (buyers do not like a house with two towers attached to it), I found myself with towers and several assorted beams lying in the yard but nothing up in the air. I needed a quick and easy-to-make radiator. I took a look through the 1972 *Handbook*, and there it was; ten, fifteen, twenty, and forty meters, all in one nice bunch — a four-band ground plane.¹ So, I decided to try it! I have been far from disappointed.

The design of this arrangement, mechanically, was by the usual engineering method used for years at W4DWK/W1CQS. Put it up, and when any part fails, use a stronger part or a different material. This method led to the discovery of a fairly unusual insulating material.

One day on a construction job I came upon a few short lengths of plastic pipe (PVC) discarded by the plumbers. The pipe was one-inch ID, with

* 1655 Meridan Road, West Palm Beach, FL 33406

¹ Page 592, 1972 edition.

walls about one eighth inch thick. With the vertical whip to be supported only at the base and 28 feet in length, I needed something strong. This pipe seemed to be the answer to my problem. As an insulating material, it is very strong, readily available, cheap, and above all, easily and quickly tailored with wood-working tools.

For construction you will need:

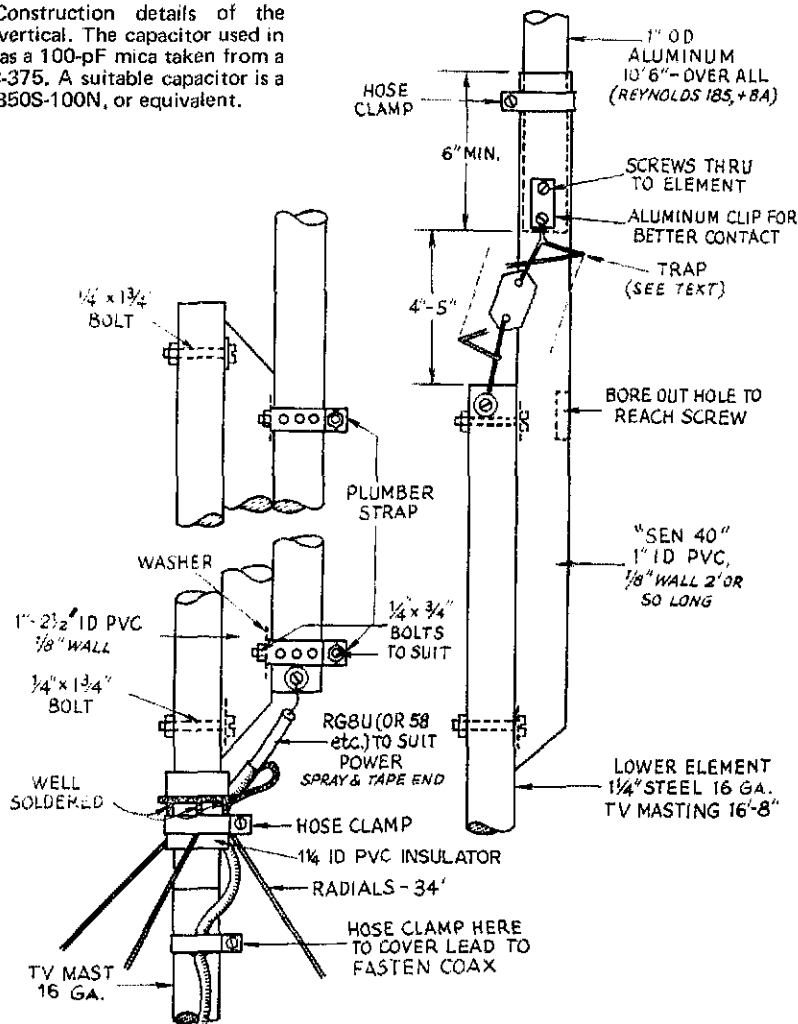
- 4-1/2 feet of Series-40 PVC, 1-inch ID.
- 2 ten-foot sections of TV masting, 16-gauge steel, (not aluminum!).
- 1 length 1-inch-OD-aluminum tubing.
- 1 length of aluminum tubing to slide inside the above, enough of both to make a 10-foot, 6-inch upper section.
- 4 1-3/4 by 1/4-inch bolts.
- 4 3/4 by 1/4-inch bolts.
- 2 short pieces of plumbers strap.
- 2 large and one small hose clamps.
- A few self-tapping screws.
- 1 3- or 4-inch piece of 1-1/4-inch-ID PVC.
- Enough wire to make as many radials as you may wish, each 34 feet long. Minimum is four, the more the better.
- Egg insulators for the above.
- 3 feet of heavy copper wire, or small tubing for the trap (see text).
- 1 transmitting mica capacitor, 100pf.

Construction Details

I engaged the two sections of TV masts first, and fastened them with self-tapping screws. Then I cut the meshed 20-foot length to 16 feet, 8 inches. The left-over piece was used to hold the lower PVC insulator and as the supporting stub, see Fig. 1.

Cut the PVC at an angle at both ends, about 30 inches long. Lay it on the stub of TV masting left over from the first cut; drill both and fasten with the 1-3/4-inch bolts. (Do not let the bolt interfere with future mounting of the stub on the supporting masting.) Drill the PVC on the outer side, and insert the 3/4-inch bolts through short pieces of plumbers strap, which will clamp the 16-foot, 8-inch lower radiator. Use washers against all PVC

Fig. 1- Construction details of the four-band vertical. The capacitor used in the trap was a 100-pF mica taken from a surplus BC-375. A suitable capacitor is a Centralab 850S-100N, or equivalent.



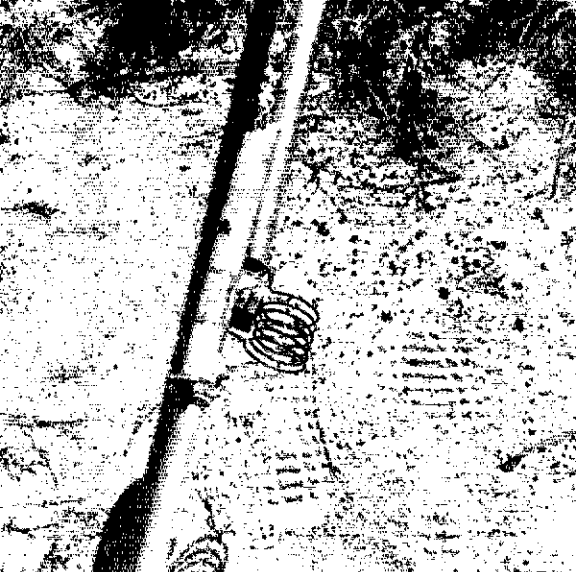
bearing surfaces. Clamp the lower radiator to the stub firmly. At the upper end of the lower radiator mount the remaining piece of PVC in like manner, allowing about 10 to 12 inches to extend beyond the lower radiator. You will need to bore a larger hole at the upper end to reach the bolt or insert it. Slide the upper aluminum element into the PVC just mounted, keeping 4 to 5 inches between the ends of the upper and lower elements. Fasten through the PVC and aluminum with self-tapping screws. Use the small hose clamp to adjust and clamp the nesting pieces of aluminum in the 10-foot 6-inch element.

Cut the short piece of 1-1/4 PVC lengthwise twice, so it fits snugly around the mounting stub just below the radiator, then fasten with tape. Make a loose ring of copper wire around this on which to fasten the radials, and wrap the radials around this ring and solder well at their respective positions. Of course, cut the radials a little long here then install the egg insulators at the outer ends at 34 feet. Wrap tape around all radials close

to the ring, and clamp with large hose clamp. The other hose clamp is used to hold the coax to the supporting masting.

Making the Trap

The trap took some doing. For the first try I used some heavy wire, about No. 8 or so, and it worked okay. But I lost it on my trip to Connecticut! I then bought 3 feet of 1/8-inch copper tubing, at an automobile supply store. I wound the coil using a beer can for a form. The trap consists of 6-1/2 turns, about two inches in diameter, using a 100-pF capacitor. The inductance can be varied considerably by stretching or compressing the coil. Wind a coil to the approximate size, clip the capacitor across the coil, and adjust the circuit to frequency with a grid dip meter at 14.1 to 14.2 MHz. Use your receiver to double check the grid-dip oscillator frequency. My GDO shows a broad dip from 14,000 to 14,250 kHz, but the trap seems to work across the entire band.



When the frequency has been adjusted, cut off the excess coil ends and mount it as per the sketch. Coat the assembly with Acrylic spray - the stuff used to waterproof automotive ignition cables. Use several coats. As for any doubts as to effective waterproofing, I have run a kW into this antenna for eight months in Florida weather, with no arcing. When I erected the antenna in Connecticut I used lacquer spray, and it is withstanding heavy rains. After the antenna is raised, check the antenna with an SWR bridge. If it shows a poor ratio, the coil assembly can be checked and

This shows the trap. Two of the surplus transmitting micas, 50 pF each, were connected in parallel for the desired 100-pF value.

adjusted with the antenna half raised. Also the angle of the radials with respect to the mast can be adjusted for the lowest SWR. The length of the supporting mast depends upon where you are going to place the antenna, of course. Mine has given good results with the lower end 25 feet from ground. Use 16-gauge TV masting for the support as 20 gauge is too flimsy and will bend and buckle while raising the vertical. The lower ends of the radials have varied from 10 to 4 feet from the ground, but try to keep about 45 degrees of droop.

Additional Notes

I used a TV mast bracket to hold the mast to the house. Also, I have raised this assembly by myself by pulling on one radial, first anchoring the two side radials to prevent side swing. I have used both RG-8/U (for a kW) and RG-58/U for 300 watts.

It may not be the best antenna but for a cheap, quick, unobtrusive, portable or permanent antenna that will fit on a 60-foot lot, it is hard to beat. You will be able to work four bands. You will not be disappointed with the effective radiated power. It is excellent on 40 and 15, good on 20, and fair on 10. I even got it to work on 80, using a Transmatch. I have come out very well in DX pile-ups with some of the big boys. When I travel, the antenna is going with me.



Multiband Vertical Antennas

(Continued from page 16)

antenna there is no rejection of some harmonics, simply because the antenna is designed to be resonant on all hf amateur bands. The solution to this problem is the use of a selective circuit installed in the feed line. A Transmatch is such a circuit and should provide adequate harmonic rejection.

Some Other Thoughts

The question is frequently asked, "should I mount my vertical on the ground, or get the base up in the air?" Getting the antenna up in the clear is always better than having it mounted at earth level and surrounded by rain gutters, house wiring, trees, power lines and so forth. However, getting the vertical antenna up in the air also means that radials, as many as possible, should be used. The average installation (if there is such a thing) usually

consists of three or four radials (or more) cut for the lowest operating frequency. Such a system should give a good performance.

Another important matter is that of the earth ground. When verticals are mounted at ground level the ground losses can be very important. Too many amateurs buy their verticals, get a five-foot long TV-type ground rod and drive it into the earth at the base of the antenna. They think this provides a good ground connection. As a matter of fact, the TV-type ground rods are practically worthless for amateur work. A good ground rod is the type used by the power company for home installations. This is a rod that is heavily galvanized, 5/8 inch in diameter, and about 10 feet long. The amateur should be able to buy these rods from any wholesale electrical supply house. If possible, tie your ground connection to the water-system piping, assuming metal piping is used.

You'll hear the statement from fellow hams that verticals are poor antennas and radiate poorly in all directions. This isn't true because a vertical can be a good antenna, but you have to give it a fighting chance.





Fundamentals of Solid-State Power-Amplifier Design

BY J. H. JOHNSON,* Ex K4WYQ,
AND R. ARTIGO,* W6GFS

Part I

TODAY IMPROVED rf power transistors are available at moderate prices. The technically inclined amateur should begin to experiment with solid-state power amplifiers, if he hasn't already. Designing a solid-state PA stage is a great deal easier than designing a tube stage. Fewer parts are required, power supplies are not needed for mobile applications, there is less sheet-metal work to do, and wide-band performance can be achieved using transistors. Along with ease of construction, transistors offer some advantages that tubes cannot match:

1) If a transistor is selected with care and is used properly, it will probably last a minimum of 100,000 hours.

2) Wide-band amplifiers can be constructed easily using transistors. Octave and even decade bandwidths are possible.

3) The small size of a solid-state PA stage is attractive for portable and mobile designs.

The basic idea behind this article is to convince the reader that solid-state amplifier design is easy, to demonstrate how easy it can be, and to illustrate basic principles with two practical designs for the 2-meter band. The emphasis will be on vhf- and uhf-circuit design at relatively high power levels for transistors (40 to 160 watts). Solid-state amplifier design for lower frequencies or lower power levels does not require many of the precautions prescribed in this article. (See references 13 and 17 for a discussion of hf transistorized amplifiers.)

An important aspect of any amplifier design is cost. For amplifiers in the 100-watt-output-and-under class, you no longer pay a premium to use transistors. Of course, you must consider the *total* cost, including that of the power supply, when making a valid comparison. Fig. 1 shows some recent prices for vhf and uhf transistors which are suitable for amateur use. All of these devices will

* Communications Transistor Corporation, 301 Industrial Way, San Carlos, CA 94070.

withstand infinite VSWR. Fig. 1 also gives some prices of popular vhf tubes in the 100-watt-and-under class. As you can see, the cost of going solid state has never been lower!

Design Philosophy For Amateur Amplifiers

There are many ways to design rf power amplifiers — it sometimes seems that each engineer has his own philosophy. Designing amplifiers for the amateur bands is different in many ways from those intended for industrial or military applications. A few good reasons for using transistors have been presented above; but, at what power levels are transistors practical? If you are interested in building a 1-kw final amplifier, a tube stage is still the "way to go," unless utmost reliability is required. Fig. 2 shows the Class C power levels easily achieved using two transistors in parallel in a PA stage.

When you begin making design decisions, review Fig. 1, plus any new transistors, and use the solid-state approach if the power level you seek can be achieved using one or two transistors in the output stage. Leave the circuits for three, four or more transistors to the experienced engineer. It is

Transistors are now available for bf, vhf and ubf amplifiers which rival tubes in cost and performance. This article describes the design and construction techniques used at 50 MHz and above, with practical examples including a 160-watt-output amplifier for 146 MHz. Part I reviews the basics of transistor amplifier design.

Fig. 1 Selected 12.5-V Transistor Prices

Transistor Type	Cw Power Output (Watts)	Frequency Range (MHz)	Price (\$)
A25-12	25	25 to 80	18.00
A50-12	50	25 to 80	30.00
B3-12	3	100 to 200	7.00
B25-12	25	100 to 200	18.25
B40-12	40	100 to 200	25.00
BM80-12	80	100 to 200	39.00
C12-12	12	200 to 600	12.00
C25-12	25	200 to 600	25.10
CM40-12	40	200 to 600	43.20

Selected Tube Prices

Tube Type	Cw Power Output (Watts)	Frequency Range (MHz)	Price (\$)
6146	70	2-50	4.30
5894A	80	50-200	29.49
6884	80	400	39.20

always easier to use one large transistor in place of two smaller ones operated in parallel.

Make your solid-state PA designs wide band. It is easy to do with transistors over any of the vhf and uhf amateur bands, offering the following advantages:

- 1) No tuning when changing frequency within the band.
- 2) No variable capacitors needed.
- 3) Easy elimination of spurious oscillations.
- 4) Low loss in matching networks.
- 5) Easy initial alignment.

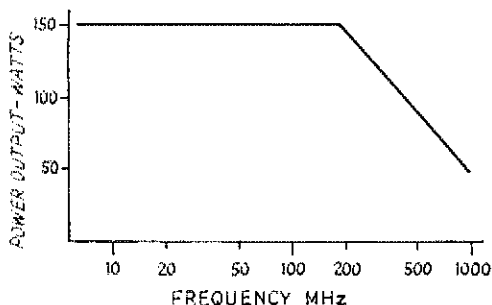


Fig. 2 — Power output available using one or two transistors.

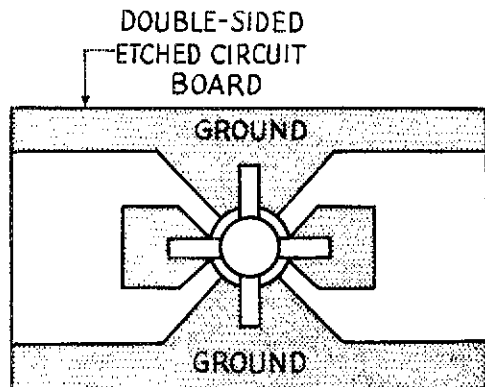


Fig. 3 — Typical foil-pattern layout for a power transistor.

Always select a transistor for your design that is rugged and capable of withstanding high VSWR. Ballasted transistors do not cost extra, and are very hardy. Choosing a rugged transistor in the beginning may eliminate the possibility of an unexplained failure. Ensure the transistor you select will withstand high VSWR at the peak voltage it may experience (15 volts in an automotive system). If a manufacturer specifies that a transistor will withstand infinite VSWR at 175 MHz, the device will be less rugged at 100 MHz, and it may not withstand infinite VSWR. At even lower frequencies, 30 MHz, for example, it may be too fragile to be useful. To be safe, use a transistor near its rated frequency, or check with the manufacturer for derating information.

The use of an etched circuit board with strip-line inductors is the easiest approach for vhf circuits since the matching networks are easy to calculate and reproduce. It is also much easier to maintain proper ground paths on a pc board. Another important point to remember when using transistors is to assure that the device is used well within the manufacturer's ratings, especially maximum power output and supply voltage. You will always be better off to use a slightly overrated transistor in order that it may be run conservatively.

Class Of Operation

The "normal" operating mode for an rf power transistor is zero bias, Class C. The Class C solid-state amplifier is useful for fm or cw service,

as is a Class C tube. If linear amplification is desired, the transistor must be biased for Class B operation, with a quiescent collector current of 50 to 100 mA. See reference 19 for an excellent bias technique for linear operation. When Class B is used, both the power output and efficiency are degraded. Class A operation is only employed for ultralinear amplifiers requiring intermodulation products down 50 dB. SSB applications are covered in references 13 and 17. This article describes practical examples of Class C amplifiers intended for fm service.

Toward A Solid-State PA Design

It is important that a designer understand transistor input and output impedances. There is a lot more to transistor impedance matching than just stating transistor impedances are a lot lower than those found with tube circuits. It is true, of course, that transistors are low-impedance devices, with some very serious implications. In a low-impedance matching circuit you have to be more concerned with current flow; the ground paths and the current-handling capability of components have to be chosen carefully. Stray inductances are extremely important, particularly transistor lead inductance and any series inductance in a shunt component in a matching network. Any inductance in the ground path is also very important.

A key point to remember when choosing a component, a capacitor for example, is do not forget about series lead impedance and, possibly, the ground-return impedance. It does not take much stray inductance to equal the 1-ohm capacitive reactance you may be seeking, only about 1 nH at 150 MHz (about 1/16 inch of the lead on a strip-line transistor). (See reference 16.) Any capacitors used in a low-impedance vhf of uhf circuit at the 40-W power level, or higher, should have ribbon leads or no leads at all (chip capacitors). The best capacitors are the uncased mica and porcelain-ceramic types. These capacitors have a very low series resistance, and, thus, are capable of operating at high rf current. At higher impedances or lower frequencies, NPO "chips" or NPO capacitors with very short leads will work.

The techniques used to ground the various components in an amplifier may well be the most important aspect of the design. Employing several of the tips listed below will help to optimize a design. Again, ground returns become critical at high power levels at vhf.

1) Ground the transistor emitter leads (base leads for common-base operation) *at the body* of the transistor. Not at the ends of the leads, not 1/8 inch away from the body of the device!

2) Use double-sided pc board.

3) The back side of the pc board should be nearly a continuous ground plane. The top-side ground foil should be connected to the bottom-side foil using straps under each emitter lead. (See Fig. 4.) Plated-through holes are also acceptable.

4) Components in the matching networks must have adequate ground returns. The grounds for C1

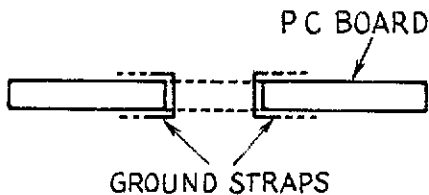


Fig. 4 — Straps should be added to connect ground foils on the top side of the board to those on the bottom.

and C2 of Fig. 5 are of critical importance. The shunt required is often 1 or 2 ohms, and, therefore, the total inductive impedance in the ground return to the emitters must be extremely small. For this reason, two capacitors connected in parallel, one to each emitter lead, are usually required.

5) Capacitors in the matching networks, such as C3 of Fig. 5, even though located at a slightly higher impedance point, require a good ground. A direct connection to the bottom-side ground using a strap through a hole in the pc board is the best construction technique.

6) Grounds for components and connectors at higher impedances, near 50 ohms, are not so important.

An rf power transistor is a reliable device capable of operating in excess of 100,000 hours without failure, when proper mechanical and electrical specifications are observed. Without proper mounting, the transistor may be both mechanically and thermally stressed beyond reliable limits.

1) **STUD TORQUE** — A torque of 6 ± 1 in.-lb. should be used when installing a transistor with a 3/8-inch stud, 5 ± 1 in.-lb for a 1/4-inch stud and 8 ± 1 for 1/2-inch stud are accepted practice. A releasing type torque wrench should always be used, such as a Torque Controls TS-30¹.

2) **MOUNTING-FLANGE PACKAGES** — Flange packages must be mounted on a flat (± 2 Mills) surface if proper heat transfer is expected. It is most important that the flange not be twisted or bent before or during installation.

3) **STUDLESS PACKAGES** — Studless packages may be installed using epoxy cement or solder. When soldered properly, thermal resistances equivalent to the stud packages can be expected. Some degradation in thermal resistance will be experienced when epoxy is used; the extent depends on the conductivity of the epoxy cement.

¹ Torque Controls, South El Monte, CA 91733.

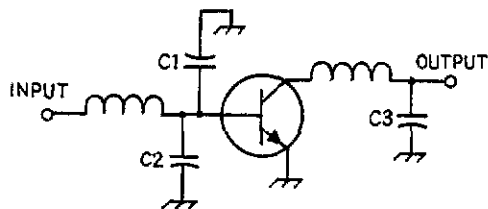


Fig. 5 — Simplified transistor amplifier circuit.

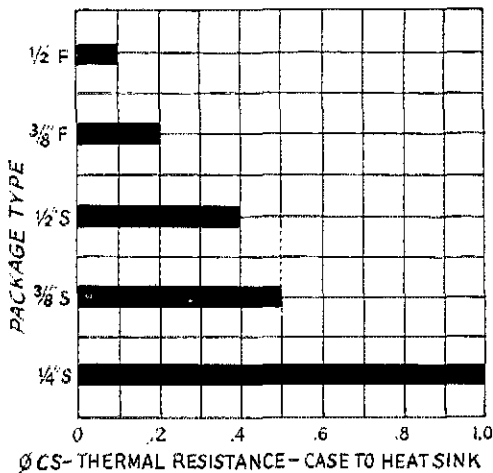


Fig. 6 — Thermal resistance of the case of a transistor of the associated heat sink varies according to the stud (S) or flange (F) size.

4) WHAT ABOUT SILICONE GREASE — A high quality silicone grease like GE Insulgrease² or equivalent should always be used on both stud and flange devices. The use of silicone grease will improve the interface thermal resistance by at least 0.2° C/watt.

5) RELATIONSHIP OF LEADS TO CIRCUIT — One of the most important aspects of transistor mounting is assuring that the transistor rests on the circuit board without stressing the leads when it is bolted to the heat sink. See Fig. 8.

Other important aspects of power-amplifier design are thermal considerations. For optimum reliability, the transistor chip must be kept as cool as possible. There are several thermal resistances of importance, as shown in Fig. 7. The thermal resistance value specified by the transistor manufacturer is Θ_{JC} only and does not include Θ_{CS} . Because of this, many circuit designers assume the

² G-641 Insulgrease, General Electric, Silicone Product Dept., Waterford, NY 12188.

NOTE THAT LEADS ARE ON AN EVEN PLANE WITH PC BOARD

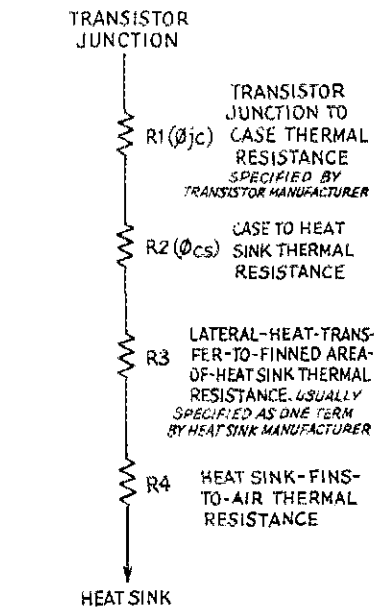
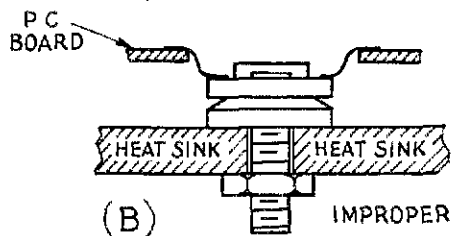
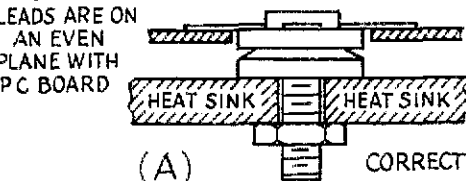


Fig. 7 — Resistances to heat flow encountered from a transistor junction to a heat sink.

thermal resistance from case to heat sink is negligible. *This is not so . . .* typical values for the various packages bolted to a heat sink using the manufacturer's specified torque are shown in Fig. 6. All of the individual thermal-resistance terms must be added together as though they are series-connected resistors.

$$(R_1 + R_2 + R_3 + R_4) \text{ } ^\circ\text{C/watt} \times \text{Total Power Dissipation (Watt)} = \text{Junction Temperature (} ^\circ\text{Celsius)}$$

For maximum reliability, the operating junction temperature should be less than 150 degrees Celsius (C).³

³ For additional details, see White, "Thermal Design of Transistor Circuits," *QST*, April, 1972.

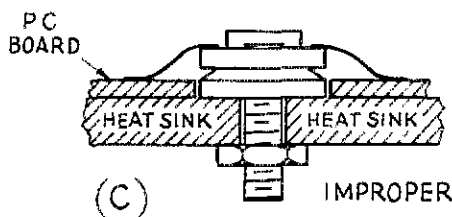
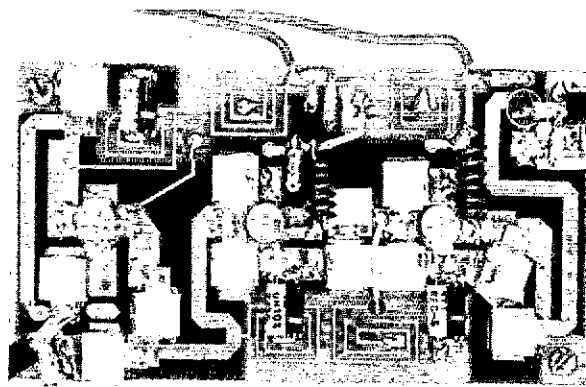


Fig. 8 — Proper (A) and improper (B and C) ways to mount a power transistor. At B the transistor leads are forced up to meet the pc board, which may fracture the leads at the edge of the case. At C the lead inductance will be high, reducing stage gain.

The 12- and 40-watt stages in this 3-stage amplifier have two capacitors connected in parallel in the base circuit, one returning to each emitter lead. Underwood low-loss mica capacitors are used.



Several other precautions should be taken when using transistors to avoid damage:

1) Transistors will not tolerate overloads to the extent that a tube will, because the thermal time constant of a transistor is in the order of 1 millisecond and the time constant for a tube may be several minutes.

2) Because of the short thermal time constant, a transistor should be operated at an output power level well below its maximum power-dissipation rating, not two to three times the dissipation rating as with a tube. A transistor must have extra dissipation capability to handle momentary overloads. A good rule of thumb for Class C operation is to keep the rf output below 50 percent of the power dissipation rating.

3) Transistors will not tolerate voltages higher than manufacturer's rating. If possible, prevent voltage spikes. Most transistors intended for 12.6-volt mobile applications are designed to withstand the 15- to 16-volt transients found in automotive systems. Make sure the transistor you select has similar specifications.

4) Ensure your amplifier is stable before you apply full power. If low-frequency oscillations are present, they can destroy your transistor.

Circuit Design

Transistor amplifier design also involves choosing suitable impedance-matching networks and decoupling components for the dc feeder; see Fig. 9. The impedance-matching networks are usually constructed using L sections. These L sections also act as a low-pass filter reducing the level of harmonic energy (Fig. 10). If the Q of each matching network is kept low (2 to 3), the bandwidth of the resulting amplifier will be wide enough to permit operation across any of the vhf or uhf amateur bands without retuning. The Q referred to is the loaded Q of the matching network, not the unloaded Q of any individual component. Keep the component Q high, of course, to minimize losses. In addition to wide bandwidth, low- Q matching networks have low loss (because circulating currents are low) and do not require critical component values. The values for the L , C , and Q may be quickly determined using a Smith chart once the impedances to be matched have been determined. See reference 15, 20 and 22 for instructions about using a Smith chart. If an optimum network for a very wide bandwidth (octave or greater) is desired, see reference 18 for design details.

The input and load impedances for a power transistor are usually given in the manufacturer's data sheet. These impedances may be either the series or parallel equivalent. Either is readily transformed into the other.⁴ When comparing data

⁴ Grammer, "Simplified Design of Impedance-Matching Networks, in three parts, *QST*, March, April and May, 1957.

sheets, make sure you know whether series or parallel impedance equivalents are specified.

When designing a matching network, always work from the transistor to the termination. If the first matching component is a shunt element, the parallel equivalent impedance should be used. Use the series equivalent when the first matching component is a series element. A typical input matching network is shown in Fig. 11A along with some typical impedance values. The following is a step-by-step method for calculating the component values required for the input and output matching networks:

1) The transistor input impedance is usually inductive because of lead inductance inside the package. In order to maintain the lowest loaded Q for the first matching section, the first component used should be a shunt capacitor equal in imped-

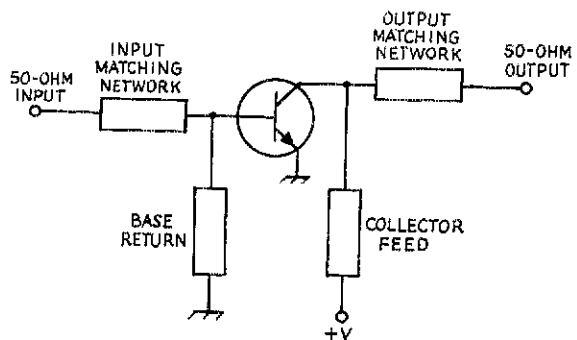


Fig. 9 — Networks that must be designed for a power-transistor stage.

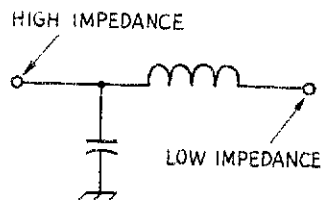


Fig. 10 — The L Network.

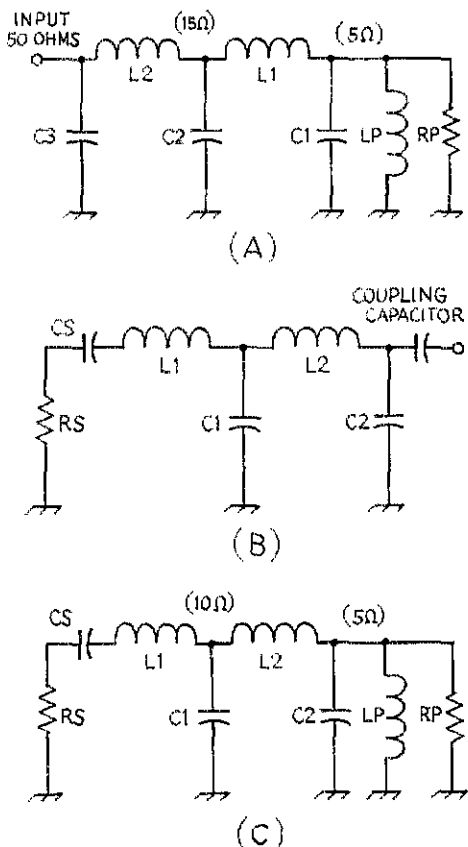


Fig. 11 — The (A) input, (B) output and (C) interstage networks described in the text.

ance to L_p making the impedance real and equal to R_p . If the impedance of C_1 is less than about 8 ohms, it is often best to use two capacitors in parallel, one connected back to each transistor emitter lead to minimize inductance and to equalize ground currents.

2) If R_p is high (15 ohms, for example) then the matching network may require only one L section. If R_p is low (2 to 5 ohms), two L sections probably will be required. The larger the impedance change, the higher the Q . Keeping the Q low improves the bandwidth and lowers power loss. If two L sections are required, select an intermediate impedance point approximately

$$Z_m = \sqrt{Z_1 Z_2}$$

Using the values in Fig. 11A:

$$Z_m = \sqrt{5 \times 50}$$

$$Z_m = \sqrt{250}$$

$$Z_m = 15.8$$

$Z_m = 15$ ohms, rounded to a convenient number

Both the intermediate impedance point and the number of L sections chosen are not critical, unless maximum bandwidth is required.

3) After selecting the intermediate impedance point, L_1 and C_2 can be calculated using a Smith chart. The best choice of strip-line impedance for calculation is a value equal to Z_m (15 ohms). Use a Smith chart normalized to 15 ohms to make the calculation. Start at Z_1 (5 ohms) on the chart and progress clockwise on a circular path, with the chart center the origin, until you reach an admittance circle which also passes through the desired output impedance (Z_m , 15 ohms). See Fig. 12A. Note that the value of L_1 , C_1 , and Q can be read directly.

4) If one wishes the length of L_1 to be shorter, then a higher value of strip-line impedance can be chosen with a slight sacrifice in Q . Always normalize the Smith chart to the strip-line impedance value.

5) Additional L sections can be calculated in the same manner. An output matching network might look like the example shown in Fig. 11B.

6) The transistor manufacturer usually specifies the load impedance required to obtain rated specifications ($4 + j2$). The impedance to start from on the Smith chart is the complex conjugate of the load ($4 - j2$). When working on the Smith chart, always begin with the load that the network sees on transistor end. The final value you obtain at the other end of the network is the impedance you require "looking into" the network. Otherwise, the calculations are the same as the input network. See Fig. 12B.

Another interesting matching problem is the design of the interstage network between two transistors. A typical network is shown in Fig. 11C. This network is plotted on a Smith chart in Fig. 12C. The optimum line impedance for L_1 and L_2 is quite low. At some sacrifice in Q , a higher impedance is used to obtain a practical strip-line width.

There are several other ways to provide impedance matching using strip lines:

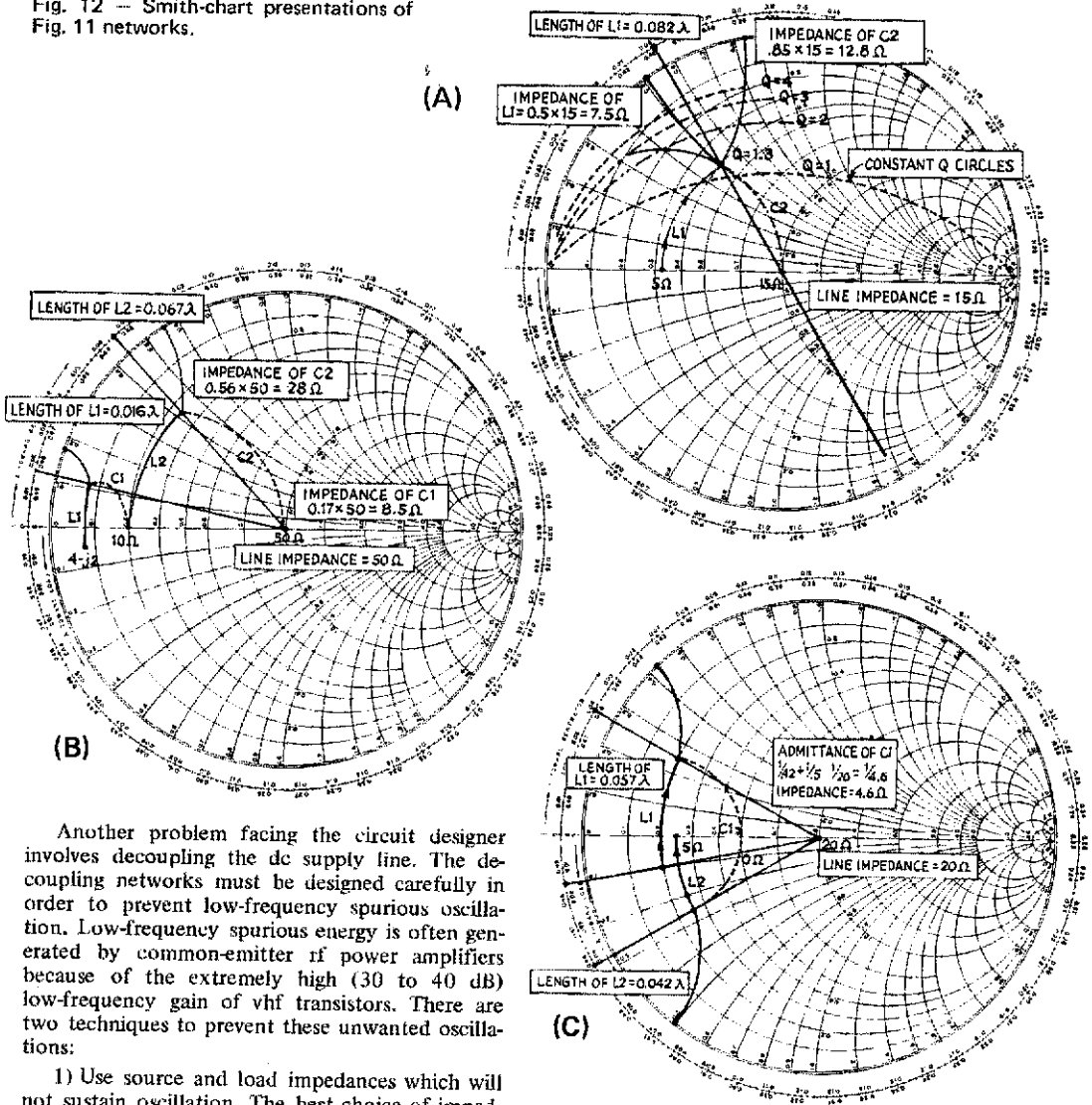
1) QUARTER-WAVE MATCHING TRANSFORMERS — Two real impedances can be matched using quarter-wave strip-line with Z_0 calculated as follows:

$$Z_0 = \sqrt{R_1 R_2}$$

2) EIGHTH-WAVE STUBS — An eighth-wave stub may be used as a shunt capacitor or inductor. If the end of the stub is open, the stub looks like a capacitor with a reactance equal to the impedance of the strip-line used as the stub. An inductive reactance equal to that of the line is obtained when the end is shorted. Using stubs in matching networks provides excellent harmonic suppression.

3) QUARTER-WAVE STUBS — A quarter-wave stub which is shorted on one end looks like an infinite impedance on the other. Thus, the quarter-wave stub makes an excellent rf choke at vhf and above.

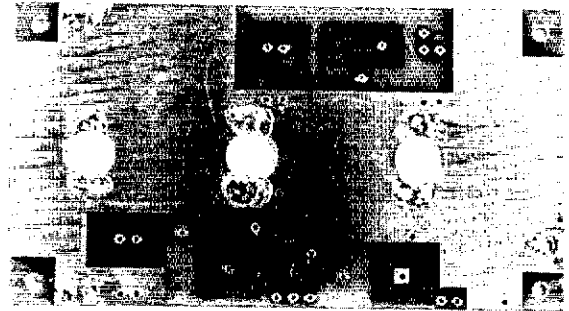
Fig. 12 — Smith-chart presentations of Fig. 11 networks.



Another problem facing the circuit designer involves decoupling the dc supply line. The decoupling networks must be designed carefully in order to prevent low-frequency spurious oscillation. Low-frequency spurious energy is often generated by common-emitter rf power amplifiers because of the extremely high (30 to 40 dB) low-frequency gain of vhf transistors. There are two techniques to prevent these unwanted oscillations:

1) Use source and load impedances which will not sustain oscillation. The best choice of impedance to prevent low-frequency spurious generation is a low value of pure resistance. The circuit shown in Fig. 13A provides such a termination. L_1 and L_3 of Fig. 13A should be low-value rf chokes chosen for the carrier frequency. L_2 and L_4 should be as large a value as possible consistent with the ability to handle the required current. (Ten μH is a good value at 146 MHz.) C_1 is a low-value bypass capacitor at the carrier frequency. Choose a value as small as possible without reducing the output power. C_2 and C_3 must provide a low-impedance bypass at all frequencies from the operating channel to dc. (Capacitors of $0.22\ \mu\text{F}$ and $10\ \mu\text{F}$ are good choices.) At low frequencies the base of the transistor will "see" R_1 and the collector will "see" R_2 . R_1 and R_2 should be some low value such as 10 to 15 ohms.

2) A second method of preventing rf spurious oscillation involves using negative collector-to-base feedback to lower the gain of the stage below a



Before mounting the power transistors on this circuit board, straps were installed on either side of each transistor mounting hole and on the outside edges of the board to connect the ground foils together. See Fig. 4.

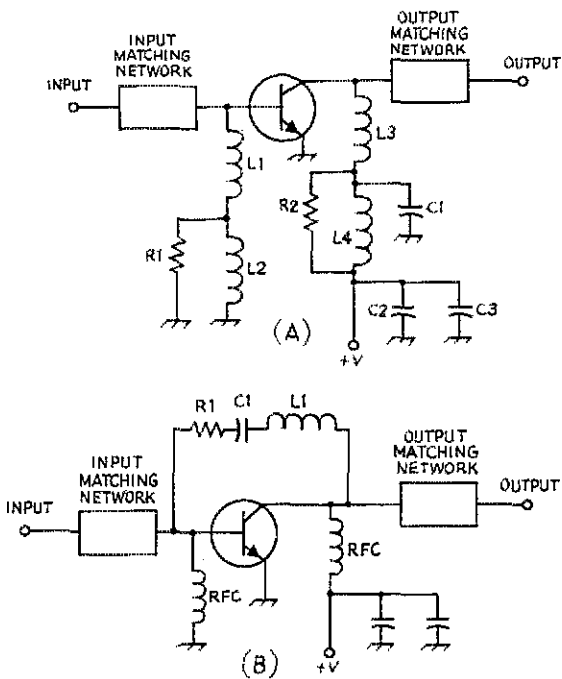


Fig. 13 — Methods of eliminating low-frequency spurious oscillations. (See text.)

selected frequency. The connection of the feedback network is shown in Fig. 13B. Make the value of L1 large enough so that installation of the feedback network has no effect at the operating frequency. The lead inductances of R1 and C1 are often sufficient without additional inductance. C1 should be a value large enough for good coupling at the lowest frequency of interest. A value of 10 to 100 ohms is usually selected for R1. Both the base and collector rf chokes must be low values of inductance to obtain maximum benefit from the feedback network.

Using one or the other of these techniques, most transistors can be stabilized. However, a transistor can have several features built in which make the device easier to stabilize. The low frequency gain of the transistor should be as low as possible. Any resistance or inductance in the transistor emitter lead provides negative feedback which decreases the gain of the device, making the transistor inherently more stable. A transistor with large-value emitter resistors is easier to stabilize. A transistor with low emitter-lead inductance (such as the improved strip-line package) is slightly more difficult to stabilize.

Reminders

There are several key points which the designer should remember:

- 1) Keep lead inductances as low as possible.
- 2) Make sure all ground paths are short and of low inductance.

3) Use quality (high-Q) components at low-impedance points.

4) Use an etched circuit board, with strip-line construction of inductors whenever possible.

5) Keep the Q of matching networks low for minimum losses and maximum amplifier bandwidth.

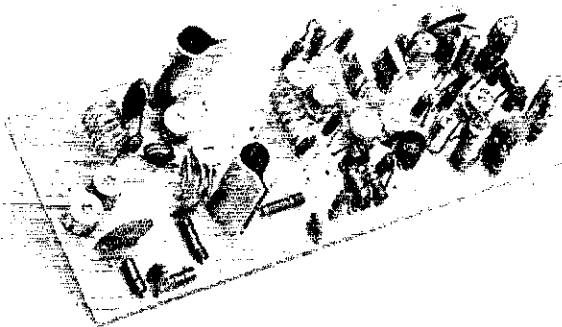
6) Choose a rugged transistor that is rated for the type of operation intended.

If you keep these key points in mind, following the instructions outlined in this article, an rf power amplifier can be constructed and adjusted without difficulty. (The other parts of this article will appear in subsequent issues of QST).

BIBLIOGRAPHY

- 1) Black, "Electro Migration Failure Modes in Aluminum Metallization for Semiconductor Devices," *IEEE*, September, 1969.
- 2) Reich and Hakim, "Hot Spot Thermal Resistance in Transistors," *IEEE Transactions on Electron Devices*, February, 1966.
- 3) Steffe and Moutoux, "Avoiding Second Breakdowns in Power Transistors," *The Electronic Engineer*, December, 1967.
- 4) Gri, "Microwave Transistor — From Small Signal to High Power," *Microwave Journal*, February, 1971.
- 5) Gundeach, "Rx for RF Power Transistors," *Electronics*, May 26, 1969.
- 6) Lee, "Microwave Power Transistors," *Microwave Journal*, February, 1969.
- 7) Magill, "Watt — Megahertz Ratings Run Second to High Reliability in Foreign RF Power Transistors," *Electronics*, April 27, 1970.
- 8) Tatum, "Fingers in the Die," *Electronics*, February 19, 1969.
- 9) Carley, McGough and O'Brien, "The Overlay Transistor," *Electronics*, August 23, 1965.
- 10) Carley, "A Worthy Challenger for RF Power Honors," *Electronics*, February 19, 1968.
- 11) Johnson and Mallinger, "You Can Depend on Today's RF Transistors," *Electronics*, September 13, 1971.
- 12) Nelson, "Higher Power From Transistors on Six Meters," *Ham Radio*, October, 1968.
- 13) Hejhall, "Solid State Power Amplifiers for Ssb Service," *QST*, March, 1972.
- 14) Franson, "How to Use RF Power Transistors," *Ham Radio*, January, 1970.
- 15) Linville and Gibbons, *Transistors and Active Circuit*, Chapter 14, McGraw-Hill Book Company, 1961.
- 16) Perna, "Don't Let the Wrong Input Q Wreck Your Rf Power Amplifier," *EDN/IEEE*, November, 1971.
- 17) Schultz, "Solid-State 100-W Amplifier Operates from a 12-Volt Source," *EDN/IEEE*, March, 1972.
- 18) Pitzalis and Gibson, "Tables of Impedance Matching Networks which Approximate Prescribed Attenuation Versus Frequency Slopes," *IEEE Transactions on Microwave Theory and Techniques*, April, 1971.
- 19) Hejhall, "Solid State Linear Power Amplifier Design," Motorola Semiconductor Application Note, 1971.
- 20) Smith, *Electronic Applications of the Smith Chart*, McGraw-Hill Book Company, 1969.
- 21) Wheeler, "Transmission-Line Properties of Parallel Strips Separated by a Dielectric Sheet," *IEEE Transactions on Microwave Theory and Techniques*, March, 1966.
- 22) *Solid-State Power Circuits*, RCA Designer's Handbook, 1972.

Top side of the fm transmitter. This view shows the prototype version. Some of the components indicated in Fig. 1 are located on the foil side of this model. The template includes a few changes in layout which permit all parts to be mounted on the non foil side of the board. The two models are otherwise identical. The large metal cylinders at one end of the board are the homemade heat sinks for Q2 and Q3. The audio section of the circuit is assembled on the opposite end of the board. Smaller heat sinks (3/4 inch high) can be used if the builder wishes to reduce the vertical profile of the assembly.



The Pip-Squeak Gets Smaller

BY DOUG DEMAW,* WICER

IN AN EFFORT to shrink the dimensions of the solid-state fm transmitter treated earlier in *QST*, and in the 1972 *ARRL Handbook*, it became necessary to eliminate one stage in the rf section, and to reduce the size of the speech amplifier and clipper. The product of that effort is shown schematically in Fig. 1.

A slightly different electrical approach was taken, wherein the oscillator was called upon to deliver a fair amount of power. The increased output from Q1 permitted the deletion of a driver stage ahead of the PA. The change made it necessary to pay particular attention to the design of all networks between stages, providing adequate selectivity to assure suppression of unwanted output frequencies. The criterion was met, as evidenced by a spectral display of the output energy. The MK-II version is as clean as was the MK-I model.

A logical approach to reducing the area occupied by the speech amplifier and clipper was the employment of a transistor-array IC as opposed to the use of discrete components. The latter technique was used in the MK-I example.

Circuit Highlights

Generally, the circuit of Fig. 1 follows the classic Sonobuoy format given in RCA's *Power Circuits, DC to Microwaves*.¹ Some of the circuit changes made by the writer are radical. Others are subtle. The boiled-down version is based on amateur-band performance criteria and the more commonly available supply voltage of 12. Emphasis has

* Technical Editor, *QST*.

¹ Recommended for amateur libraries. Order from local radio store, or write RCA Electronic Components, Harrison, NJ 07029. Price: \$2.

been placed on good frequency stability, narrow-band deviation (up to 6 kHz), and relative freedom from spurious output.

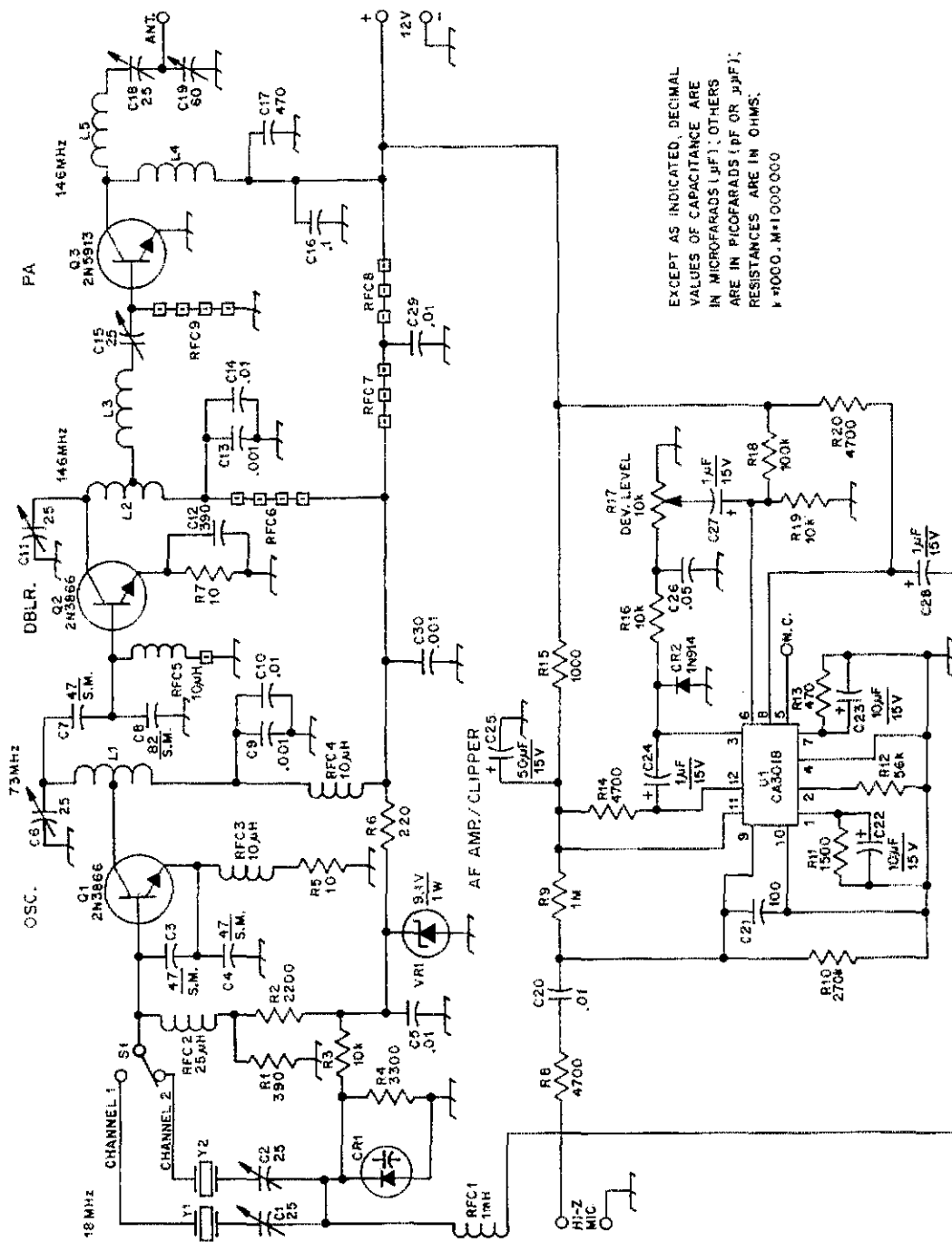
Low-cost transistors are used at Q1 and Q2. A ballasted transistor (mismatch protected) is used at Q3 to prevent burnout resulting from temporary open- or short-circuit conditions in the antenna system. The current OEM price (single lot) for the 2N5913 is \$3.63. Over-the-counter prices will be slightly higher, but it is recommended that the builder use the '5913 if he wishes to have the circuit perform as specified here. Substitutes for any of the devices used in the circuit of Fig. 1 should be employed only by those who are experienced in semiconductor work. The wrong choice can lead to dismal results with the circuit—instability, low output, or destruction of one or more of the transistors.

Ferrite beads are used generously in the circuit for decoupling of the dc bus and as rf chokes.² The beads provide low-Q impedances and are superior to solenoid-wound inductors in preventing circuit instability caused by tuned-base-tuned-collector conditions. A further aid to stability is provided through the use of high and low values of capacitance (combined) in various parts of the circuit. This standard technique helps to assure stability at hf and vhf, and is necessary because of the high f_T of the transistors used.³

² See parts list for ordering information.

³ The higher the f_T (upper-frequency rating) of a transistor, the greater will be its gain capability at lower frequencies, thus giving rise to unwanted hf or if oscillations.

In response to the many requests for a compact version of the FM Pip-Squeak described in March 1971 QST we offer this MK-II version. Though the mass has been reduced to approximately one-third that of the original model, the power output, operating voltage, and crystal frequency remain the same. This unit measures 6-1/4 x 2-1/2 inches, audio section included, contrasting the 3-3/4 x 8-inch size of the MK-I, which used a separate audio module.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR p.p.F); RESISTANCES ARE IN OHMS. * 10000. M=1000000

Fig. 1 — Schematic diagram of the 2-meter fm transmitter. Fixed-value capacitors are disk ceramic unless otherwise marked. Polarized capacitors are electrolytic. Fixed-value resistors are 1/2-watt composition. Numbered components are appearing in parts list are so specified for pc-board layout purposes only.

C1, C2, C6, C11, C15, C18 — 7 to 25-pF miniature ceramic trimmer (Erie 538-002B-7-25 or equiv. Avail. new from Newark Electronics, Avail. as surplus from Newark Electronics, Avail. as Phila., PA).

C19 — 15 to 60-pF miniature ceramic trimmer (Erie 538-002F-15-60 or equiv.).

L1 — 5 turns No. 16 tinned bus wire, 1/4-inch ID X 5/8 inch long. Tap at 2-1/2 turns.

L2 — 3 turns No. 16 tinned bus wire, 1/4-inch ID X 3/8 inch long. Tap at 1/2 turn from C13 end.

L3 — 4 turns No. 22 enam. wire, close-wound, 1/4-inch ID.

L4 — 25 turns No. 28 wire, close-wound on body of 100,000-ohm, 1-watt resistor. Use resistor pigtail as anchor points for ends of winding.

L5 — 5 turns No. 16 tinned bus wire, 5/16 ID X 1/2 inch long.

Q1-Q3, incl. — RCA transistor.

R17 — 10,000-ohm pc-board carbon control, linear taper (Matory MTC 14L1 or equiv.). RFC1 — 1-mH miniature rf choke (James Millen J302-1000. Avail. direct: James Millen Mfg. Co., 150 Exchange St., Malden, MA).

RFC2 — 25- μ H miniature rf choke (Millen J300-25).

RFC3, RFC4 — 10- μ H miniature rf choke (Millen J300-10) with one Amidon ferrite bead over ground-end pigtail.

RFC6, RFC9 — 4 Amidon ferrite beads on 1/2-inch length of No. 24 wire (Amidon Associates, 12033 Olsego St., N. Hollywood, CA 91607).

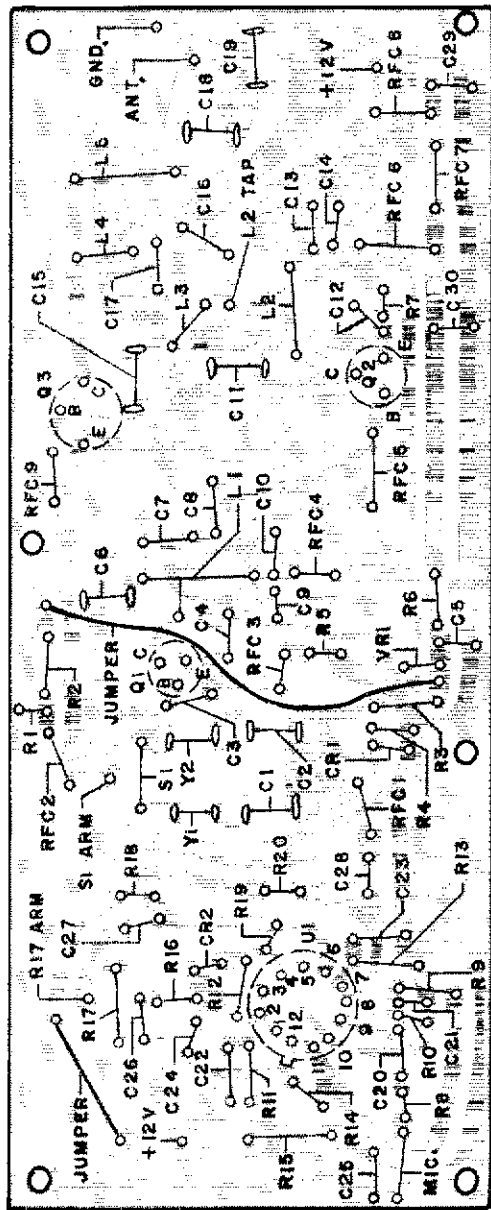
RFC7, RFC8 — Same as RFC6 but with three beads on 3/8-inch length of wire.

S1 — Spdt slide or rotary switch.

U1 — RCA integrated circuit.

V1 — 9.1-volt, 1-watt Zener diode.

Y1, Y2 — 18-MHz crystal (International Crystal Co. ground for 20-pF load capacitance. HC-25/U holder (FM-2). Use International FM-2 pc-board crystal socket). High-accuracy .002% temperature-tolerance crystal recommended.



Template and parts layout for the transmitter, drawn to scale. Foil-side view.

Transistor sockets should not be used at Q1, Q2 or Q3. The additional lead lengths resulting from the use of sockets could cause instability problems. Those wishing to use a socket at U1 may do so by redesigning the pc board to allow a socket to be installed (bringing the twelve holes for the IC closer together). Alternatively, one might employ an IC socket which has fairly long lugs, bending the lugs outward to mate with the holes in the pc board.

Speech Amplifier

U1 consists of four bipolar transistors on a common substrate. Two of the transistors are connected for use as a Darlington pair. The remaining two are separate from one another. In the circuit of Fig. 1 the Darlington pair serves as a preamplifier for a high-impedance crystal, ceramic, or dynamic microphone. One of the separate transistors is used as a diode in the clipper circuit (an outboard silicon diode is used to clip the opposite side of the af sine wave), and the remaining transistor amplifies the clipped audio after it is filtered by an R-C network. Deviation is set by adjustment of a pc-board potentiometer, R17.

The processed audio is fed to CR1, the varactor-diode modulator. Some reverse bias is used on CR1 to assure greater linearity of modulation (3 volts dc taken from the junction of R3 and R4). As the audio voltage is impressed across CR1, the junction capacitance of the diode shifts above and below the steady-state value which exists when no af voltage is present. The change in capacitance shifts the crystal frequency above and below its nominal value to provide fm.

Construction

There are no special instructions necessary provided the builder follows the template pattern offered in this article. However, it is worth mentioning that the QST model was built on glass-epoxy circuit board. Those attempting to use phenolic or other types of pc board may encounter difficulty in obtaining proper circuit performance. The dielectric properties of the various board materials are different, thereby causing different values of capacitance to exist between pc-board foil strips. The condition can cause instability, unwanted coupling, and tuned circuits that will not hit resonance. Some builders of the MK-I transmitter learned this the hard way!

Transistors Q2 and Q3 require fairly hefty heat sinks if good efficiency and longevity of the devices are to be realized. Homemade sinks are shown in the photo. Each consists of a piece of 1/16-inch thick aluminum (brass or copper is okay) formed over a drill bit slightly smaller in diameter than a TO-5 transistor case. The aluminum can be crimped in a bench vise until it fits snugly around the drill body. Silicone grease should be used to coat the transistor bodies prior to installation of

the heat sinks. The height of the writer's sinks is 1 inch. The ID is approximately 1/4 inch.

Lead lengths of the wires going from the pc board to S1 should be kept short—preferably less than 1-1/2 inches long. Coaxial cable (50-ohm impedance) should be used between the antenna terminals on the pc boards and the antenna connector. The shield braid must be grounded at each end of the cable. Similarly, shielded cable should be employed between the microphone jack and the audio-input terminals on the pc board.

Checkout and Use

Initial checkout should be undertaken at reduced supply voltage. Apply a voltage of between 6 and 10, making certain that a dummy load of approximately 50 ohms is connected to the output of Q3. A 56-ohm 2-watt resistor or a No. 47 pilot lamp will suffice. Using a wavemeter tuned to 73 MHz, adjust the collector tank of Q1 for a peak reading on the wavemeter. Next, set the wavemeter for operation at 146 MHz and adjust the collector tuned circuit of Q2 for maximum meter indication. The tank circuit of Q3 should be adjusted for maximum power output as observed on an rf wattmeter or Monimatch-type SWR indicator. A rough check can be made by using a No. 47 lamp as a load, adjusting for maximum bulb brilliancy. The next step is to raise the supply voltage to 12 and repeat the tweaking procedure outlined above. If all stages are functioning normally, a No. 47 lamp should illuminate to slightly more than normal brilliancy. Power output into a 50-ohm load should be between 1-1/2 and 2 watts. Current drain will be between 200 and 250 mA, speech amplifier included.

Adjustment of the transmitter frequency and deviation can be done while using a vhf frequency counter and deviation meter. Most two-way radio shops have equipment for doing this, and will charge a nominal fee for their services. Alternatively, one can put the transmitter in service and ask one of the other fm operators in the area to observe his receiver's discriminator meter while you adjust your crystal trimmer for a zero reading. Deviation can be set reasonably close to the desired amount by comparing your modulation against that of other local stations, having a third operator report the comparisons.

Closing Comments

This transmitter is well suited as a companion unit to the fm receiver described earlier in QST.⁴ The two units can be packaged to form a transmitter for portable, mobile, or fixed-station use. The transmitter can be used to drive a high-power solid-state 2-meter amplifier if one wishes to put on a pair of "boots."⁵ Ready-made pc boards may be available from Spectrum Research Laboratory.⁶

⁴ DeMaw, "A Single-Conversion 2-Meter Fm Receiver," QST for August 1972.

⁵ Hejhall, "Some 2-Meter Solid-State Rf Power-Amplifier Circuits," QST for May 1972, p. 40.

⁶ Write: Spectrum Research Laboratory, Box 5824, Tucson, AZ 85703.

QST

ARRL QSL Bureau

The function of the ARRL QSL Bureau 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 4 1/4 by 9 1/2 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. Recent changes are in bold face.

- W1,K1,WA1,WN1¹ - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.
 W2,K2,WA2,WR2,WN2 - North Jersey DX Assn. P.O. Box 505, Ridgewood, NJ 07451.
 W3,K3,WA3,WN3 - Jesse Bieherman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.
 W4,K4 - North Alabama DX Club, P.O. Box 2035, Huntsville, AL 35804.
 WA4,WB4,WN4¹ - J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL 32901.
 W5,K5,WA5,WB5,WN5 - Kenneth F. Isbell, W5QMJ, 306 Kesterfield Blvd., Frid, OK 73701.
 W6,K6,WA6,WB6,WN6¹ - No. California DX Club, Box 11, Los Altos, CA 94022.
 W7,K7,WA7,WN7 - Willamette Valley DX Club, Inc., P.O. Box 555, Portland, OR 97207.
 W8,K8,WA8,WB8,WN8¹ - Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.
 W9,K9,WA9,WB9,WN9 - Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.
 W0¹ - Reggie Hoare, W0DYP, P.O. Box 115, Mitchellville, IA 50160.
 K0,WAD,WB0,WN0¹ - Dr. Phillip D. Rowley, K0ZFL, Route 1, Box 455, Alamosa, CO 81101.
 KP4 - Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, PR 00902.
 KZ5 - Lee DuPre, KZ5OD, Box 407, Balboa, CZ. Box 407, Balboa, CZ.
 KH6,WH6 - John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, HI 96701.
 KL7,WL7 - Alaska QSL Bureau, Star Route Box 65, Wasilla, AK 99687.
 VE1 - L. J. Fader, VE1FQ, P.O. Box 663, Halifax, NS.
 VE2 - A. G. Daemen, VE2IJ, 2960 Doublas Avenue, Montreal 301, PQ.
 VE3 - R. H. Buckley, VE3UW, 20 Almont Road, Downsview, ON.
 VE4 - D. F. McVittie, VE4OX, 647 Academy Road, Winnipeg R3N 0E8, MB.
 VE5 - A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, SK, S4S 5F5.
 VE6 - D. C. Davidson, VE6TK, 1108 Trafford Dr. NW, Calgary 47, AB.
 VE7 - H. R. Hough, VE7HR, 1291 McKenzie Rd., Victoria, BC.
 VE8 - Yellowknife Centennial Radio Club, P.O. Box 1944, Yellowknife, NWT, Canada.
 VO1 - Ernest Ash, VO1AA, P.O. Box 6, St. John's, NF.
 VO2 - Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, LB.
 SWL - Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

¹ These bureaus prefer 5 x 8 inch or No. 50 manila envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the June and December issues of *QST*.

Note: First-Class mail in the U.S. and Canada is now 8¢ an ounce. QSL Bureau users should send their manager enough two-cent stamps to cover the envelopes on file.



September 1922

... "This has been a rotten summer for ME. I didn't stop 'em a minute." So say Ol' Demon QRN in 8ZZ's cover for this issue. It's a commentary on the efficiency of cw in beating the traditional summer slump of the spark era.

Several manufacturers have brought out untuned rf transformers for wavelengths from 200 to 600 meters. An article reviewing rf amplification says that most of them fall off rather badly at 200, having been designed principally for the bc (360-meter) market. Ballantine's conclusion is reiterated: Because of detector characteristics, rf amplification is useful for spark and phone reception, but offers no improvement in sensitivity over the oscillating detector for cw reception.

The Editor reports on an address by Marconi at a joint AIEE-IRE meeting. Marconi demonstrated the use of beam antennas (using 1-meter wavelength) and described his experiments with short waves, citing a 15-meter radiotelephone circuit giving reliable communication over a distance of nearly 100 miles.

Three articles on superregeneration, still a hot subject: One, a resume of progress from the Editor's pen, concludes that the system is great for loud response to strong phone signals, but falls down in DX reception. Experience is that it is at its best with a loop antenna. By careful adjustment, several experimenters have found it possible to receive cw sigs by beating against harmonics of the quench oscillator.



September 1922

... The "World Above 50 Mc" cites new DX records on 144 and 420 - 575 miles on 144 (W3EKK/1 - W3KUX) and 186 miles on 420 (W6VIX/6 - W6EKK/6).

Dominating the technical articles is a comprehensive one by WIDX on noise figure, then an unfamiliar concept to amateurs. Included are constructional details of a noise generator, instructions for its use, and the results of measuring some available receivers and preamplifiers.

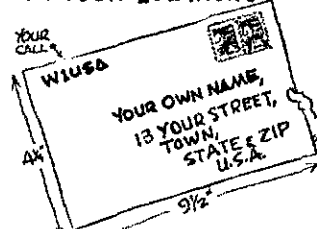
"Atlantic City Report": An unexpected development respecting 14 MHz has occurred in the July sessions of the conference, and the chances of holding the full pre-war 400 kHz look dimmer.

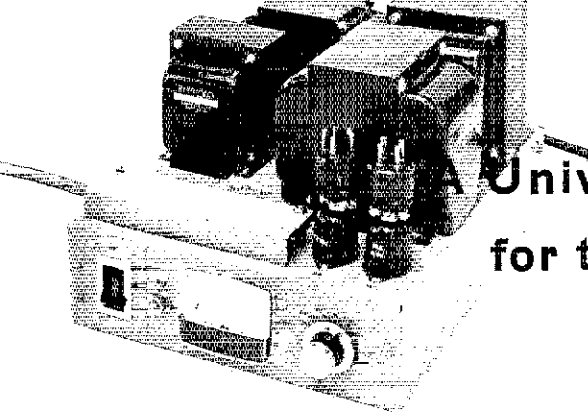
The Technical Editor looks at the overall TVI situation to be faced by amateurs. Possible ways in which interference can be caused in both transmitter and TV receiver are discussed, based on experience gathered in northern New Jersey.

Articles of interest to beam users introduce some new ideas - a hydraulic beam rotator by W9JBU, an inductive system for coupling power from the line to the beam by W3IKX and, to top it off, W2JBU describes his 24-element phased-type 2-meter beam, certainly an elaborate job for that period.

A 350-watt phone/cw transmitter in the best current style exhibits lots of ironware. A-m, of course. WIPEK is the builder and author. - WIDF

IS YOURS ON FILE WITH YOUR QSL MGR?





Universal Power Supply for the Amateur Station

BY ROBERT M. MYERS,* W1FBY
and AUGUSTUS M. WILSON,** W1NPG

FAR TOO MANY times the station power supply is a heavy black box that is tucked away in a corner and just sits there. A large cable interconnects this strange device with the station transmitter or transceiver, and the amateur never comes directly in contact with it (we hope!). All of the supply functions are remotely controlled from the shiny panel of the station transmitting gear. But what happens if an instance arises where a particular voltage (or combination of voltages) is needed for an experimental project? Can that "black box" in the corner be pressed readily into service? In most cases, the answer is no. The trouble would be greater than the project is worth, and consequently the project remains undone. And what about the amateur who buys two power supplies for his station because his "Brand-X" mobile transceiver cannot be plugged directly into his "Brand-Y" home-station transmitter power supply?

Many of today's commercially available ac supplies are not equipped for 220-volt operation. This is unfortunate. If the station includes a two-kilowatt amplifier, chances are that a separate 220-volt line is available in the shack. Blinking house lights are not *always* a result of running a high-powered amplifier. It could be caused by the

intermittent 400- or 500-watt load presented by an exciter power supply to the 117-volt source. Connecting the supply to a 220-volt outlet (providing a dual-primary transformer is used) can be helpful in this regard.

Presented here is a general purpose unit with provisions for 117-220-volt operation, and it is adapted easily for use with most commercially available gear by constructing appropriate power cords. This device offers some "extras" making it a very useful piece of test gear as well as a functional part of the amateur station.

Circuit Details

Primary power may be applied to the supply in two ways. First, terminals 6 and 8 of J3 may be shorted together; this is normally the function of the station transmitting equipment on-off switch (see Fig. 1). On the other hand, S1 may be actuated when the supply is used independently. Transient voltages on the ac line are eliminated by Thyrector assemblies VR1 and VR2.

Full-wave rectification is employed in the secondary circuit of each power transformer to develop the three dc operating voltages. Choke-input filtering provides adequate regulation of both the 300- and 800-volt outputs. Both L1 and L2 are shunted with suitable resistors to reduce the possibility of diode damage when primary power to the supply is removed. R4 consists of three 39,000-ohm two-watt composition resistors connected in parallel.

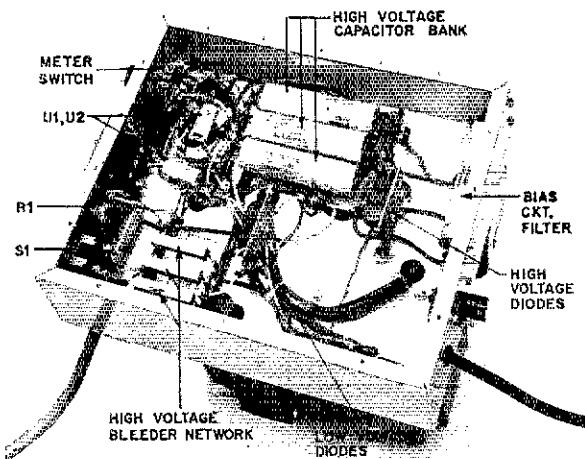
The bias voltage is adjustable and may be set to any value between -40 and -80. Should a range between -80 and -130 volts be required, R1 may be interchanged with R3. Likewise, if a range from 0 to -40 volts is needed, R1 may be swapped with R2.

Metering

A six-position switch and a 0-1 mA meter allows monitoring of high and low voltages, the current for each of these, and the bias voltage. The sixth position permits the meter to be disabled. The meter shunts for both current positions of S2 are homemade and provide a full-scale reading of 500 mA on each range. The proper resistance for

* Asst. Technical Editor, *QST*.

** Laboratory Technician, ARRL.



Bottom view of the Universal Power Supply.

(Continued on page 63)

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF), OTHERS ARE IN PICOFARADS (pF OR μMFD). RESISTANCES ARE IN OHMS.
 1=1000, M=1000 000.
 **3A FOR 220 V OPERATION.
 ***FIL. LEADS MUST BE CORRECTLY PHASED

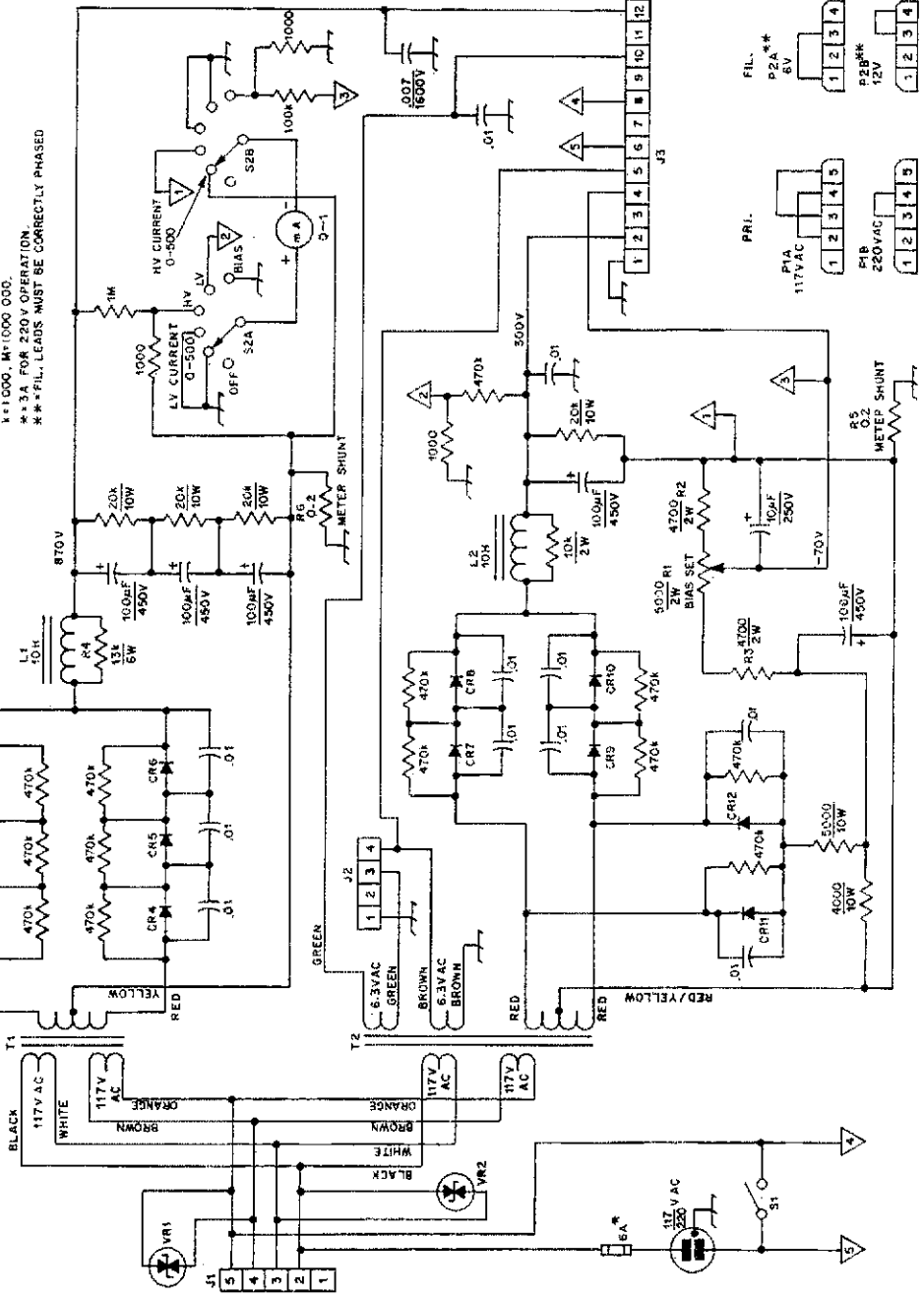


Fig. 1 — Circuit diagram for the power supply. Component designations not listed below are for text reference.
 CR1 — CR12, incl. — 1000-PRV, 2.5-A silicon diode (Mallory M2.5A or equiv.).
 J3 — 12 lug terminal block (Cinch 12-140 or equiv.), and 12 lug fanning strip (Cinch 12-160L or equiv.).
 L1 — 10 H, 200 mA (Hammond 193J).
 L2 — 10 H, 300mA (Hammond 193M).
 T1 — Dual primary, secondary 890 volts each side of center tap at 300 mA (Hammond type 101059).
 T2 — Dual primary, secondary 350 volts each side of center tap at 175 mA, 6.3 volts ac at 6 A, 6.3 volts ac at 5 A (Hammond special 273 BX).
 VR1, VR2 — Thyrector assembly (GE 6RS20SP8B8).

Synthesis of a Varicap†

BY EDMUND S. CROMARTIE*

IN THIS ARTICLE a method is shown by which simple devices such as bipolar transistors and fixed capacitors can be used in lieu of Varicap or Epicap tuning diodes. First, let us take a look at the voltage-variable-capacitance diode. It is similar in forward-conduction characteristics to a general-purpose diode. However, the reverse-bias characteristics give these semiconductors their unusual abilities. A certain amount of capacitance exists in all components. When the capacitance is more prominent than the other characteristics of a component, it may be used as a capacitor. In the Varicap, the reversing of the bias voltage negates conduction of large amounts of current. The internal reverse resistance is high. A representation of this component is shown in Fig. 1.

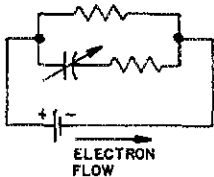


Fig. 1 — Equivalent circuit of a reverse-biased tuning diode.

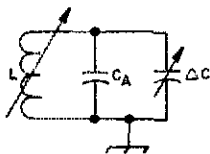
What happens in a Varicap? The reverse bias on the p-n junction of the diode sets up a charge within the two types of material. This charge forms an electric barrier field.¹ It is this field barrier that determines the junction capacitance. As the voltage is increased, the barrier widens and the junction capacitance is lowered, and vice versa.

A Varicap is a diode in which the junction capacitance meets specific requirements. All diodes exhibit the same properties as a Varicap, to some extent. The major drawback to the use of general-purpose diodes is the value of the resistance in

* 4132 Sylvan Dr., Dayton, OH 45417.

† Trade name of TRW Semiconductor Div., TRW, Inc., Lawndale, Calif.

¹ General Electric, "Basic Semiconductor Theory," *Transistor Manual*, Seventh Edition, 1964.



$$Q = \frac{\Delta C}{R} = \text{Component Reactance} \\ R = \text{Series Resistance}$$

$$f_{low} = \frac{1}{2\pi \sqrt{LC_A + LC_{max}}}$$

$$f_{high} = \frac{1}{2\pi \sqrt{LC_A + LC_{min}}}$$

$$\Delta f = f_{high} - f_{low}$$

Fig. 2 — Variable parallel-tuned circuit with padding capacitor.

series with the junction capacitance. It is rather high; thus, the Q is very low. Bipolar transistors also exhibit these characteristics. The collector-base junction of a bipolar transistor is the most notable example. The emitter-base junction also displays these qualities, but use of this junction is limited by the characteristics of the transistor and therefore is impractical.

Keeping in mind the Q factor, one may substitute a transistor for a Varicap. The effective maximum capacitance will be on the order of 20 to 30 pF, going down with increasing reverse bias to 2 to 5 pF. The primary limitations are, of course, the ratings of the transistor in use. The author has used a 2N404 transistor in VFOs and fm wireless mics. The operation of the circuits proved them to be very linear and sensitive!²

In most hf-band circuits, 3 to 30 pF may be fine for a narrow bandspread or for fine tuning, but it is impractical in circuits requiring high Q and much capacitance. How can we synthesize, for example, a 600-pF Varicap?

Components of a Tuned Circuit

Let us examine a tuned circuit. Fig. 2 illustrates a variable parallel-tuned circuit. The tuning range is a function of CA and ΔC . As the ratio of CA to ΔC becomes smaller, the tuning range increases. These terms apply to purely reactive circuits where resistance is constant and minimal.

Now let us consider introducing a significant amount of resistance in series with one element of a parallel-resonant circuit, as in Fig. 3. It can be

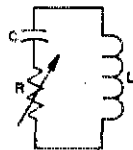


Fig. 3 — Resistance in series with reactance element of a parallel-tuned circuit.

shown mathematically that the point where the total reactance becomes infinite (parallel resonance) can be manipulated not only by varying the inductance and the capacitance values, but also by varying the resistance, R . Increasing the value of R will cause an increase in the resonant frequency; however, the amount by which R must be increased in order to make an appreciable change in frequency will lower the Q of the circuit by several orders of magnitude. Hence, such a circuit is not at all practical.

By modifying the circuit of Fig. 3 to that of Fig. 4, we now have a reactance paralleled with the resistance. The reactance is that of the variable capacitance, ΔC . The resistance, R is no longer simply in series with all of the reactive elements. If the value of ΔC is made small with respect to C the value of R may vary from zero ohms to a few thousand without lowering the Q beyond a usable level. As R is further increased, the Q factor drops

² Experimentation by the author has shown that pnp transistors exhibit much higher maximum capacitances and that they have more linear characteristics than npn transistors.

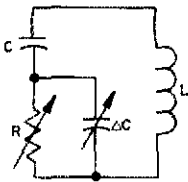


Fig. 4 — Resistance in parallel with reactance element of an equivalent parallel-tuned circuit.

sharply. Contrary to what seems to be likely, reducing the value of ΔC will improve the circuit Q at the higher values of R . However, if C is left relatively large it will restrict the tuning effect of R and lower the Q at large values of R . The reason for this is the establishment of a phase shift through R and ΔC . Ideal conditions exist when R equals reactance of ΔC .

If we are to tune the circuit by varying R , and at the same time vary ΔC such that R equals the reactance of ΔC , we would have to introduce some form of a variable capacitor. This is impractical, since we started out to find a device which could replace such a capacitor. Nevertheless, we can settle for conditions approaching ideal. Since the value ΔC need be only a small fraction of C , and since some form of a variable resistance is needed, a logical choice is a bipolar pnp transistor (see Fig. 5). To make the circuit practical, one must add a

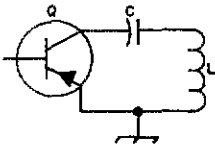


Fig. 5 — Bipolar transistor used as a variable resistance in a parallel-tuned circuit.

collector load resistor of a value high enough to have a negligible effect on the tuned circuit, and still maintain sufficient conduction for proper operation. Also, a base current-limiting resistor *must* be used in order not to damage the transistor. Finally, the emitter-base junction impedance is rather high. So, in order to maintain a high circuit Q , a fixed capacitor is connected across the emitter and base. Fig. 6 represents a complete tank circuit. It will be noted that the collector-base junction is

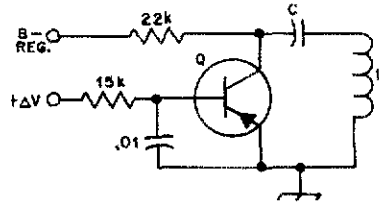


Fig. 6 — Bipolar transistor in a practical circuit as a variable-resistance element.

not reverse biased. However, the Varicap effect is still present, because of the way in which the device is being used.

Practical Limitations

Now see Fig. 7. The associated components have been omitted for clarity. The frequency range

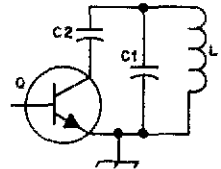


Fig. 7 — Simplified circuit of a "synthesized" tuning diode of high capacitance value.

of this circuit is dependent upon the values of C_1 and C_2 . For all practical purposes, we may assume that the value of the C_2 leg of the circuit can be varied from the actual value of C_2 to a value of only a few pF, by the action of the transistor. Therefore, in answer to the previous question, a 600 pF Varicap may be synthesized by the use of a 600-pF capacitor for C_2 and either omitting C_1 or using a small value at C_1 . C_1 can be used to determine the minimum capacitance and C_2 to determine the maximum capacitance.

A practical circuit now being used by the author as the local oscillator of a receiver is shown in Fig. 8. An FET is used to reduce drift and loading, thus increasing circuit Q . It is hoped that this information will allow many amateurs to use voltage-tuned circuits where previously the need for a Varicap was the primary problem.

QST

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR $\mu\mu F$); RESISTANCES ARE IN OHMS; k = 1000.

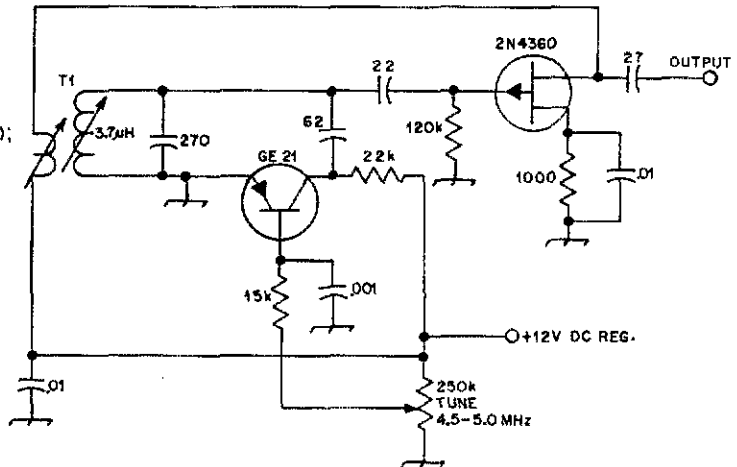
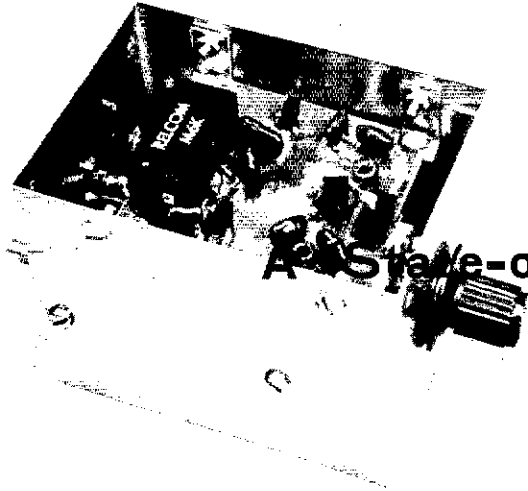


Fig. 8 — Local oscillator circuit using a "synthesized" tuning diode. Feedback winding of T1 is a few turns of enameled wire wound over a stock variable inductor.



The top view of the completed module showing the mixer and output sections. The knob on the front is the deviation control, S1.

A "State-of-the-Art" Approach to Multiband Fm

BY LYNN A. GERIG,* WA9GFR

AS THE NUMBER of vhf repeaters increase steadily nationwide, there is an ever-growing interest in fm communication, particularly for mobile operation. The circuitry discussed here provides the heart of a multiband fm transmitter.

The approach taken is not the typical method used by most amateurs. Deviation limiting is achieved without clipping or compressing the audio; distortion-free age action is used. Fm is generated at a single frequency and heterodyned to the desired output, thereby eliminating the need for a multiplier string. The modulator is not crystal controlled, but is a frequency-stable oscillator.

The purpose of this article is to acquaint the fm operator with information about an approach that is now uncommon to amateur radio. Although this isn't intended to be a construction article, the

* R.R. 1, Morgan Rd., Monroeville, IN 46773

circuits can be duplicated with little difficulty. Inexpensive semiconductors have been used wherever possible with alternative devices also listed.

Some Disadvantages of Phase Modulation

Before the advent of varactor diodes and other semiconductor devices, a common method of obtaining fm was with a reactance-tube modulator. In the use of this method, a tube would be placed in parallel with the circuit of either an oscillator or an amplifier,¹ becoming a part of that circuit and would have its reactance varied by the applied audio signal; however, center-frequency stability now becomes a problem.

When a reactance modulator is used in the tank circuit of a crystal oscillator, the result is predominantly phase modulation because the crystal provides sufficient oscillator stability to prevent its being "pulled" under modulation. The same meth-

¹ For more information see pp. 435-436 of *The Radio Amateur's Handbook, ARRL 1972.*

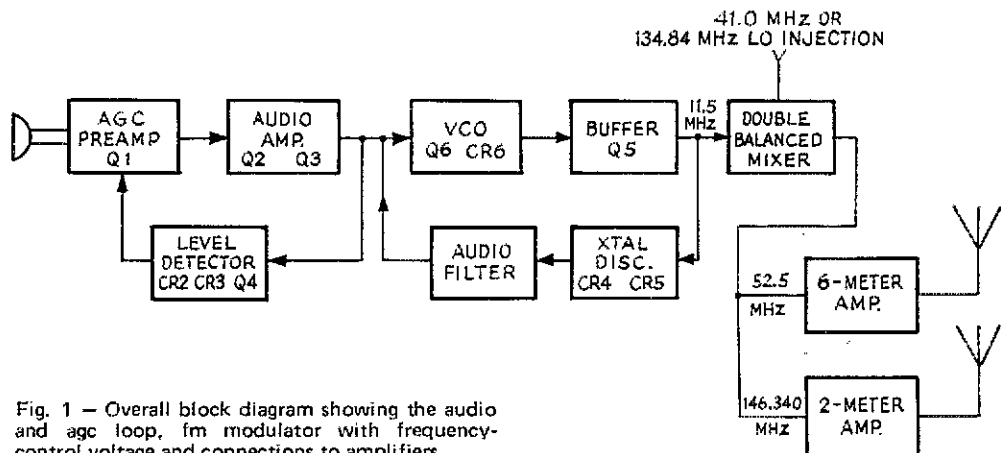
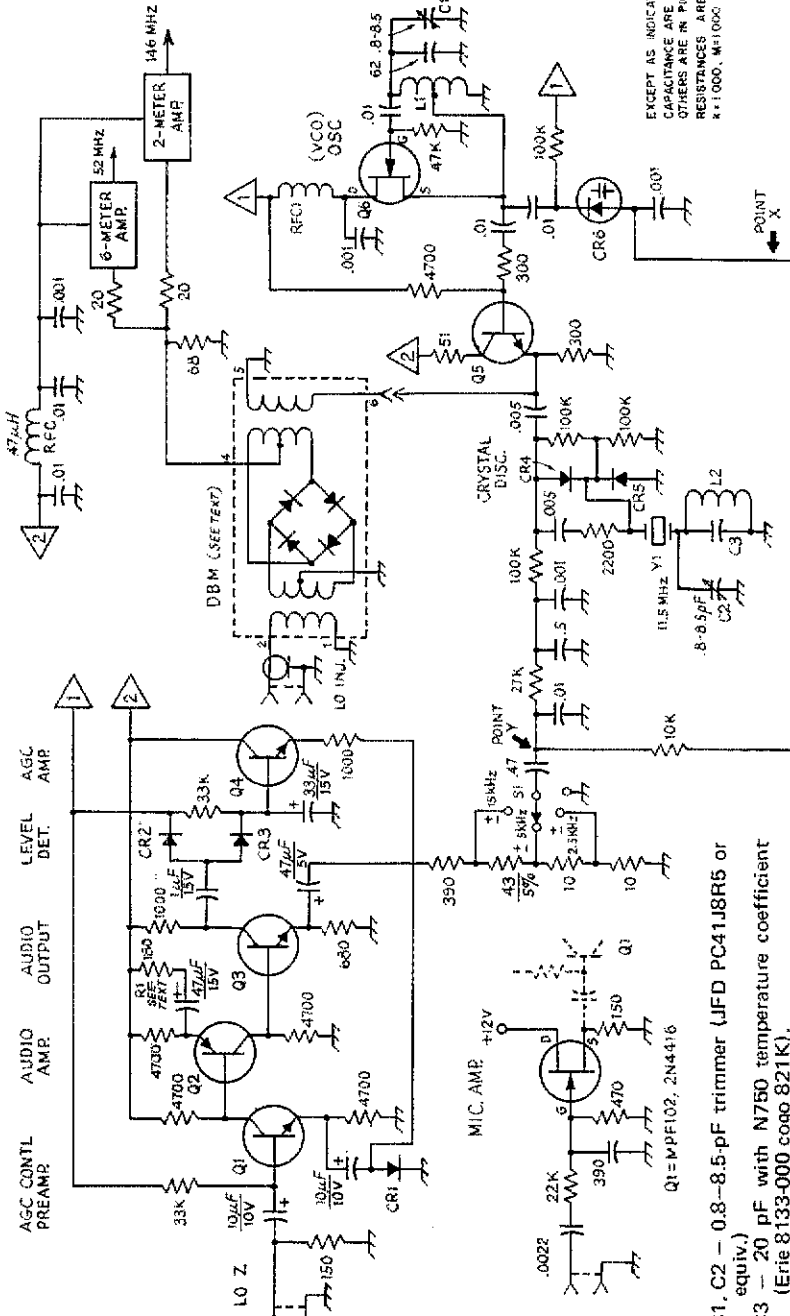


Fig. 1 — Overall block diagram showing the audio and agc loop, fm modulator with frequency-control voltage and connections to amplifiers.

Fig. 2 — Circuit of the fm modulator. Capacitors with polarities indicates electrolytic types. Component labels not found below are for text-reference purposes.

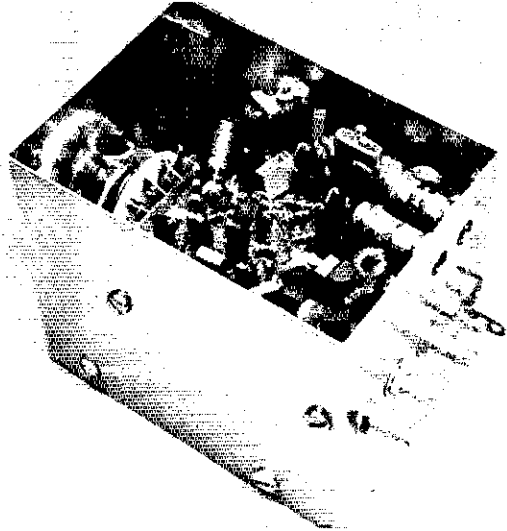


EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF). OTHERS ARE IN PICOFARADS (pF OR pF!). RESISTANCES ARE IN OHMS.

- Q6 — MPF102, 2N4416.
- RFC1 — 100 μH Nytronics DD-100 Nytronics, Inc., Essex Electricians Division, Orange St., Darlington, SC 29532.)
- S1 — Single-pole 4-position rotary switch.
- Y1 — 11.525-MHz crystal (International Crystal Co., Inc., Oklahoma City, OK 73102).

- L2 — 44 turns No. 30 wire on Amidon T30-6 toroid form. Approximately 6 μH.
- Q1, Q3, Q4 — 2N2484, 2N4123, 2N4125, MPS3393.
- Q2 — 2N2429, 2N3502, MPS3638A.
- Q5 — 2N706

- C1, C2 — 0.8-8.5-pF trimmer (JFD PC41J8R5 or equiv.)
- C3 — 20 pF with N750 temperature coefficient (Erie 8133-000 cogo 821K).
- CR1, CR2, CR3, CR4, CR5 — 1N914, 1N3064, 1N4454, signal or surplus computer diode.
- CR6 — 56-pF varactor diode, (Motorola 1N5454, 1N5473 or equiv.)
- DBM — Relcom M6K double mixer or equiv. (see text).
- L1 — 25 turns No. 30 wire on Amidon T30-6 toroid form, tapped 15 turns from ground.



This view shows the crystal discriminator and voltage-controlled oscillator. The pc capacitors in the upper right-hand corner are C1 and C2 that are used during the alignment. The 6- and 2-meter output jacks along with the 12-volt supply, microphone, and LO injection inputs, are provided on the rear of the module.

od used in an amplifier tank circuit also produces phase modulation.

A disadvantage of phase modulation is that only a very narrow frequency deviation can be obtained. To reach the desired deviation amount the frequency must be multiplied several times. This dictates having a low-frequency oscillator followed by multiplier stages to obtain the required output frequency. The use of many multipliers results in increased equipment size, cost, and power consumption. A not-so-obvious problem is that of keeping the low-frequency spurious signals from showing up in the output.

A popular oscillator is the VCXO (voltage controlled crystal oscillator). A device such as a varactor diode, whose capacitance change is a function of the applied voltage, is placed either in series or parallel with a crystal in an oscillator circuit.² When audio voltage is applied to the varactor, the crystal frequency is varied at an audio rate, and the result is a frequency-modulated signal. Therefore, one still must use multiplier stages, and suffer the consequences. A typical 2-meter fm transmitter may have a 12-MHz crystal oscillator with a times-12 multiplier to reach 144 MHz. Unless very high Q double-tuned (band-pass) circuits are used in the multiplier stages, the output may also contain spurious signals which are 12 and 24 MHz on each side of 144 MHz.

² Ibid.

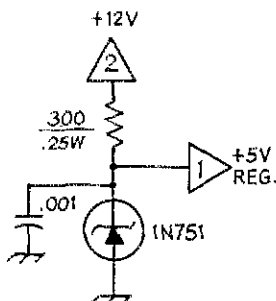


Fig. 3 — Schematic of the 5-V regulator circuit.

The Audio Amplifier

A block diagram of the automatic-gain-controlled audio amplifier is shown in Fig. 1, and the circuit is shown schematically in Fig. 2. A 5-volt regulated power supply is used with the modulator to assure frequency stability; see Fig. 3. Transistors having relatively high beta are used, thereby providing ample gain when using dc coupling between stages. (Note that bias resistors and coupling capacitors are eliminated between stages.)

Q1 is a common-emitter stage with the emitter resistor bypassed with a diode, CR1, and a 10- μ F capacitor. When CR1 is biased off (unsaturated), the gain of the stage is nearly unity since the 4700-ohm emitter resistor is not effectively bypassed when CR1 is fully turned on (saturated) providing a low ac resistance, the gain of the stage becomes a function of the beta of Q1, and can easily approach 100. Therefore, the gain of the amplifier can be controlled, theoretically, over nearly a 40-dB dynamic range.

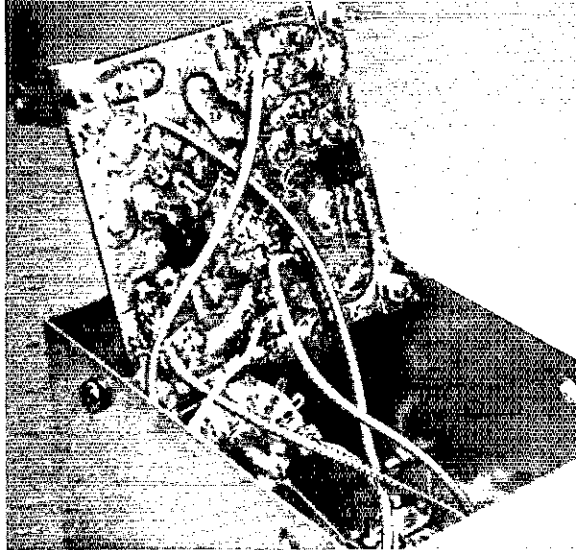
The input signal is amplified to a level of about 0.5 V rms at the audio output, Q3, emitter. In the collector circuit of Q3, the audio is further amplified, then rectified and filtered, with the result applied to Q4 and CR1. When the output level increases, the rectification provided by CR3 forces the base of Q4 to go more negative; therefore, the current through CR1 and ultimately the gain of the amplifier is reduced. Similarly, when the output level decreases the current in CR1 is increased, again holding the overall output at a constant level.

The audio circuit is designed for a low-impedance microphone. If a high-impedance microphone is used (such as the author's Turner 350C), a source follower will provide an excellent impedance match as well as furnish additional audio shaping. Coupling and bypass capacitor values have been chosen to attenuate frequencies below 300 Hz and above 2500 Hz, leaving audio power where it may do the most good.

Resistor R1 is chosen to select the desired level for age action to begin. (This will be a function of the microphone output level and will vary with different types of microphones.) For very small values of R1, the gain of Q2 is large, and age action will begin with voltage as low as 1 mV. Larger values of R1 will decrease the gain and increase the input voltage necessary before age action begins.

Layout and parts values for the audio amplifier are not critical. Keep the input leads short and shielded to minimize rf and 60-Hz pickup. Also, do

An inside view of the module with the rf board swung out to show the two MPF102s on the foil side of the circuit board.



not use less than 33 μF for the capacitor connected to the base of Q4. Small values (less than 20 μF) can cause a loop oscillation. Larger values will assure greater stability but will also increase the attack time of the circuit. With values shown attack time is about 80 ms, and the decay time is 2 to 3 seconds.

Although this method is more complicated than brute-force clipping, the distortion is very low, and no low-pass filter is needed. Typical distortion at 1 kHz with 20 dB of compression is 4 percent. The characteristics of the amplifier are shown in Fig. 4. The overall frequency response of the combination amplifier and modulator is illustrated in Fig. 6.

The Modulator

A block diagram of the author's modulator is included in Fig. 1. The oscillator is a simple Hartley type with a varactor diode serving as part

TABLE I

	6 meters	2 meters
C1	10 pF	5 pF
C2	39 pF	22 pF
C3	100 pF	36 pF
C4	36 pF	12 pF
L1	17 turns No. 32 on Amidon T-20-10 form	8 turns No. 28 on Amidon T-20-13 form
L2	11 turns No. 32 on Amidon T-20-10 form	7 turns No. 28 on Amidon T-20-13 form
Q1	Motorola MPF121, RCA 40603, RCA 40673	
Amidon Associates, 12033 Otsego St., North Hollywood, CA 91607.		

of the capacitance. This type of oscillator is called a voltage-controlled-oscillator (VCO) because the bias voltage applied to the varactor controls the output frequency.

The VCO is set at the nominal oscillator frequency, in this case 11.5 MHz. Now all one must do is apply audio to the varicap modulator, and fm is produced. The more audio applied, the more deviation. Over 100-kHz deviation is possible.

An obvious question is: how does one maintain stability of only a couple kHz over time, temperature, and vibration, especially in a mobile application? Looking at Fig. 1, you will notice that the VCO output is applied to a crystal discriminator. Crystal discriminators have been around for a long time, but their application has typically been in fm

receivers. As one may see from Fig. 7, if the input to a crystal discriminator is at f_o and the input frequency is changing at an audio rate, the output voltage is then detected audio.

The discriminator is used in just the opposite way in this modulator to that used in fm receivers. If the input frequency drifts away from f_o , there is a dc voltage in the output of the discriminator. The modulation is removed from the rf voltage by an audio filter and the dc error voltage is applied to the varactor to pull the VCO back on frequency. The filter is used to remove the audio and apply a dc control voltage which is a function of the change in the oscillator frequency and not the audio input. We now have a complete fm modulator. The VCO is held on frequency by the crystal discriminator, and the applied audio (which is added to the error voltage) causes the frequency of the VCO to be changed at an audio rate.

The VCO is a straightforward Hartley oscillator with a varactor across part of the inductance. Do not place the varactor diode across the entire tank circuit. This should not be done because the rf swing at that point is larger than the dc bias on CR6. A regulated dc voltage is applied to the

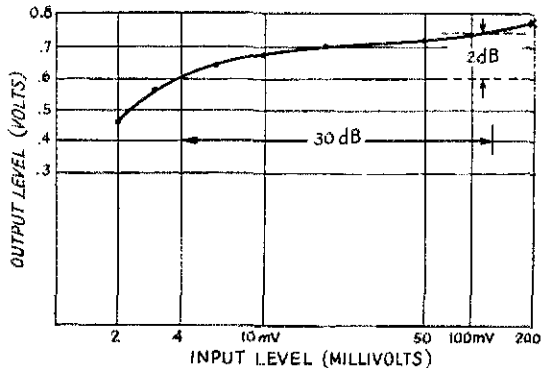


Fig. 4 — Agc characteristics of the audio amplifier.

6-2 METER AMPLIFIER

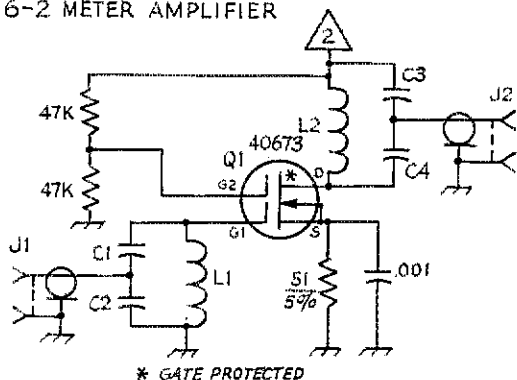


Fig. 5 — The circuit for the 6- and 2-meter amplifiers. See Table 1 for the component values.

oscillator stage, and the varactor bias is also regulated to aid stability. The pk-pk rf swing at the input to the discriminator (emitter of Q5) is approximately 6 volts. Notice that there are no active components in the discriminator; layout therefore is not critical. A crystal that is resonant 25 kHz higher than the output frequency is chosen so that the discriminator response can be spread by C2, C3, and L2 to allow for sizeable drifts in the VCO frequency.

Alignment

For alignment, temporarily ground point X and adjust C1 for correct output frequency. Now adjust C2 for zero dc voltage at point Y. Open the temporary ground at point X and the closed-loop output should be within a few kHz of 11.5-MHz. Final adjustment of C2 should be made after the unit is in its final position in the container with a cover. For very small values of C2, it is possible to get a false crossover point (zero V dc at point Y), so if the closed-loop frequency shifts several kHz when point X is opened in the alignment procedure, increase the value of C2 (or C3 if necessary) and repeat the procedure. This method can be

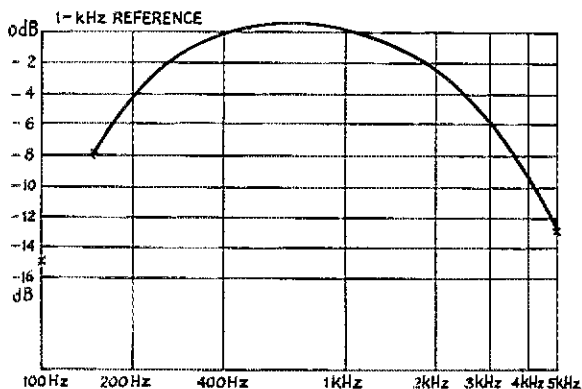


Fig. 6 — Frequency response of the combination modulator, agc amplifier and audio output amplifier.

used at any frequency which is convenient or desired by the builder. I chose 11.5-MHz because that is my receiver's first i-f. A potentiometer can be used to vary the deviation, or a switch (S1) can be used as shown in Fig. 2. For the resistance values given, deviations of 15, 5, and 2.5 kHz are obtained with 0.5 V rms audio applied to the modulator.

Heterodyning and Output Section

The next circuit described uses a broad-band double-balanced mixer whose output can be connected to many different amplifiers. Multiband fm is now easily achieved. Band switching becomes as simple as selecting the correct injection frequency and applying voltage to the desired amplifier.

The secret of the simple band-changing arrangement of this unit lies in the use of a broad-band double-balanced mixer (DBM). There are many of these devices on the market, but the author's choice was a Relcom M6K³. The M6K is the most inexpensive DBM of its type known to this author, and it sells for about \$25. The unit is essentially flat from 5 to 200 MHz with LO injection isolation of over 35 dB. Don't let the price discourage you; prices drop in quantity amounts (ideal for club groups).

Six and Two Meter Amplifiers

The mixing arrangement is shown in Fig. 2 with details of the amplifiers shown in Fig. 5. The amplifiers are basically straight from the *Handbook* and are receiver front ends rebaised for greater output power. The author chose to use a capacitor-divider network for matching instead of tapped coils. A critical noise figure is not important at these power levels. Note that gate 2 of the FET has not been bypassed. The only difference in gain at 50 MHz is 1 dB, and although another 4 dB of gain could be picked up on 2-meters by bypassing this gate, the gain isn't needed.

The LO injection level to the mixer should be approximately 0.5 V rms from a 50-ohm source. Since the mixer is broad-band, either 41-, 63-, or 135-MHz range injection frequencies can be used on either 6 or 2 meters with no additional tuning or other adjustments to the DBM are necessary. The author chose to construct only a two-band rig, but the same principle can be applied to any number of bands.

Spurious outputs from a mixer of this type are held to a minimum by its design characteristics. The LO signal is attenuated more than 30 dB through the mixer, and of course gets further attenuated by the tuned amplifiers that follow.

One advantage of using the heterodyning method is that if the modulator is designed to work at the receiver first i-f, the same LO injection can be used for the transmitter as for the receiver. For simplex operation this means buying only one crystal and having one local oscillator per channel, instead of separate crystals for transmit and re-

³ For information on the M6K write to Mark Montgomery, Marketing Manager, Relcom, 2329 Charleston Road, Mountain View, CA 94040.

Fig. 7 — A typical discriminator response near center frequency.

ceive. Also, this further reduces the overall complexity of the system. It is possible to use the same mixer in the receiver front end and eliminate additional components; however, this would increase the T-R switching complexity and might degrade the receiver noise figure.

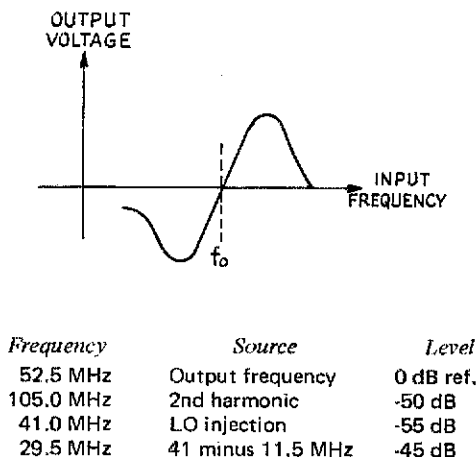
Results

The entire unit is assembled on two printed-circuit boards, 2 inches square, and placed in a brass box 2-1/8 x 2-1/2 x 3 inches. The front panel switch is used to select the amount of deviation. All connection terminals are mounted on the rear panel.

The audio and modulator circuits are on one board, with the mixer and output circuits on the other. To this author, packaging density was a challenge. Do not try to duplicate this density unless you have had previous printed-circuit-board layout experience.

The 6-meter output power at 52 MHz was 20 mW and dropped to about 5 mW at the band edges. The 2-meter output ranged from 2 to 3 mW across the band. Although this unit was designed to drive following amplifier stages, the author keyed a repeater located a couple of miles away with the 2 mW output, using a quarter-wave whip antenna mounted on the workbench inside a metal-framed building.

The 6-meter output was monitored on a spectrum analyzer. The following levels of frequency responses were found:



On 2 meters the unwanted mixer product was only 22 dB down with the LO injection down by 35 dB. These, of course, were all reduced further by frequency-selective circuits in the following stages.

Using a system such as this, band-switching becomes very simple. One can follow with separate 6- and 2-meter amplifiers, each connected to its respective antenna. Band-switching would amount to selecting the proper LO injection frequency and turning on the B+ to the proper amplifier. The circuit operates with input voltages varying from 11.5 to over 16 volts. When operating the equipment from a regulated supply voltage, total oscillator drift because of temperature changes likely to be encountered in a typical mobile operation should only be a couple of kHz.

QST

Strays

U.S. — Guyana Third Party Agreement

As the result of a recently concluded agreement between their governments, it is now permissible for amateurs in the United States and Guyana to exchange messages on behalf of third parties. Such third-party traffic must be limited to unimportant conversations or messages of a technical or personal nature, or communications relating directly to the safety of human life or property. Call signs of amateur stations in Guyana have the prefix 8R.

W9IOP's SECOND OP, now in its 6th edition, is fully computer revised. This circular calculator is a handy operating aid to any degree of DXer. With it, you can easily match prefix, county, zone, country. Great circle bearings are shown for the east, midwest, southwest, and west. Postal rates are included for air, 1st class, QSLs and IRCs. The reverse side of the SECOND OP contains mailing addresses of world QSL bureaus. Time differentials are also included for EST CST and PST. The SECOND OP is available from Publications in Electronics, Inc., 2330 Topsfield, South Bend, Indiana 46614. — W1YL.



How's this for a unique QSL? WN8LEG sent this homemade QSO confirmation to WA1LFA.



Hints and Kinks

For the Experimenters



TRANSISTOR RADIO AUDIO-AMPLIFIER OSCILLATIONS CURED

While servicing several small low-cost transistor radios a solution to a problem was discovered. When advancing the audio gain control the audio became distorted and eventually broke into oscillation. When monitoring the battery voltage two things were observed: the voltage was low, and the terminal voltage was fluctuating with the audio signal. Replacing the battery only cured the problem for a short time and when low-priced 9-volt batteries were used, the replacement was of no help.

Analyzing the problem I found the cure. Many of the radios employed Class B audio amplifiers. The Class B situation provides for maximum battery life, but, require high peak currents from the power source. If the source is not stiff enough the amplifier will oscillate.

Usually a battery is thought of as a stiff source however, after some use, the battery builds up an internal resistance. Widely varying current loads produce a significant change in terminal voltage. The situation is particularly bad when low-grade batteries are employed. To cure the problem I found it advantageous to place a high-value of capacitance across the battery. This allows the capacitor to deliver its stored energy to satisfy the peak current demands of the audio amplifier. I chose a tantalum electrolytic capacitor because of its low leakage and small size. The value of capacitance needed varies from set to set, however a 220 μF unit (10 V dc) worked for me. Using this modification allows the 9-V battery to degenerate to 5 or 6 volts before being unacceptable, while previously the battery had to be discarded when down to slightly less than 8 volts. Placing the capacitor on the switch side helps to preserve battery life since a small leakage current does exist. However, installation on the unswitched side will work also. — *Ted Von Kampen, WAØVMT*

DRIFT IN THE R4B CURED

A small but annoying drift caused by heat in my Drake R4B receiver was traced to a 6000-ohm, 5-watt resistor that was mounted under the chassis directly beneath the VFO. Heat was transferred to the VFO by convection and radiation and the VFO would creep in frequency until thermal equilibrium was reached (measured with a thermocouple).

To correct the problem I relocated the resistor near the top of the bracket supporting the slug rack and made connection at the original points in the circuit with two new longer leads. The VFO drift was reduced to a nearly unmeasurable proportion with this modification. — *Dave Windisch, K3BHJ*

A QUICK AUDIO-SIGNAL SOURCE

While troubleshooting the audio section of a rig one night I had need for an audio oscillator to help find the problem. I was pressed for time, so could not build one. My simple answer was to use the station receiver with its built-in calibrator serving as the generator. With the calibrator on, I tuned the receiver about the calibration point to obtain the desired audio beat note. — *Henry L. Howe, WNØDLF/3*

SWITCH TO SAFETY AND PREVENT TVI TOO

For the past year I've had a problem with a 20-dB-over-S9 buzzing noise interrupting my QSOs and phone patches. My XYL reported that this same noise wiped out our stereo. It could also be heard in all of our portable radios. Not being able to pinpoint the problem myself, I called on the assistance of the Pacific Gas and Electric Company, our local power company. A man was sent out to see what he could find. After climbing two poles on our street and checking all connections he could find nothing wrong so frustration set in. We started ringing doorbells to inform neighbors that their power would be off for a short time to conduct some test. At the second house, pulling the main switch stopped the buzzing. The problem was then isolated to the contacts behind a fuse in the main power panel.

In the fuse holder, a screw-in type, there is a cork washer held in place by the screw. This washer was burnt and quite brittle, allowing an arc to jump from the center (hot) contact to the surrounding housing (ground). According to the power-company man, this type of problem is an extreme fire hazard, especially in older homes where the electric service does not pass through a metal conduit.

What made this problem so difficult to isolate was that the buzzing noise was intermittent. It would come on for one second to perhaps ten seconds and last for upwards to four hours each evening. Speculations were that the cause might be an electric heater

for a tropical fish tank, electric blanket or other type of heating device.

Should anyone have this type of interference, you might have the fuse holders checked by an experienced electrician, by pulling out the fuse, and using an insulated screw driver short the contacts in the holder while observing for any possible arcs. Most power companies will investigate and even repair, in some cases, the cause of this type of QRN, free of any charge. They may not have any better equipment to isolate such a problem than you have, but they certainly are aware of all the possible causes and have the experience in coping with them. - *Vern Hajek, K6UGS*

MAKING TAP CONNECTIONS ON SMALL COILS

Whenever it is necessary to solder a tap connection on Miniductor or similar coil stock it is often difficult to avoid shorting to the adjacent turns with the solder. To help remedy this situation I place a strip of household aluminum foil between the turns on each side of the turn to be soldered. The excess foil is folded back over the other turns to shield them from solder splashes. Clean connections are now possible and quite easy to make. Of course, you should not forget to remove the foil before applying any power. - *Burton H. Syrverson, W9HD*

MOUNTING HIGH-VOLTAGE CAPACITORS

Mounting high-voltage oil-filled capacitors has always impressed me as being one of the least pleasant jobs in the building of a power supply, because of the usual absence of a self-contained means of fastening the capacitor to the chassis. For this reason I felt a need to come up with a better mounting device prior to building my next power supply.

I found that a tube of silicone rubber-adhesive sealant, the type manufactured by GE and Dow-Corning for bathtub sealing, proved to be my solution. A good-size blob of the sticky sealant under each capacitor holds them firmly and neatly in place. One word of caution: put the capacitors where you want them on the chassis the first time, because after the sealant has set, it takes brute-force strength to remove them. - *J.R. Falke, W8SRK*

CHEAP-AND-EASY PANEL TRIM

Adding a stripe of color to the panel of a piece of homemade radio equipment will often impart a professional appearance that might otherwise be lacking. Those ubiquitous gray Hammertone rack panels certainly need something to dress them up, and the technique described here does the job rather well.

Select a roll of masking tape that is made to the width you prefer for a stripe of panel trim. (The writer has rolls of tape in various widths to meet various design require-

ments.) Remove from the roll a length of tape somewhat in excess of what will be needed. Next, affix one end of the tape to a solid object. Hold the free end in one hand, and spray paint the nonadhesive side the the strip your favorite color. White, black, or red contrasts nicely with gray panels. After the paint has dried, the strip can be applied to the panel, and the free ends of excess material sliced off with a razor blade.

White decals do not stand out well against a gray panel. A strip of painted masking tape can be attached to the panel, full length, above and below the row of controls. White press-on decals placed on the trim strip will be easy to read. Alternatively, black decals can be installed on a white or yellow strip.

Though the writer has not tried to use Mystic Tape (available at most hardware stores and supermarts), it should serve nicely as trim. - *WICER*

ANTENNA INSULATORS FROM A SIX-PACK

Antenna insulators are usually inexpensive but are not always on hand when needed, especially on a Field Day when they might be one of the forgotten items. I have found the plastic holder on most brands of beer sold in six-packs to be quite strong and able to support a length of wire. When cut into three pieces, one holder should be adequate for the ends and center of a dipole for all bands except maybe 40 and 80 meters, in which case the folded holders of three six-packs may be necessary to support such lengths. Seems to me that there are always a lot of insulators available and wasted on these weekend Field Days. - *Ev Taylor, W6DOR/W7BYF*

TONE-OSCILLATOR REPAIR ON HW-101

My new HW-101 transceiver would not work on cw because the 1000-Hz tone oscillator, V15A, would not oscillate. I called the local Heath Service Center and was told that they usually replace the phase-shift network (PEC 84-22) in the grid circuit to solve this problem. I later talked with other hams who had the same problem.

A check with my brother, WB8DGC, revealed that two years ago he had the same problem with his HW-100. He called Heath at Benton Harbor, and was told to change the cathode resistor, R310, from 1000 ohms to 680 ohms. This solved his problem and mine. I suspect that many people replace perfectly good PECs when this cathode-resistor change would solve their problem.

Further, my sidetone level was ear shattering. I solved this problem by changing R326 (in the plate lead to V15B) from 1M ohm to 6.8M ohm. The circuit of the SB-102 was modified to include a cw-tone volume potentiometer. - *Jan A. Heise, WA4VQD*



Recent Equipment



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

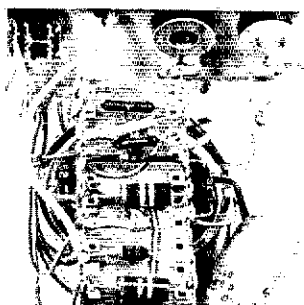
Heath Company IM-103 Line Voltage Monitor

HEATH NOW OFFERS an expanded-scale solid-state line voltage monitor which is a useful accessory in the ham shack or at the work bench. Amateur gear and bench test equipment may not operate properly if the line voltage is outside the range specified by the equipment manufacturer. Heath's monitoring instrument provides a convenient and reliable means of knowing what the line voltage actually is at any moment.

The principal part of the IM-103 is a 4-1/2-inch meter, calibrated in bold black markings of linear I-V increments from 90 to 140 volts ac. The basic meter movement is dc, our measurements indicating it to be a 0- to 200- μ A device. As may be seen from Fig. 1, the ac line voltage is rectified and filtered (D1, R1, and C1), and the resulting dc voltage is applied to a bridge circuit. D3 is a Zener diode which holds the negative side of the meter at a constant voltage, with R2 acting as a series dropping resistor. Fluctuations in line voltage will cause a change in the dc potential at the junction of R3, R5, and R6, with the current flowing through the meter being directly proportional to this voltage. D2 is a protective diode which prevents reverse current from flowing through the meter if the line voltage drops below 90.

Construction, Calibration, and Operation

Heath's latest catalog shows many of their kits with a designation, "X-evening kit." This designa-



tion does not appear in the IM-103 description, but, indeed, it might be called a "1-evening kit." Construction and calibration time for this writer was 2-1/2 hours. Most parts are mounted on a 20-lug terminal strip, which, in turn, is mounted at the meter terminals. The circuit is isolated electrically from the metal chassis box.

Calibration of the IM-103 may be made either with or without accessory instruments. The Heath designers have devised a clever method of using the regulated voltage from the Zener diode, D3, as a reference source for calibration if no other instruments are used. A two-position NORM/CAL switch alters the circuit connections as required. If the line voltage is known and the calibration is performed in this manner, Heath's specification on the resulting meter accuracy is ± 5 percent — a specification that was met in the instrument we tested in the ARRL lab. If the line voltage is not known, the resulting calibration accuracy is not specified by Heath, but our checks indicated the accuracy at worst case to be within 5.2 percent of the voltage indicated by a 1/10-percent digital

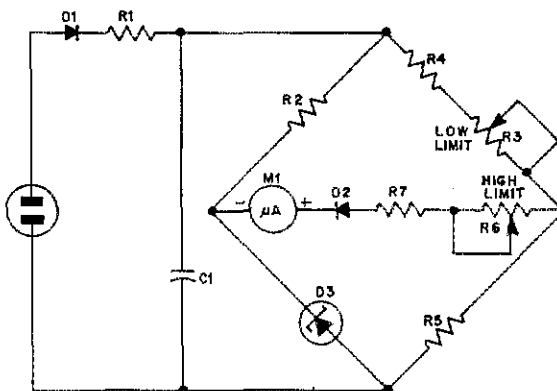
An inside view of the IM-103 Line Voltage Monitor. Most parts are mounted on a terminal strip, which is mounted at the meter terminals. The NORM/CAL switch may be seen at the upper left in this view, and the two calibration controls, R3 and R6, at its right. Calibration may be made or checked with the cover in place.

Fig. 1 — Equivalent schematic diagram of Heath's line-voltage monitor. Except for M1, parts designations are those of the manufacturer.

voltmeter. This accuracy can vary from one instrument to another, however, depending upon the departure of the Zener-diode voltage from its nominal rating.

For the most precise calibration, sine-wave voltages of accurately known amplitude in the 95-V and 135-V ranges must be available. R3 and R6 of Fig. 1 are adjusted alternately at these voltages. Heath's specified accuracy for the monitor calibrated in this manner is ± 2 percent. In the instrument we checked, the results were within +0 and -0.52 percent of the readings of the digital voltmeter, throughout the range from 95 to 135 V ac.

Heath does not recommend this instrument for use in an rf field. However, no ill effects were noted from transmissions of WIAW, with the instrument located in the approximate center of the rhombic antenna being used. The relative low cost of the line-voltage monitor should not be used as a judge of its performance. — *KIPLP*



Heath Company IM-103 Line Voltage Monitor

Dimensions (HWD) and Weight: 5-1/4 × 6-1/4 × 3 inches, 1-3/4 pounds.

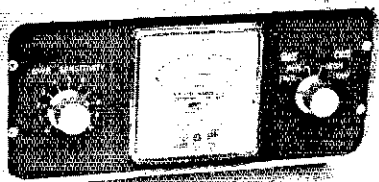
Power Requirements: 4.2 watts. Monitors 50- or 60-Hz voltages in the range 90 to 140 V.

Price Class: \$17.

Manufacturer: Heath Company, Benton Harbor, MI 49022.

QST ————— QST ————— QST

KW Electronics Model KW-103 SWR/Power Meter



TWO OF THE MOST USEFUL accessories in today's ham shack are an SWR indicator and a wattmeter. With the increased use of TV sweep tubes and other components working near their limits, it is of great importance to be able to rapidly and accurately determine the SWR and power output in a given situation. KW Electronics has neatly packaged both items in a single small unit known as the KW103 SWR/Power Meter.

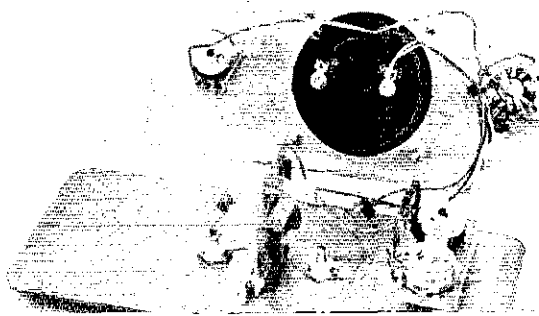
Designed to work into a load impedance of 52 ohms, the KW103 will provide accurate measurement of SWR and average power over the 3.5 to 30

MHz range. The SWR indicator easily handles 1-kW PEP. On 80 meters, full-scale deflection is possible with as few as 10 watts. The wattmeter is calibrated in two ranges, 0-100 and 0-1000 watts. Compared with a Bird Thru-line wattmeter, the KW103's measurement of average power is within the manufacturer's claimed accuracy of 5 percent at full scale.

The front panel is dominated by the large, easy-to-read 3-1/4-inch square meter. The only controls are SWR SENSITIVITY for setting the SWR meter reading to full scale when the meter switch is in the FORWARD position and WD/RFLD — HIGH/LOW for measuring SWR and average power output.

(Continued on page 58)

Inside view of the KW Electronics Power Meter. The toroid inductor is mounted on the circuit board between the two coaxial connectors.



Technical Correspondence

MAKING IMPEDANCE TRANSFORMERS FROM SURPLUS TOROIDAL INDUCTORS

Technical Editor, *QST*:

The passive hand-pass filters described in several recent issues of *QST* can be easily adapted for use with the low-cost imported headphones having an 8-ohm impedance. This is accomplished by adding a secondary winding to the output inductor to transform the filter output impedance to the 8-ohm level. The total number of turns in the 88/22- or 44/11-mH inductors must be known in order to calculate the number of turns for the 8-ohm winding. This information can be gleaned from the data published by W3NQN¹ by plotting the number of turns removed versus the square root of the resulting inductance. The intercept on the turns axis yields the total turns on the coil. This number is 750 for the 88-mH toroid and 536 for the 44-mH toroid. The turns required for the 8-ohm coil can then be calculated from the relationship that the turns ratio is the square root of the impedance ratio. The actual number of turns required is small and the winding takes only a few minutes. — *Stanford J. Solms, WA2MEL, 18-44 Chandler Dr., Fairlawn, NJ 07410.*

ON THE CARE OF WIRE ROPE

Technical Editor, *QST*:

After reading the article by KH6JJ on cable supports,² I feel I should add some comments to help avoid confusion. First, wire rope should never be painted to protect it. It is a very complex machine. Like all machinery, it must be properly lubricated. Most all rope is lubricated at the factory, during manufacture. It is usually unnecessary to relubricate the rope. However, 7 × 19 galvanized aircraft cord (the type of "cable" generally used on towers) and other ropes under severe service will require periodic lubrication. Any good grease will do the job. It should be applied, if possible, at the top of a sheave so the lubricant can be worked into the core. All excess grease should be removed.

If one has questions pertaining to use and care of wire rope, he should contact his local distributor. One more point for safety. Wire-rope breaking strength is *not* the working load. Always leave at least a 5 to 1 safety factor. — *Alan Applegate, WB0BHE, 6000 Buena Vista, Shawnee Mission, KS 66205.*

¹ Wetherold, "Inductance and Q of Modified Surplus Toroidal Inductors," *QST*, September, 1968.

² Nose, "Coax and Indicator-Cable Supports for Beam Antennas," *QST*, April, 1972, p. 68.

THREE-DIMENSIONAL LOGIC SYMBOLS

Technical Editor, *QST*:

I can never become another Larsen E. Rapp, John G. Troster, or even a draftsman, but perhaps some of your readers will appreciate the bit of nonsense shown in Fig. 1. — *R. M. Stevenson, WB2CZL, 10 Edgewood Dr., Glen Head, NY 11545.*

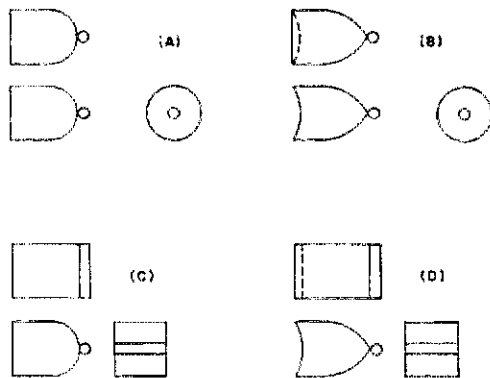


Fig. 1 — WB2CZL's three-dimensional logic symbols. At A is shown a NAND gate, and at B a NOR gate, formed from round stock. If the logic-circuit designer has only square stock on hand, he should use the symbols of C and D. [EDITOR'S NOTE: There are no plans to begin using the top and end views of these symbols in *QST*, at least not in the near future.]

QUESTIONS AND THEIR ANSWERS ON THE SOLID-STATE SSTV MONITOR

Technical Editor, *QST*:

Interest in the solid-state SSTV monitor I described in an earlier issue of *QST* is certainly running high.³ I have answered over 200 letters concerning various questions about the monitor. Some of the most frequently asked questions and their answers follow.

Are there other transistor types that can be substituted for the ones shown in the diagrams?

There are literally hundreds of types of silicon npn transistors that will function satisfactorily in the sockets of Q1, Q2, Q3, Q4, Q6, Q9, Q10, Q15, and Q16, as well as Q6 in the power supply. Substitutes, if used, should preferably have betas of at least 100. The same comment regarding beta is true of the 2N3906 pnp silicon type. Transistor Q5 must have a VCEO of 300 V, in order to handle the supply voltage used. HEP803s may be used in place of the 2N5462s in Q11 and Q17. Types MJE520 and MJE370 can be used respectively as low-cost replacements for the 2N4910 and 2N4898 complementary pair.

Where can I obtain the MCR51P monostable multivibrators?

These are obtainable from any large semiconductor supply house. Two such sources are: Semiconductor Specialists, 195 Spangler Ave., Elmhurst Industrial Park, Elmhurst, IL 60126; and Newark Electronics, 500 N. Pulaski Rd., Chicago, IL 60624.

³ Tschannen, "A Solid-State SSTV Monitor," *QST*, March, 1971.

Are there any substitutes for the MC851Ps?

There are several. Some are the TI SN74121 and SN74122. A dual monostable MV is also available in the SN74123. The manufacturer's data sheet should be checked for basing differences.

Where can I obtain surplus 5FP7 tubes?

These tubes have been bought through several surplus houses; some of the supplies are running low. New tubes are still available, but I suspect that there are plenty of surplus ones around if some diligence is used in looking.

Where can I obtain a yoke and focus coil?

Yokes and focus coils of the type needed are available from old TV sets employing the 10-, 12-, 14-, and 16-inch tubes with 50- or 70-degree deflection. Many TV service shops can get these for you.

Are there any errors or changes that should be made in the original diagrams?

There is one error in the drawing, and additionally, some circuit changes will improve operation.

- 1) The emitter and collector of Q14 are shown reversed.
- 2) The 22-ohm resistor in the emitter of Q18 should be 220 ohms.
- 3) The resistor in the supply lead of the 1N4733 Zener diode may be 150 instead of 147 ohms.
- 4) Add a 0.47- μ F capacitor from the base of Q15 to ground for improved noise immunity.
- 5) Add a 10,000-ohm resistor in series with the base lead of Q6.

I'll be glad to answer any further inquiries on the SSTV monitor, but please suggest to your readers that a stamped self-addressed envelope be sent. My thanks go to those who have observed this courtesy. — Bob Tschannen, W9LUO, 354 N. Stewart Ave., Lombard, IL 60148.

THE UBIQUITOUS μ A709 OP AMP

Technical Editor, *QST*:

I wonder how many amateurs experienced the same problems as I did with the "Simple and Inexpensive Audio Oscillator" in Hints and Kinks, *QST* for September, 1971. I dutifully ordered the μ A709C linear operational amplifier from Poly-Paks and proceeded to put the oscillator together. To my amazement, it didn't work! After seeking advice from some of my associates, I discovered that the μ A709 integrated circuit is made in three styles: a round metal can, an in-line molded type, and a flat pack. Fig. 2 shows these three case styles. The circuit shown in September 1971 *QST* gave the circuit connections for the metal-can type. Since mine was the in-line type the connections were changed as follows: 6 became 10, 7 became 11, 2 became 4, 3 became 5, 4 became 6, and 5 became 9. In circuits like these couldn't *QST* warn

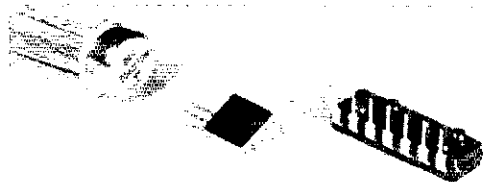


Fig. 2 — The three case styles for the μ A709C op amp. At the left is the TO-5 metal can, in the center the 10-lead flat pack, and the right, the 14-lead dual-in-line package.

the poor ham that connections change with the various types?

The oscillator works beautifully with these changes. To power the circuit I use two batteries, one for +9V and the other for -9V. These voltages are relative to a common ground. In other words, the total is 18 volts with the center grounded. This is not mentioned in the article. Somehow I think if a professional like me can get booby trapped on these points, heaven help the poor beginner. — H. O. Lorenzen, W3BIC, 3713 Bangor Street, S.E., Washington, DC 20020.

[EDITOR'S NOTE: Package types for ICs are usually designated by a suffix letter, although such is not the case for the μ A709C op amp. There is not yet complete standardization among manufacturers on the various suffix-letter designations, a reason for further confusion. Where possible discrepancies may exist, basing data are now given in the schematic diagrams for *QST* construction projects.]

THE MICRO-TO KEYS WITH TTL ICs

Technical Editor, *QST*:

Recently I decided to replace the vacuum-tube keyer in my shack with a nice solid-state version. The Micro-TO keyer in the 1972 ARRL *Handbook* caught my eye as being very simple and easy to build.⁴

I decided to implement the design with the popular TTL logic family, rather than RTL as was originally used. For the two *J-K* flip-flops, the MC7473P dual flip-flop IC was used, and for the NOR gates the MC7402P quad 2-input NOR gate was used. Both of these ICs are available in 14-pin dual in-line plastic packages, which lend themselves to a simple pc-board layout. The complete circuit diagram except for power supply, is shown in Fig. 3.

Two of the NOR gates, U2A and U2B, are used for output gates, as in the original circuit, and the other two NOR gates are used to invert the *J* inputs to each *J-K* flip-flop. This arrangement allows the paddle contacts to return to ground, as in the original design.

The *K* inputs are also inverted. This is done by tying them to the positive supply. This should be done through a 10,000-ohm resistor if a regulated supply is not used, to prevent transients from destroying the devices.

The power supply needed for TTL ICs is +5 volts. This can be obtained from a 12.6-volt filament transformer followed by a rectifier and filter capacitor and a simple series pass regulator. An MFC4060 regulator could be used.

The monitor was also changed, with my circuit given in Fig. 3B. A "Twin-T" oscillator from *QST* for November 1971⁵ was used with a small amplifier to drive the speaker. The tone frequency can be calculated using the graph in that article. I prefer a high-pitched tone, so 2 kHz was chosen. The tone with this type of oscillator sounds quite pleasing to the ear, and the monitor has adequate volume for the average shack. — Don Aldridge, WA7RL, Application Engineer, Motorola Inc., 3500 E. McDowell Rd., Phoenix, AZ 85008.

⁴ "The Micro-TO Keyer" was originally described by Opal in *QST* for August, 1967, and has appeared in the 1968 and all subsequent editions of the *Handbook*.

⁵ Tarone, "A Simple and Stable Transistor Audio Oscillator," Hints and Kinks, *QST*, November, 1971, p.47.

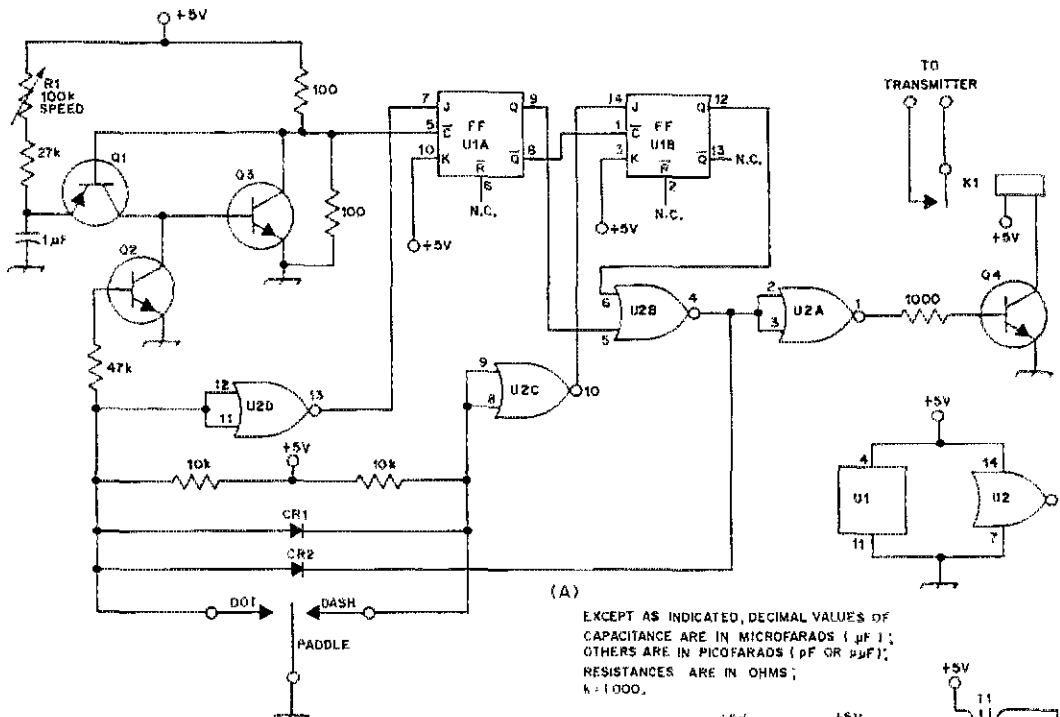
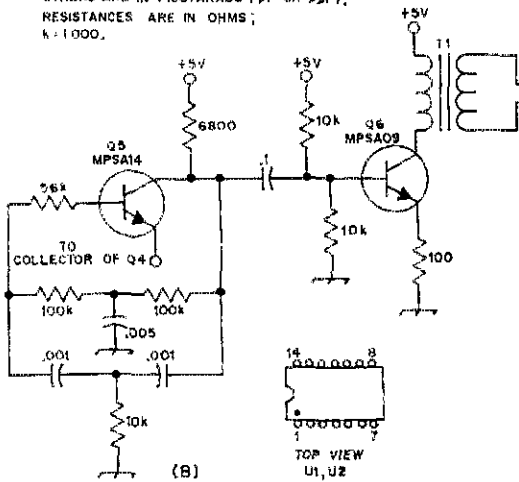


Fig. 3 - The Micro-TO Keyer with TTL ICs. Capacitors with polarity indicated are electrolytic. CR1, CR2 - Germanium diodes, type 1N270. K1 - Spst reed relay (Magnecraft W102MX-1 or equiv.). LS1 - 8-ohm impedance. Q1 - Silicon pnp transistor (2N4126 or Motorola HEP52 or equiv.). Q2, Q3 - Silicon npn transistor (2N4123 or Motorola HEP50 or equiv.). Q4 - Silicon npn audio transistor (Motorola MPS3394 or equiv.). Q5, Q6 - Motorola transistors. T1 - Miniature audio transformer, 1000-ohm primary, 8-ohm secondary. U1 - TTL dual J-K flip-flop, Motorola MC7473P or equiv. U2 - TTL quad 2-input NOR gate, Motorola MC7402P or equiv.

(A) EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR $\mu\mu F$); RESISTANCES ARE IN OHMS; $k = 1000$.



FEEDBACK

W7MRX writes in to say that Fig. 2 of his article, "A Stretcher for End-Fed Multiband Antennas," *QST* for July 1972, page 32, has an error. The end of the tuned circuit which is shown connected to the ground portion of the coax receptacle should be left floating, not grounded.

In The Flashlight Sidebander in July *QST*, the block diagram on page 12 should have the BFO transistors labeled as Q12 and Q13. On page 16, Q1 and Q2 should be NPN type devices, not PNP as Q2 is shown to be.

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.

KW Electronics Model KW 103

(Continued from page 55)

Being a QRP enthusiast, this writer found the KW103 especially useful in obtaining optimum matching and power output with several low-power rigs running from 2 to 90 watts input. - W4WFL/1

KW103 SWR/Power Meter

Dimensions (HWD) and Weight: 4-1/4 x 9-1/8 x 4-1/4 inches, 2-1/2 pounds.
Price Class: \$35.

Distributor: KW Electronics, 222 Newkirk Road, Richmond Hill, Ontario, Canada. In U.S. - 10 Peru Street, Plattsburg, New York 12901.

Amateur Activity in South Dakota Flood Disaster

Big Rivers are less often the cause of serious flood damage, these days, than small tributaries and creeks. Amateurs in and around Rapid City, S. Dak., had their hands full in early June when Rapid Creek went on a rampage and wiped out a large section of the city.

ON JUNE 9 THE northern and central areas of the Black Hills received over eight inches of rain, with many areas reporting ten inches and a few as high as fourteen, resulting in extreme flash flooding at various places. The greatest loss of life and property occurred in the Rapid City and Keystone areas, 236 persons losing their lives with property damage assessed at \$100,000,000. South Dakota SCM Ed Gray, WA0CPX, is our reporter for activities of those in the thick of it.

Disaster Area Station Activities

The Pennington County Amateur Radio Emergency Corps net was activated by EC WA0UEN at 10 p.m. June 9th. At about 11 p.m. the already high water rose in a matter of seconds and swept through Rapid City. An area five blocks on either side of Rapid Creek was severely damaged and some areas were completely destroyed. Electrical, telephone and gas service were disrupted. Numerous fires occurred during and after the flood.

At 1:30 a.m. on June 10 the full impact of the flooding was realized by seven amateurs on 3.955 MHz. Several amateurs played an important part in helping to get KOTA, a local radio station, on the air. The engineers could not get on from the KOTA studios because of lost remote lines, so they began operating from the transmitting site as well as activating the Emergency Broadcast System from the Emergency Operations Center at the court house. For the first few hours KOTA was the only source of information for the public directly out of the EOC. WA0EYY, W0OQQ, WA0BGL/0, and W0EJM helped get urgently needed equipment and personnel to the transmitter site to get KOTA on the air.

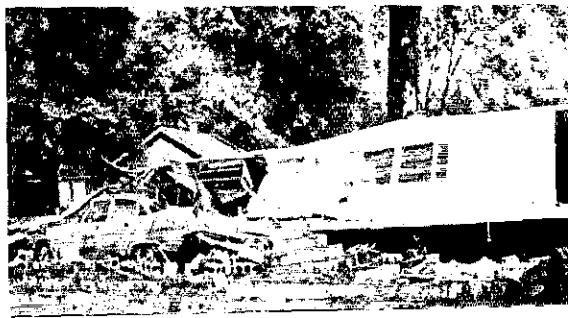
WA0CPX began operating from the EOC at the court house using 2 meter fm at 3:00 a.m. on June 10th, Saturday. This station, WA0CPX/0, was the vital link in and out of the EOC to the 75-meter frequency through WA0UFS and the 40 meter frequency to K0CXL via 2 meters. The two-meter station at the EOC, in addition to handling all of the 80 and 40 meter traffic in and out of the court house, handled all the traffic from the two-meter

mobiles. The court house EOC two-meter station was operated 64 hours straight by WA0CPX, WA0ZCE, K0KLR, and W0COV.

Early traffic handled on 75 meters consisted of Red Cross inquiries into Rapid City. These began about 2:00 a.m. Saturday morning. The 40-meter frequency, 7275, was activated by K0CXL on emergency power at 6:30 a.m. Saturday morning. He was assisted by net control WA0YRI of Madison, S.D. With the help of W0LZZ and W0ZWL, Rapid City station K0CXL stayed on for 43 hours straight. They handled American Red Cross traffic from K0ZZR at Minneapolis. A total of 379 messages were handled by K0CXL, many of which were emergency or priority traffic. Other net controls that operated on 7275 were WA0YAK, K0TVJ, and WA5WDB/9.

One thing that was shown again in the Rapid City flood disaster was that emergency and priority traffic regarding supplies and equipment should come first, followed by outgoing messages. The incoming health and welfare messages should be taken last. Rapid City amateurs found that it was almost impossible to handle incoming health and welfare messages with any efficiency at all for the first 72 hours after the disaster. It was impossible to reach many telephone numbers because of their being out of service or the people were gone. Another major problem was that the amateurs that did have telephone service had to wait many minutes for a dial, if indeed they could get one at all. Some addresses were checked by two-meter mobiles, but this was found not to be practical. Although the amateurs had no trouble from law enforcement or other officials in gaining entrance to restricted areas, the large amount of debris, mud, water, lack of remaining street markers, and traffic problems made checking of specific addresses in the disaster area impractical.

This mobile home became mobile in a way not intended. In foreground is water-filled basement of a house that was swept away. The mobile home came from upstream, was stopped by a tree.





Some of the first outgoing messages to people outside of Rapid City started early Saturday morning on 20 meters, from WA0UFS, assisted by W9LNT. The telephone number and address of WA0UFS was given over KOTA radio several times for people who wanted to get messages out of Rapid City but could not get a long distance line. Over 500 outgoing messages were handled which were received via telephone or in person.

Nine additional stations handled over 1500 messages.

On Sunday, June 11, K0FCR, Ellsworth AFB MARS station, handled incoming traffic on 20 meters while WA0UFS assisted by a W5 amateur passing through Rapid City on vacation handled outgoing traffic. This combined effort, each on a different frequency, worked out very well.

WA0CPX and W0YOB assisted by WB0BAY handled incoming messages on 3955 from 1:00 until 6:00 a.m. Sunday morning. Because of the lateness of the hour and being some hours after the flood, reasonable success was had in reaching people via telephone. People were most cooperative about answering health and welfare inquiries even though it was the middle of the night.

The two-meter mobiles were among the first into the area. They provided help for some people still stranded. They were most useful in providing a first-hand account of the situation and as to the areas affected, which was used on other frequencies. A lot of the incoming traffic had to be handled on the basis of whether the address was in



ARRL Vice Director WA0CPX reports from a trailer park that was completely destroyed by the flood. Mobile capabilities included both 2 meters and high frequencies.

the disaster area or not. This information was secured by the two-meter mobiles, who also provided communication back to the EOC from several refugee centers. They handled requests for medical supplies, food and clothing, and the all-important pure drinking water. One two-meter mobile helped coordinate instructions for the volunteer search parties as to areas they should search. The two meter mobiles were WA0BGL/0, WA7MPA/0, WB0HKO, WA0GKU, and WA0CPX. The fixed stations on two meters were K0CXL, WA0NRE, WA0UFS, WA0CPX, and K0MZN.

Mobile operation on 40 and 80 meters was done by WA0CPX, W0HYQ, W0OQQ, WA0UEN, and WA0ZZP. Other Rapid City amateurs who provided communications not previously mentioned were W0GDE, WA0ZZP, W0QBK, WA0NRE, K0WNV, and WA0CIP. Amateurs in nearby towns helped a lot. Some of their calls: W0DVB, W0NWK, WA0DEM, W0IG, W0CAS, W0MZI and W0HOH. Also WA0FGV, who drove to Rapid City from Hot Springs, S.D., and WA0OVR from Sturgis.

Incidents

On Monday evening, June 12, WB0BAY, who had been operating portable at Johnson Siding located about 10 miles west of Rapid City on Rapid Creek, called WA0CPX on 3955 and requested a helicopter for a person who had suffered a heart attack. WA0CPX called the National Guard at Camp Rapid in western Rapid City and a helicopter was dispatched immediately. The patient was taken to the hospital at Ellsworth AFB. The whole incident took just over ten minutes until the helicopter arrived at Johnson Siding.

Early Saturday morning during the first hectic hours of operation, neighbors of K0CXL were attracted to his QTH by the noise of his emergency generator. One of them came bursting into the shack exclaiming the generator was on fire. It seems the muffler had ignited the wall of the carport. The fire was quickly extinguished. K0CXL then gave permission for the neighbors to plug in a big coffee pot to boil water for drinking. It wasn't long until the lights started to dim and Elmer checked to find not one but three big coffee pots hooked to his generator! Needless to say they went back to one big coffee pot so K0CXL could stay on the air.

WB0HKO checks a wrecked vehicle, ironically bearing the sign "Home Repairs." Many were swept away in their vehicles and drowned in the flood.

"Nobody lives here!" WA7MPA/Ø (in car) and WBØHKO (with mike, on 2 meters) check an address in western Rapid City near Rapid Creek.



Much of the incoming health and welfare traffic was handled by relaying the names to the court house EOC on two-meter fm where the names were checked against the missing, found, and dead-on-arrival lists. WAØZCE, WAØCPX, WØCOV, KØKLR, and WAØNRE spent many hours pouring over these lists.

Hams all over the United States patiently stood by for traffic for their area or took traffic and telephoned it to other areas. We have received several reports from people in Rapid City that their relatives got the message that they were safe before they knew of what had happened in Rapid City. Special mention should be made of two amateurs, WAØUZO and WBØEDA, who drove to Rapid City from Pueblo, Colo., to assist with two-meter communications. Some of the net controls that have not already been listed are WØNEO, WAØSBT, WAØYFR, WAØTNM, WAØPDE, WB4GLG, K8IOF, WA8HVJ, WB5DRU, W5EOD, W5SP, as well as help from WB6ISL, WA3RCN, WØCQX, WA7OSO as well as many others we may have forgotten to mention. — WAØCPX.

Activity Elsewhere

Most of the actual emergency communication took place entirely in the disaster area, but throughout the U.S. were hundreds of amateurs supporting the activity by protecting frequencies, handling priority assurances and even emergency messages coming out of the disaster area, and struggling to cope with the deluge of inquiries trying to get into the disaster area from concerned relatives and friends on the outside. Here is a resume of reports received from outside participants:

Washington. Quite a lot of participation from Washington amateurs. W7BA, that veteran traffic handler who eats messages for breakfast, dinner and supper, was very much in the picture, handling flood traffic with WAØCIO, KØFCR, WAØFUZ and KØTVJ. K7SUX reports relaying welfare information from W7BA to the Clark County Chapter of the Red Cross. W7DYZ got six members of the Lower Columbia Amateur Radio Association together at the Kelso C.D. office and succeeded in getting much info together on conditions in the disaster area, so that people inquiring could have an idea of the probable status of their relatives in the area. Whidbey Island Amateur Radio Club members performed a similar function in the Puget Sound area under the leadership of WA7HDI and WA1DRH. EC W7IEU and a crew of five amateurs handled 68 inquiries for the Snohomish County Chapter of the Red Cross.

California. W6CPB reports that although he spent 30 hours monitoring, he handled only four "health & welfare" messages, but did help to keep

frequencies being used for emergency purposes clear. He also reports on activities of others he heard active in contact with Rapid City, namely WAØUFS, KØFOR, WB4GLG, WB6YPX (for Vietnam traffic via MARS) and W6BNX. WB6WWW reports H & W activity in contact with Rapid City in the evening while W6PRD carried on during the day and mentions W5EOD as one of the stations he relayed for. WB6ZOM got a good writeup in the Eureka newspaper for his handling of inquiry traffic with KØFCR.

Nice report from WB9DKS detailing his activities during and following the disaster, mostly guarding and protecting MWARS and other net frequencies. He also tells us that WA1JIZ/Ø was giving out several telephone numbers in Rapid City that could be called to get H & W information by computer. WBØGAJ handled an active H & W net, assisted by W8GKB/3. Oklahoma SEC WA5FSN says Oklahoma amateurs were on the job handling inquiries and compliments the handling of the situation by S. Dak. amateurs. SCM W7PBV lists WA7ESM, W7KVV, K7ZOK and himself as having handled some H & W inquiries. WA7JKX gathered info for 11 families in his Grants Pass (Ore.) area, via KØTVJ and KØFCR. Indiana SCM W9BUQ was on the air for 34 hours, handling 24. H & W messages. Colorado SCM WAØHLQ lists 13 Colo. amateurs in the act. And the Queens (N.Y.) headquarters of the Red Cross set up WB2QBP to handle inquiries.

* * *

That about sums up our reports. No praise is too great for the hundreds of amateurs who spent sleepless hours just standing by, ready to assist but keeping off the air unless they were needed, in addition to all those whose on-the-air activity was needed and used. There were also, of course, those who caused QRM and just plain got in the way trying to help, but let's discuss that another time. While this article was in the writing stage, another flood emergency had already occurred in the east, and so another article will be coming up. Let's hope that these two emergencies occurring so close together will do something to "shape up" average Joe Amateur to the necessity for better emergency preparedness. — WINJM.

7031 kHz

BY RAY LARSON,* WØGHX

THE OTHER NIGHT I got on the air again after a QRT of about eight years. A couple of weeks earlier I had hooked up my old receiver to a hay-wire antenna and had been listening around the bands to see what was happening and to get my code speed back up. I noticed that there are a lot more S9 signals and electronic keyers on the air than there used to be — often in conjunction. After a couple of weeks of SWLing I couldn't stand it any longer, so I carried my exciter up from the basement and put it alongside the receiver. The antenna seemed to load up alright on forty. So, I got my old bug out of the closet and was all set for a QSO.

I was tuning around the band looking for a victim when I came across a fist that sounded hauntingly familiar (it was a bug, not a keyer). He was sending CQ on 7031 (my receiver may be old but it's accurately calibrated), and when he signed, sure enough, it was Al, W4**. I quickly zeroed in and gave him a call.

Even as I was calling I began to have misgivings. Old Al was one of the reasons I had gone QRT, though in my excitement I had forgotten it. It's not that Al was a bad guy, really. But, he was the crotchiest, ornieriest, most reactionary old geezer I had ever run into. Not just politically, mind you, but in everything. And he was always a decade or so behind the issues (if you can call the kicks he got on "issues"). Back in the '60s he was denouncing the transistor, the one-piece bathing suit (I doubt that he had heard of the two), ssb, the automatic transmission, and the Lindy — demoralizing and un-American influences all. He was the Archie Bunker of the airwaves. There was absolutely no way to get him off a subject. You just had to suffer. I tried to avoid him but he always seemed to find me out. In self-defense I had finally gone QRT altogether.

"Lord knows what he's into now," I thought as I began to sign, "probably Goldwater's presidential campaign." I half hoped the antenna wasn't getting

* 401 Birch St., St. Joseph, MN 56374.

out. I tried to console myself. "Maybe he's mellowed with time," I thought, "and anyway, this time I won't let him get to me, no matter what." I signed AR and turned up the receiver gain.

Sure enough he came back. He remembered my name as though our last QSO had been yesterday instead of eight years ago and gave me my report — 459. In Al's tight-fisted world, this meant I had a solid signal. The best I used to be able to get out of him when I had the kilowatt connected to a dipole was a 349. "Maybe he *has* mellowed," I thought. I gave him his report and tried to avoid everything but the most uncontroversial cliches. The weather should be safe: *WX HR COLD ES CLR — TEN BELOW IN MPLS THIS AM.*

QRG? was his only reply. Al was always laconic except when it came to one of his pet topics.

That seemed harmless. "7031 kHz, I replied, rather proud that I had kept up with the world enough to know that kc had been replaced by kHz during my QRT.

The receiver went berserk. For a moment I thought that my gain control had gotten noisy from being unused for so long. But no, it was all right. Al was making spluttering noises. His bug sounded like a demented cricket. I finally made out some of it: . . . *SCHMERTZES — WHATS MY FREQ? FREQ MEASURED IN CYCLES NOT BUSHELS CUBITS OR RODS — HERTZ RENTS CARS.*

"My God!" I thought, "I've done it." 7031 kc, I replied and then, instead of turning it back, I tried to change the subject. I brought him up to date on my family, how my son was ten now and playing the French horn in the school band. I hoped Al didn't have anything against French horns.

He ignored it and went on with his harangue. He said that a cycle is a phenomenon of the physical world, a Hertz a member of the human world, and probably an immoral one at that. He capped his outburst with this, QRSing to 20 wpm and carefully spelling out each word:

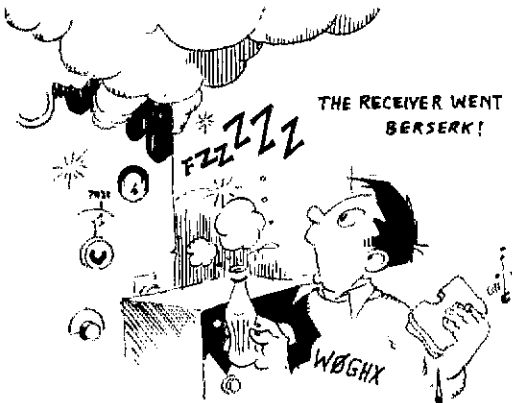
Mourned a doleful old-timer named Gertz,

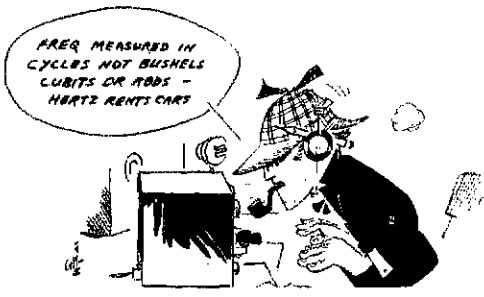
"I'm appalled that all cycles are Hertz:
kHz is a fright,

And MHz outta sight,
And when I ride on my biHz it hurts!"

By now I was shaken and badly in need of a drink. I gave him a rundown of my gear and then went into a detailed description of my antenna — its exact resonant frequency (in kilocycles), its length and the height at each end, in feet. Too late I realized I might be in deep water there. I hoped he wasn't a metric nut.

But Al picked up his tirade where he had left off. A cycle, he said, is a perfectly descriptive name for a thing that has frequency, like a wave of water or energy. A Hertz, on the other hand, is descrip-





tive of nothing. It is the name of a family -- a foreign family. How would they like to be called "Cycle?" They should have the decency not to foist their family name off on a natural phenomenon. The silly thing, he continued, is that everyone knows a cycle is really a cycle, they just pretend it's a Hertz. And on and on. Then another limerick, QRS again:

Said a cheeky YL name of Mavis,
 "This Hertz thing is really deprevais:
 Number Two wasn't tough,
 Or didn't try hard enough,
 Or kiloHertz would be called kiloAvis."

I replied that I was planning on putting up a real antenna in the spring. What did he think about

the relative merits of a dipole as compared to a ground plane on forty meters?

But Al wasn't about to be derailed. Measuring frequency in Hertz, he said, is like measuring time in Methuselahs or velocity in Wright Brothers, because these people had something to do with age and speed. CAN U IMAGINE DRIVING 60 WBPH? he asked, rather rhetorically. Must we reHertz our used beer bottles? Will the Pope start issuing enHertzicals? Can you feature looking things up in the *EnHertzopaedia Britanica*? Are we going to be plagued by eleven-year sunspot Hertzies and will scholars start ranting about Hertzical history? Then he fell into his demented-cricket swing again and, as ill luck would have it, the QSB was at the peak of its Hertz and he was over S9:

Fiattety-thrattety, it's a conspiracy,
 Hertzian frequencies crowding the air.
 Gone are the cycles that,
 Aesthoerotically,
 Used to remind us of Sophia, bare.

I pulled the big switch and went down for a drink. The next day I carried my old receiver and the exciter back down to the basement and put the bug back in the closet. They cluttered up my study anyway. I really don't have room in the yard for an antenna. Maybe in a few years . . .



A Universal Power Supply

(Continued from page 42)

the shunts is determined by dividing the meter internal resistance (approximately 100 ohms in this case) by 500, and is equal to 0.2 ohm. A check of the copper-wire table in *The Radio Amateur's Handbook* shows that No. 30 enameled copper wire is 105 ohms per 1000 feet, or 0.105 ohm per foot. Extending the division another step, one inch of wire has a resistance of .008 ohm. Approximately 23 inches of wire provide the correct value for the shunts. Each 23-inch length of wire is wound on a 100,000-ohm, two-watt composition resistor which serves as a form.

Construction

The supply is built on a 10 x 8 x 3-inch aluminum chassis. The spot welds at the four corners are reinforced with No. 6 hardware since the transformers are quite heavy. The total weight of the completed supply is slightly over 40 pounds. Several one-inch diameter holes are cut in the chassis bottom plate to allow adequate air circulation.

All of the power-supply output voltages are present on a 12-connection terminal block. The end of the cable used to interconnect the supply to the station transceiver is equipped with a 12-lug fanning strip, providing a convenient means to disconnect it.

One special wiring precaution is necessary; the bleeder resistors for both the high and low-voltage circuits should be mounted in the clear to allow plenty of air circulation around them. Perforated aluminum stock is placed over a 1 x 3-inch cut in

the chassis which is directly above the mounting position for the 800-volt bleeder network.

Operation

The voltage and current ratings for the supply are listed in Table I. Two jumper plugs are mounted "back-to-back" making the change from 117-volt operation to 220 volts a simple matter of reversing P1. P2 performs an identical function to select 6 or 12 volts for the filament line.

TABLE I

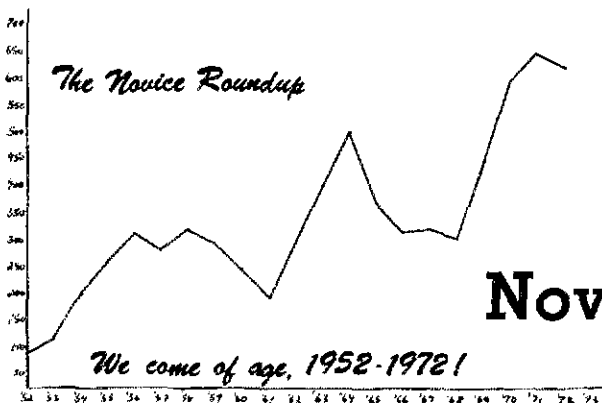
Voltage	Current
300 V dc	175 mA
800 V dc	300 mA
-40 to -80 V dc	25 mA
6 V ac	11 A
12 V ac	5.5 A

This unit has been subjected to extended periods of operation without developing serious problems. At one point, however, a high-voltage filter capacitor developed an open circuit, giving a "buzz saw" effect to the transmitted signal. This problem was solved by replacing the defective capacitor.

The cost for this project should be under \$100, even if all of the parts are purchased new. The price of the two power transformers and two filter chokes comprises approximately 60 percent of the total value.¹



¹A package including the two power transformers and the two filter chokes is available from Hammond Manufacturing Company, Inc., 1051 Clinton Street, Buffalo, NY 14240, for approximately \$60. In Canada, the address is Hammond Manufacturing Company Limited, 394 Edinburgh Road, North Guelph, Ontario. Catalog available.



Results, 1972 Novice Roundup

REPORTED BY RICK NISWANDER,* WA1PID/WA8VRB

THE NOVICE ROUNDUP has finally come of age. That's right, the February 5-13, 1972 installment of this annual event marked its 21st birthday. As the chart shows, NR participation has risen steadily during its short lifetime. Although we didn't surpass last year's record breaking Roundup, 624 logs were received at HQ (484 Novices, 122 Non-Novice and 18 check logs).

Competition for the section leader spot has increased. This year no less than 7 races were decided by 2,000 points or less. New Hampshire, Alabama and Colorado being the closest. First and second places were separated by 323, 559 and 793 points respectively in those races. The competition doesn't stop as you go down the list. Illinois provided a close race for 5th and 6th with WN9HAD edging out WN9GIW by 18 points and in Ohio 5th, 6th and 7th places were separated by a scant 311 markers. The closest race was in NNJ, where WN2CIO edged out WN2QIR for the second spot by the paper thin margin of one point. Congratulations to WN0DYV who topped all entrants with a score of 66,555.

*Communications Assistant. ARRL.

A record number of sections were represented this year, 64 to be exact. Section awards will be in the mails on September 15. Stand by.

The shortened contest period (9 days instead of 16), the reduced operating time (30 instead of 40 hours) and mandatory time-offs were well received. Some felt the consecutive number should be reinstated. What is your opinion? Drop a note to a member of the ARRL Contest Advisory Committee (W1BGD, W2EIF, W3GRF chairman, W4UQQ, K5TSR, W6DQX, WA9UCE, W0HP, KH6JJ and VE2NV) and tell them what you think. Or, better yet, send your comments to HQ and we'll make sure each member of the CAC receives a copy.

To those of you who asked, there is as much QRM in the higher class bands during a contest. Use those crystals filters, audio filters, attenuators and listen hard for that new multiplier. If that doesn't work, WN6NSW seems to have come up with a solution: "The Novice Roundup was a pretty fun event. It teaches you the art of praying when the QRM hits."

Congratulations to all. Glad you could make it.

Soapbox

It is remarkable how far 75 watts will carry. — (WN6LSH). Wow! The most fun I've ever had on the air. — (WN7PRV/7). I heard a lot of higher class operators calling CQ NR in the course of the contest. I don't think that this is fair or considerate to the Novices. So for next year guys, how about giving our rockhound friends a chance. — (WB2ONZ). Murphy struck when I realigned my receiver and it ended up worse than when I started. — (WN7SKY). I am a doctor and with the busy flu season I didn't get in too much on the air time. — (WN5EIC). The NR turned me into a contest man. — (WN3QJR). I picked up three new countries and ten more states for my WAS. — (WN6OKG). It was fun last year when the contact number was exchanged instead of the RST. — (WN5DML). The shock of the contest came when Vermont asked

WN0CEZ, Nebraska section leader, and mascot Loomis. We are told that Loomis likes to sit on the top of the rig and listen to the cw. Loomis is very nervous and the cw calms her down. How's that for shock therapy!



Tom, WN6KQZ, keyed his HW-16 to a division leader spot and second place in the NR from hilly San Francisco.



me to please QSL. — (WN6GCE). Sorry to see the lack of interest Novices have on 2 meters. — (WN2NRK). Now the XYL knows what a contest is. — (WN0BHF). Really blew my mind working a KL7 and a WH6 with my 20 watts. — (WN91MV). Operators CQ far too long. I lost one person on 15 meters when he CQ'd right into a fade out. — (WN3RTY). Great contest. It was stimulating and challenging besides being fun. — (WN1NZT). I really enjoyed working the QRM. — (WN9FBR). Let's do it again next year. — (WN6GLZ). Imagine my disappointment...I worked DJ1US only to discover he was operating portable in 1 land. — (WN3RQB). Next year I will operate from my home QTH in Germany. — (DJ1US/W1). Being pressed for time, sometimes I had to eat while operating. The main tragedy of the whole contest was when my brother sat on my chicken sandwich. — (WN6NSW). Many thanks to the Generals who helped make this contest a success. — (WN4TIU). It was great to have W1AW answer my call. This is the one you always look for but never really expect to hear. — (WN0FAT). Happiness is working a ZD8 off the back of my beam in the NR. — (WN8LGF). All in all this was a great test for all the "poi pounders" out there. — (WH6HJE). I had problems with my dipoles and beam. Who ever heard of climbing the tower to cut your antennas to change bands? — (WN8IUK). In a way I'm glad it is over now. I just couldn't afford any more QSO's. At 6 cents a QSL card times 230 QSO's. . . — (WN7PDV). Enjoyed the NR even though my broken leg slowed me up a little. — (WN2AEY). Are QSOs with Nevada and North Dakota by sked only? — (WN6HHE). It was nice to make contacts with the General and higher class licensees. — (WN1OAS). The only thing wrong with school is that it takes up 5 days of the NR at 8 hours a day. — (WN2QEP). As always, the Novices did a tremendous job. — (WA2LOI). I found out that the NR was more fun than the DX Competition. — (WA7KZP). I think that the NR is an experience that all Novices should not miss. — (WN8IQT). Passed my General exam two weeks before the NR but luckily the ticket didn't come in time. — (WN2ADH). The NR went well, excluding the part where my antenna blew over. — (WN3PXH).

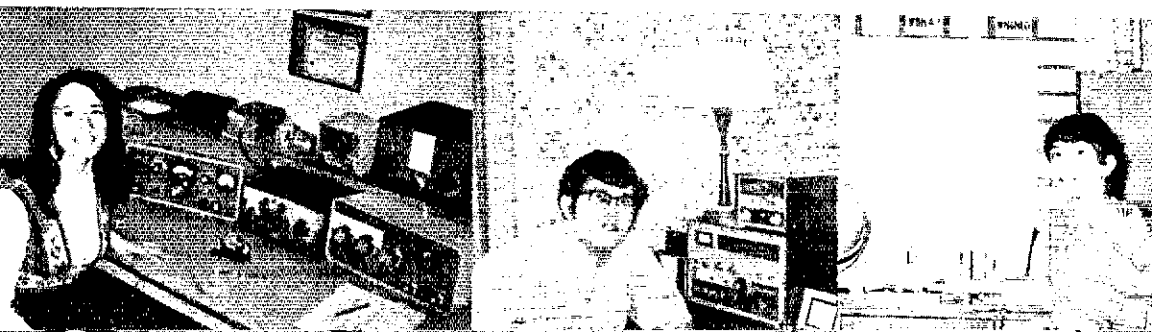
Top 10

Novice	Non-Novice
WN0DYV	VE3CDK
WN6KQZ	W4YZC
WN1OIO	K4IQJ
WN9FJT	WA3RDU
WN5FJX	WA0TKJ/Q
WN4UCC	WA0LAR
WN0CEZ	W3ARK
WN2POD	WB2PWS
WN9GIT	WA2RGW
WN5DZD	WB6NKO

Division Leaders

Atlantic	WN2CZA
Central	WN9FJT
Dakota	WN0EVQ
Delta	WN5DCY
Great Lakes	WN8HJU
Hudson	WN2POD
Midwest	WN0DYV
New England	WN1OIO
North western	WN7OOP
Pacific	WN6KQZ
Roanoke	WN8III
Rocky Mt.	WN5DZD
Southeastern	WN4UCC
Southwestern	WN6FNI
West Gulf	WN5FJX

From left to right: You don't often see a division leader with such an enchanting smile. WN9FJT, Rosalie, using her winning form, placed fourth among NR participants and tops in Indiana. Sorry gentlemen, she is married to WA9AUM to whom the linear also belongs; WN8HJU, Bill, led 22 fellow Michiganders for the section leader spot and took the Great Lakes Division while he was at it; WN8III made West Virginia popular with his 514 two-ways. We hope Steve continues to be active in contest from his usually-scarce QTH.



USA		Northern New Jersey	WN3PAO	1056-44-24-5	WN3SDA	7700-140-55-	
1		WN2SHR	WN3RCI (+WN3RIY)	19,944-257-72-21	WNSEMV	2970-66-45-	
Connecticut		WN2CLO	Western Pennsylvania		Louisiana		
WN1OIO	55,126-641-86-30	WN2OIR	WN3QNT	31,424-471-64-30	WN5FAY	10,971-187-53-17	
WN1NLD	27,216-412-63-30	WN2AGU	WN3QJR	22,896-298-72-22	WN5VCVU	5880-140-42-24	
WN1NZT	20,724-294-66-30	WN2NAB	WN3RNC	16,512-328-48-22	WN5FJU	5360-119-40-9	
WN1NFA	10,450-209-50-14	WN2BES	WN3RJV	12,444-224-51-21	WN5IVF	4770-106-45-18	
WN1NDI	8319-167-47-24	WN2SHQ	WN3RIZ	6642-162-41-21	WN5FJU	4375-115-35-9	
WN1NRF	5070-115-39-9	WN2DSM	WN3OEI	6460-190-34-30	WN5FOF	3256-78-37-15	
WN1OHH	4288-119-32-17	WN2SXD	WN3PGB	3456-134-24-10	WN5FEY	612-36-12-8	
WN1OQT	4028-91-38-15	WN2BFG	WN3PUR	2884-103-28-14	Mississippi		
WN1PGZ	2212-79-28-12	WN2AYC	WN3RKN	1302-47-21-8	WN5DCY	23,048-434-67-23	
WN1PKS	2200-88-25-24	WN2XXV	WN3PCX	242-22-11-10	WN5CPF	8789-177-47-22	
WN1PH	1050-50-21-4	WN9GEM/2	Alabama		WN5DLX	7056-134-49-24	
WN1OFI	935-40-17-8	WN2ARG	WN4UNM	14,079-237-57-30	WN5DUG	6960-145-48-29	
WN1OYD*	100-10-10-1	WN2COV	WN4SEI	13,520-188-65-	WN5FML	4277-91-47-18	
Eastern Massachusetts		WN2ABV	WN4WHA	1400-50-28-10	WN5DDU	4183-89-47-27	
WN1PDM	19,089-293-63-30	WN2DJM	Eastern Florida		WN5EMT	3675-105-35-12	
WN1OTE	16,005-271-55-29	WN2CPM	WN4RGO	36,991-501-71-28	WN5BVP	646-34-19-31	
WN1NRT	10,472-172-56-15	Southern New Jersey		WN4TUR	WN5CON	544-34-16-5	
WN1PFD	10,191-237-43-19	WN2CZA	35,000-500-70-28	WN4UPT	New Mexico		
WN1ORI	5320-123-40-23	WN2QEN	10,136-181-56-11	WN4ULL	WN5DZD	38,837-532-71-24	
WN1ONB	2805-85-33-11	WN2BIX	9636-199-44-17	WN4WXX	WN5CSO	33,950-475-70-29	
WN1PMR	1281-51-21-8	WN2OLS	4270-123-35-13	WN4VFN	WN5FAI	11,664-201-54-28	
WN1MPZ	1215-45-27-16	WN2TRK	2485-71-35-13	WN4VYU	WN5DUD/5	3675-138-42-27	
WN1PFQ	160-10-8-9	WN2OMY	2184-84-26-16	WN4YUC	WN3REY/5	3885-111-35-18	
WN1OXC (+WN1OLV)	14,580-243-60-20	WN2OLP	1580-64-20-5	WN4SMZ	Northern Texas		
		WN2ZAI	1534-59-26-9	WN4SMZ	WN5FJX	46,400-580-80-30	
		WN2ROQ	1323-49-27-7	WN4TAK	WN5SEI	36,156-524-69-29	
Maine		Western New York		WN4TAZ	WN5BNG	35,560-508-70-29	
WN1OHJ	10,808-193-56-20	WN2RAD	26,724-373-68-28	WN4UZA	WN5LUC	17,030-262-65-29	
WN1OVP	5576-116-41-11	WN2AAG	20,400-320-60-22	WN4VFN	WN5DXB	6440-161-40-	
WN1MXO	378-27-14-	WN2DMK	19,703-323-61-30	WN4YFN	WN5ENV	4641-119-39-27	
New Hampshire		WN2SIN	19,404-308-63-13	Kentucky		WN5EAI	4104-108-38-16
WN1NIE	6063-109-47-11	WN2RZL	18,054-344-51-29	WN4YFG	Oklahoma		
WN1ODG	5740-164-35-20	WN2RAB	17,568-368-61-25	WN4RXL/4	WN5FRP	10,761-211-51-21	
WN1PNC	456-24-19-20	WN2NRK	16,714-254-61-30	WN4WDV	WN5FTE	9660-195-46-29	
Rhode Island		WN2TWX	15,464-279-56-19	WN4WCM	WN5DML	1755-50-27-4	
WN1POJ	17,745-263-65-28	WN2QXA	15,840-220-66-24	WN4YAF	WN5CRX	174-9-6-1	
WN1NZR	13,392-248-54-24	WN2SIY	10,796-234-44-19	WN4YMO/4	Southern Texas		
Vermont		WN2PCH	10,034-173-58-28	North Carolina		WN5FYL	21,142-331-62-30
WN1OJJ	5382-117-46-	WN2OWP	6468-147-44-26	WN4VVP	WN5DYS	8790-166-53-	
WN1OIG	1920-60-32-13	WN2AEY	6408-158-36-30	WN4YJQ	WN5ELC	528-23-16-10	
WN2DGG/2	1105-50-17-15	WN2BAK	6084-154-36-25	WN4TMD	6		
Western Massachusetts		WN2DMN	5180-133-35-30	WN4SGB	East Bay		
WN1OAS	25,185-320-73-30	WN2DWA	3740-110-34-28	WN4WUD	WN6HLA	8350-157-50-19	
WN1ORL	8288-214-37-30	WN2DCX	2916-71-36-20	WN4YNC	WN6NDR	6330-139-45-24	
WN1PIE	7040-166-40-30	WN2CLG	990-30-22-7	South Carolina		WN6MJI	1708-61-28-22
WN1PCJ	5408-154-32-26	WN2QXL	630-32-15-9	WN4VGZ	WN6KJF	1215-45-27-26	
WN1NWK	5355-119-45-15	WN2TLR	384-24-16-8	WN4YFZ	Los Angeles		
WN1PHO	1980-90-22-13	WN2CVP	294-21-14-	WN4YIU	WN6EFS	23,718-344-67-30	
2		3		WN4QJT	903-33-21-	WN6DOH	16,043-238-61-
Eastern New York		Delaware		WN4WME	21,350-295-70-28	WN6HVU	15,708-213-66-28
WN2POD	43,500-500-87-30	WN3PTY	18,648-308-56-28	WN4VZC	9204-177-52-25	WN6FOL	12,204-226-54-
WN2AKV	20,557-317-61-18	WN3RFI	10,692-183-54-15	WN4UXU	7242-132-51-22	WN6MJP	11,774-703-58-20
WN2QQQ	7920-150-48-14	WN3RUF	7774-169-46-28	WN4UUH	2880-96-30-17	WN6JQP	10,230-176-35-18
WN2BLO	4585-121-35-	WN3RWD	5650-103-50-17	WN4WHE/4	1736-56-31-24	WN7PVY/6	8745-159-55-30
WN2CNE	4482-166-27-14	WN3RKH	5508-147-34-16	WN4WMA	320-20-16-7	WN6BHL	8280-180-46-
WN2SEO	2294-64-31-10	WN3ROB	4544-142-32-16	WN4TRH (multipt)	1078-49-22-9	WN6IFM	8046-149-54-23
WN2ZBLU	463-31-15-	WN3ROE	4320-96-45-18	Virginia		WN6GLZ	5244-114-46-17
WN2SKD/2	375-25-15-4	WN3RPO	2813-97-29-22	WN4YJK	19,800-300-66-	WN6EAT	3276-91-36-16
N.Y.C.-L.I.		WN3QAX	2581-89-24-	WN4VQL	10,290-200-49-16	WN6DQG	1248-52-24-20
WN2CJN	22,066-374-59-24	WN3QWF	2392-82-26-6	WN4VWG	10,032-213-44-22	WN6DUX	190-19-10-9
WN2SKO	17,800-356-50-30	WN3QVJ	1280-64-20-7	WN4WLV	3600-80-40-12	Orange	
WN2BPC	14,406-279-49-30	WN3QUL	960-33-20-11	WN4WLK	2490-83-30-27	WN6FNT	12,495-470-67-29
WN2CPN	10,047-177-51-13	WN3OSI	936-36-26-8	WN4URZ	2073-64-28-17	WN6DFE/6	15,080-222-65-12
WN2RDO	7222-157-46-25	WN3RUC	504-63-8-10	WN4YHB	861-41-21-14	WN6MBG	12,595-214-55-30
WN2UDN	6556-134-44-17	WN3RGN (4 oprs.)	21,420-400-51-30	WN4YHD	552-69-8-	WN6BHE	6345-141-45-20
WN2NYSV	6210-115-54-24	Maryland-D.C.		Western Florida		WN6BKL	4320-98-40-22
WN2DGP	4960-114-40-19	WN3QCG	28,718-441-63-30	WN4YKV	36,168-548-66-30	WN6HRH	4192-131-32-17
WN2DLV	3510-130-27-17	WN3OCIT	24,795-435-57-30	WN5BYK/4	360-15-12-8	Santa Barbara	
WN2ADH	2904-78-33-	WN3SAI	23,323-289-78-	6		Santa Clara Valley	
WN2QJQ	3816-88-32-30	WN3RSL	18,200-325-56-38	WN5FMJ	22,610-323-70-23	WN6MTV	23,383-334-67-39
WN2BUE	2772-74-33-20	WN3RSK	15,996-258-62-19	WN5FMK	20,150-325-62-26	WN6HVW	20,790-315-63-30
WN2CLC	1672-76-22-	WN3RJS	12,250-230-49-22	WN5FWF	8464-184-46-22	WN6HQI	17,360-310-56-23
WN2THV	1380-50-15-5	WN3SAF	11,160-186-60-20	WN5DRY	8415-187-45-	WN6LUX	8319-162-47-21
WN2BSV	1029-49-21-10	WN3QGB	9073-211-43-24	Arkansas			
WN2CYS	748-34-17-5	WN3QDH	8136-206-36-30	WN5FMJ	22,610-323-70-23		
WN2AMU	494-26-19-7	WN3OBU	4576-143-32-13	WN5FMK	20,150-325-62-26		
WN2CWB	440-25-11-3	WN3RLC	4563-117-39-	WN5FWF	8464-184-46-22		
WN2BXX	434-21-14-3	WN3OYP	2442-111-22-11	WN5DRY	8415-187-45-		
WN2CTN	144-16-9-3						

WN6OSS	8055-179-45-27	WN8UD	16,043-248-61-30	WN9GCU	21,838-358-61-30	WN0CSG	6783-123-51-26
WN6NDN	5145- 95-49-15	WN8IOT	13,398-231-58-21	WN9FFT	18,306-324-54-29	WN0FEM	217- 31- 7- 5
WN6NDW	3565-155-23-30	WN8KZV	12,600-252-50-23	WN9GCXV	17,152-268-64-30	WN0FNA	45- 9- 5-
WN6LBO	3024- 84-36-20	WN8JCG	11,550-195-55-30	WN9HUW	8256-157-48-14	Kansas	
WN6LQO	2112- 64-33- 9	WN8HZY	11,448-216-53-21	WN9GFR	4572-127-36-12	WN0FGV/Ø	
WN6NEH	1496- 78-17- 8	WN8LCC	11,172-218-49-30	WN9HVI	4521-127-33-26		21,012-309-68-20
WN6HTH	1404- 41-25-	WN8LUK	10,521-167-63-22	WN9FKX	1953- 93-21-29	WN0BAZ	15,792-267-56-30
WN6DFM	230- 13-10- 4	WN8JYB	7344-143-48-22	WN9HTB	1029- 39-21- 5	WN0CTQ	9936-184-54-30
San Diego							
WN6HQH	21,886-338-6-2-19	WN8JAD	4320- 88-40- 7	WN9IGM	528- 23-16- 7	Minnesota	
WN6LJO	13,647-201-67-15	WN8KJP	4290-130-33- 7	WN9HNA	504- 42-12-10	WN0GBX	24,245-373-65-24
WN6CHM	6708-129-52-27	WN8KQX	4059- 99-41-14	WN9EBR	429- 33-13-11	WN0DAC	15,789-262-57-26
San Francisco							
WN6KQZ	56,408-6-26-88-29	WN8IHR	3850-100-35-26	WN9IVR	48- 8- 6- 9	WN0EYC	12,064-217-52-28
WN6ICQ	16,714-259-61-16	WN8JYF	3475-139-25-21	Wisconsin			
WN6OKG	15,694-746-59-24	WN8KW1	3472- 97-31-17	WN9GPI/9	37,800-525-72-21	WN0CHB	9020-164-55- 9
WN6LSH	14,025-235-55-29	WN8GSV	2632- 94-28-17	WN9GAA	31,746-481-66-29	WN0DGP	8370-155-54-10
WN6KQY	4551- 96-41-15	WN8SLV	2600- 80-26- 5	WN9ISN	21,090-342-62-29	WN0AYE	2240- 80-28- 9
WN6IRI	1225- 49-25-10	WN8BLC	2080- 89-20-23	WN9ECL	18,204-325-54-30	WN0EWK	1239- 44-21-10
San Joaquin Valley							
WN6NSW	21,318-323-66-24	WN8JXX	1210- 55-22- 8	WN9GLD	11,880-201-53-28	WN0EPO	280- 20-14- 7
WN6COL	11,571-203-57-26	WN8JSG	950- 95-10-10	WN9FXR	5324-121-44-	WN0BQA	234- 18-13- 3
WN6BJN	8550-171-50-30	Ohio					
Sacramento Valley							
WN6HNX	11,520-180-64-19	WN8IUI	27,280-430-62-26	WN9GPK	4248-103-36-	Missouri	
WN6GCE	8162-144-53-29	WN8HEM	25,515-385-63-27	WN9IDM	3051- 98-27-15	WN0DYV	66,555-730-87-24
WN6OIG	2765- 79-35-13	WN8GOU	21,483-326-63-40	WN9IDU	1408-54-22-25	WN0EZX	12,712-217-56-17
WN6IAQ/6	2250- 80-25-13	WN8RJO	17,936-284-59-19	WN9ICW	1150- 50-23-17	WN0FAI	6525-125-45-17
Hawaii							
WH6HIQ	25,664-376-64-30	WN8KZE	16,536-318-52-23	WN9ICW	960- 40-24- 6	WN0GAQ/Ø	5355-133-35-15
WH6HJE	15,372-232-61-28	WN8KYX	16,280-286-55-30	WN9GYV	288- 18-16- 7	WN0FSX	4896-136-36-19
WH6HPQ	6048-144-42-30	WN8JPA	16,225-275-55-20	WN9FFT	126- 8- 7- 7	WN0JYJ	4625-125-37-20
WH6HMI	70- 10- 7-28	WN8KFM	12,710-300-41-20	WN9HRO	104- 13- 8- 2	WN0CJB	4312- 98-44-10
7							
Arizona							
WN7QNA	7661-163-47-26	WN8LWM	12,402-234-53-14	Ø		WN0FSV	4080-120-34-20
WN7PRV/7	5640-120-47-	WN8JMV	10,716-21-3-47-22	Colorado	20,800-400-52-24	WN0EUV	3024- 74-36- 8
WN7SIF	987- 47-21-12	WN8JCR	10,350-210-46-26	WN0EMZ	20,007-336-57-23	WN0EYU	375- 25-15- 7
Idaho							
WN7PDV	13,680-230-57-29	WN8KRC	7697-179-43-30	WN0CLX	16,320-240-64-	WN0EMF	288- 14-12-
WN7S1W	11,502-225-54-28	WN8KQJ	7560-189-40-30	WN0AZR	1674- 42-27-	Nebraska	
WN7QKD	1944- 54-36-10	WN8KXV	7285-140-47-14	Iowa		WN0CEZ	44,022-628-69-23
Montana							
WN7OLO	2010- 67-30-13	WN8HTB	6600-150-44-10	WN0EJL	15,455-281-55-19	WN0ECG	5977-139-43-18
Nevada							
WN7SRG	23,532-318-74-	WN8HRX	5328-144-37-14	WN0FRM	10,044-186-54-30	North Dakota	
WN7QHF	19,971-317-63-	WN8JAY	4740-138-30-30	WN0DVM	9540-180-53-30	WN0DXV	7488-141-48-22
WN7SHO	5360-134-40-19	WN8KYS	4524-156-29-27	WN0BHF	9282-167-51-	South Dakota	
WN7QKE	1122- 51-22-16	WN8KQB	4389-118-33-27	WN0EON	8778-194-42-29	WN0VQO	25,520-464-55-29
Oregon							
WN7OOP	31,088-464-67-29	WN8KYS	4224-128-33-	WN0EXM	7938-147-54-18	WN0CVO	336- 24-14-14
WN7RTA	24,060-401-60-30	WN8IYU	2790- 93-30- 7	An asterisk indicates HQ, staff member, ineligible for an award.			
WN7OML	16,958-278-61-25	WN8KXV	2675-107-25- 6	Example of listings: WVN3NZJ 13,062-253-54-27, or total score			
WN7OMP	14,190-258-55-18	WN8JFL	1330- 55-19-10	13,662, different stations worked 253, sections worked 54, total			
WN7RQP	11,424-184-56-18	WN8HFO	1240- 62-20- 7	operating time 27 hours.			
WN7RXU	5980-130-46-10	WN8JAK	1058- 46-23-24	-----			
WN7FOZ	5904-123-48-	WN8KMP	1040- 52-20- 8	Non-Novices			
WN7SKY	703- 22-19-12	WN8JBI	1008- 41-18- 8	VE3CDK 23,232, W4YZC 19,220, K4IQJ 19,198, WA3RDU			
Utah							
WN7PXI	3036- 92-33-13	WN8GYP	945- 35-21-10	18,939, WA0TKJ/Ø 18,270, WA0LAR 17,202, W3ARK 17,056,			
Washington							
WN7PRC	17,595-245-71- 6	WN8KOI	779- 41-19-	WB2PWS 16,646, WA2RGW 15,105, WB6NKO 14,763, K9WYQ			
WN7QWS	15,048-264-57-24	WN8IQT	702- 39-18-13	14,364, WA6GGK 13,924, WA6MTW 13,805, WB6LX 13,160,			
WN7QHF	14,152-244-58-28	WN8JPD	310- 31-10-16	W4KFC 12,644, WB0DRC 11,679, WB4FSG 11,664, KSPXY			
WN7RCC	11,426-177-58-30	WN8KWD	231- 11-11- 9	11,628, K7GGD 11,457, WB4LLK 11,118, WB0BPH 10,944,			
WN7PRZ	6232-149-38-13	WN8JSE	186- 31- 6- 7	VE2DHW 10,810, WA6PGR 10,788, VE6ARG 10,640, W2ECW			
WN7RUY	4680-130-36-	West Virginia					
WN7QIH	2145- 65-33- 6	WN9GIT	42,840-456-90-30	10,450, WB0DSJ 9747, WB8GLL 9653, WA4APG/4 9650, WA2LOJ			
WN7RWV	1175- 47-25-	WN9GFC	25,870-398-65-30	9540, K4BNC 9288, VE5TT 8632, WA0ZJU 8448, WA2MZH 8379,			
WN7RVA	954- 43-18-	WN9HMY	25,432-364-68-22	WA7KZP 8352, DJ1US/W1 8037, VE3LOJ 7884, WA3PWY 7875,			
WN7RLT	624- 29-16- 4	WN9DOF	23,256-308-72-30	WA2GMD 7520, W60EO 7228, WB0CVW/Ø 7105, WA1JSD 6776,			
WN7RNX	180- 20- 9-	WN9HAD	19,800-310-60-29	VE3EHF 6468, WB9FKD 6342, KØYQX 6336, WA3PFD 6120,			
Wyoming							
WN7PNW	1596- 76-21-11	WN9GIV	19,782-299-63-28	WB9DDR 6076, WB4SKG 6075, W3QEL 5986, WBRIYX 5377,			
8							
Michigan							
WN8HJU	32,760-521-60-30	WN9HKA	16,900-323-50-29	WB6EQT 5499, WA3PQF 5360, WASYSQ 5280, WB8DSG 5175,			
WN8IPG	18,774-268-63-28	WN9FDU	16,184-289-56-29	WA0ATY 5160, WB4UKA 5124, W4UC 5082, WA2LJP 4978,			
9							
Illinois							
WN9GJT	42,840-456-90-30	WN9HGN/9	14,224-254-56-26	WA7NOH 4920, W2HAE 4914, WB2ONZ 4578, WA3NXA 4356,			
WN9GFC	25,870-398-65-30	WN9HAI	12,455-225-53-19	WALKIT 3885, K8MLQ 3822, WB9DVO 3745, WA0VJF 3720,			
WN9HMY	25,432-364-68-22	WN9GSS	6179-152-37-21	VF7BL 3686, WB4PQD 3610, WA3MME 3441, WØDRE/J 3293,			
WN9DOF	23,256-308-72-30	WN9HEF	5811-129-39-18	WB9CCY 3219, WB4NDQ 3075, WA8LWB 2856, WB6FNH 2800,			
WN9HAD	19,800-310-60-29	WN9IFZ	5577-159-33-25	W0W0V 2752, WA9RJ1 2730, W3CBF 2635, W4QZF 2580,			
WN9GIV	19,782-299-63-28	WN9HLE	4114-111-34-17	W7GKF 2550, WA2PL1 2325, WB6RWZ 2291, WAØNMA 2211,			
WN9HKA	16,900-323-50-29	WN9ILU	2210- 65-34-27	WA7IOF 2139, K4ZGB 2074, W4UCG 2046, WA6HMO 1725,			
WN9FDU	16,184-289-56-29	WN9HPM	2046- 93-22-	WA2ICJ 1612, WA1MWU 1575, WB8MI 1560, WB9BAG 1496,			
Indiana							
WN9HAI	14,224-254-56-26	WN9FOK	2043- 67-29-	WA1NDM 1470, WBØJUL 1276, WA4YNE 1269, K1NTS/I 1265,			
WN9GSS	12,455-225-53-19	WN9IMV	1740- 60-29-25	WA3EDS 1071, W4DR 1024, WA6DBX 1012, WB5BSB 987,			
WN9HEF	5811-129-39-18	WN9FVG	1560- 63-20-13	WB4RSV 968, WA7OJ1 924, VE2DIN 888, K6EA 880, W4RAL			
WN9IFZ	5577-159-33-25	WN9HUI	448- 32-14-10	798, WAØUBL 684, WA8WGJ 636, K7UWT 616, WA3SCW 561,			
WN9HLE	4114-111-34-17	WN9HVK (+WN9HCL)	540- 30-18- 6	WA3RSV/3 560, WØJUZ 546, WA6FYB 532, WA7OMX 370,			
WN9HMY	25,432-364-68-22	Check Logs					
WN9DOF	23,256-308-72-30	WN9JFT	49,275-675-73-30	W1TM, W1MKP, K2CQR, W2N2JA, W2NSZT, W3JJD,			
WN9HAD	19,800-310-60-29	WN9HWV	30,800-560-55-	WA8WGJ/3, K4EJQ, W5QON, W7PCD, W7DCC, W2SQC, WBIRG,			
WN9GIV	19,782-299-63-28	WN9GZL, WØATH, WØEFX, WØEGV, VE3GLA, VF7AKJ, Ø57					

Hamfest Calendar

September

S	M	T	W	T	F	S
	3	4	5	6	7	8
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

District of Columbia - Quarter Century Wireless Association 25th Annual Dinner Meeting is Saturday, October 14, at the Marriott Twin Bridges. FCC Chairman Dean Burch is guest speaker. Special Fifty Year Awards to be presented by Senator Goldwater, K7UGA (QCWA President). Tickets at \$9.50 each are available from QCWA, Box 394, Mamaroneck, NY 10543. Deadline is October 10.

District of Columbia - National Historical Radio Conference at the Smithsonian Institution, sponsored by Antique Wireless Association is September 22, 23. Special sessions for old-time amateur and commercial operators, collectors flea market, and OOTC meeting. Registration \$4; deadline September 12. Write Lincoln Cundall, W2QY, 69 Boulevard Parkway, Rochester, NY 14612.

Florida - Platinum Coast Amateur Radio Society's 7th Annual Hamfest and East Coast Fm Convention is September 16-17 at Melbourne Civic Auditorium, 9 A.M. to 4 P.M. Registration \$1.50; children free. Additional info from PCARS Convention Committee, 1422 Virginia Dr. Melbourne, FL 32935.

Florida - The Tampa Hamfest is October 14-15 at the Florida State Fairgrounds, Electrical Building. Registration \$1.50. Meetings, swap area, free parking. Write to Hillsborough Amateur Radio Society, PO Box 8092, Tampa, FL 33604.

Illinois - Peoria Hamfest is September 17. Advance registration is \$1.50; banquet (Sept. 16) \$5.50. Deadline Sept. 4. Write Wendell McWilliams, WN9DVJ, Box 1, Rome, IL 61562.

Kansas - Wichita Hamfest is Sunday, September 10, 4-H Building, Central St. and Tyler Rd. Meetings, swap tables and games. Talk-in on 3910, 7263, 34-94, and 22-82. Map and program from Mike Downing, WB0BVC, 2301 Santa Fe, Wichita, KS 67211.

Massachusetts - Minuteman Repeater Association Hamfest is Sunday, September 24 at Chamberlain's farm, New Braintree, Mass. Camping, flea market, technical assistance for putting fm rigs on frequency. Info from MMRA, Box 381, Hudson, MA 01749.

New Mexico - The New Mexico Hamvention is September 15-17, at Albuquerque Hilton Inn. Technical sessions, banquet and displays. Talk-in on 7255, 3940, 34-94, and 16-76. Register in advance for \$8.50, \$12 at the door. Contact the New Mexico Hamvention, PO Box 14381, Albuquerque, NM 87111.

New York - Northeastern States 160 Meter Amateur Radio Association annual election and banquet is Saturday, October 7, at Kozel's, Rt. 9H, West Ghent. Flea market 1-4 P.M. Dinner at 6 P.M. For info write Bob Flynn, W1EUB, 39 Arlington St., Pittsfield, MA 01201.

Ohio - The Findlay Hamfest is September 10, at Riverside Park. For tickets contact Clark Foltz, W8UN, 122 East Hobart St., Findlay, OH 45840.

Ohio - Annual Cincinnati Hamfest is September 24, at Strickers Grove, Ross. For details write John Bruening, W8DSR, 6307 Fairhurst Ave, Cincinnati, OH 45213.

Pennsylvania - Mount Airy VHF Radio Club Hamarama is Sunday, October 1, at Warwick Fire Co., Rt. 263, Jamison. Flea market, auction, ATV demonstration. Registration is \$1. (tables \$2.) Talk-in on 146.94 and 52.525. Further info from W3ZD, 520 Centennial Rd., Warminster, PA 18974.

Washington - Walla Walla Valley Radio Amateur Club 26th Annual All Family Picnic and Hamfest is September 23-24, at Jefferson Park Fieldhouse, Walla Walla. Swap shop, contests, homebrew and antique radio displays. Free registration, coffee and punch furnished, pot-luck lunch at 12:30, Sunday. Talk-in on 3960 and 146.76. Write Pat Steward, W7GVC, 1404 Ruth Ave, Walla Walla, WA 99362.

SOUTHWESTERN DIVISION CONVENTION

Santa Maria, Calif.

October 21-22, 1972

For the first time in 22 years, the Santa Barbara Section will host a Southwestern Division ARRL Convention which will be held in the Convention Center at the county fair grounds, Santa Maria, California, on October 21-22. Santa Maria is on US 101 highway about 70 miles north of Santa Barbara. The Vandenberg Inn is the headquarters hotel where registration will begin Friday evening, only a few minutes stroll from the convention center complex.

Free parking on the grounds is available for over 2000 cars. There is also space for 300 recreational vehicles at \$1.50 a night. Camper area is a two minute walk from the convention center buildings.

The banquet, scheduled for 4 P.M. Sunday, will feature the famous Santa Maria top sirloin barbecue. . . all you can eat! The dining hall seats 1250 persons.

Many interesting technical sessions and an ARRL open forum on Saturday, a swap meet and numerous exhibits both days, with breakfasts and contests on Sunday will keep everyone pleasantly occupied without hurry or pressure. Owen Garriott, W5LFL, a NASA astronaut, will be banquet speaker. ARRL Hq. staffers Perry Williams, W1UED, and Jerry Hall, K1PLP, will be in attendance. Registration including banquet, costs \$10.50 to October 7; \$12.50 thereafter. For more information write Hamcon Inc., P.O. Box 695, Santa Maria, CA 93454.

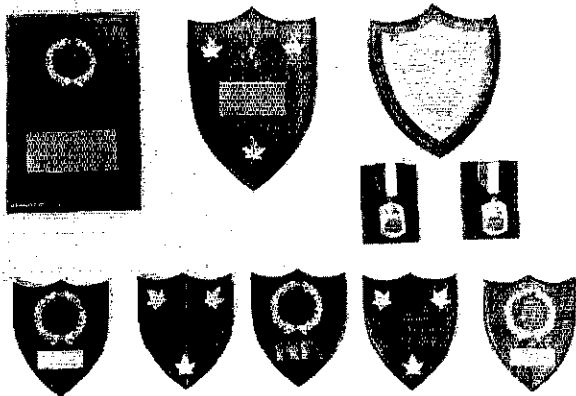
COMING ARRL CONVENTIONS

October 14-15 - Pacific Division, San Mateo, California

October 21-22 - Hudson Division, Tarrytown, New York

October 20-22 - Southwestern Division, Santa Maria, 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 Hq. for up to two years in advance.



12th RTTY DX Sweepstakes

(Photo by Robert Hudyma.)

1) The contest commences at 0200 GMT Sat. Oct. 14 and ends at 0200 GMT Mon. Oct. 16, 1972. The total contest period is 48 hours but no more than 36 hours of operation is permitted. Time spent in listening counts as operating time. The 12 hour non-operating period can be taken at any time during the test but times on and off must be summarized on the log and score sheets.

2) The contest will be conducted on the 3.5, 7, 14, 21 and 28 MHz amateur bands.

3) Use the ARRL Country list, except that KL7, KH6 and VO are to be considered as separate countries.

4) The message is to consist of a message number, time in GMT, zone and country.

5) All two-way contacts with stations in one's own zone will receive two points. All two-way contacts with stations outside one's own zone will receive points listed in the Zone Chart (see page 54, Sept. 1969 QST). Stations may not be contacted more than once on any one band. Additional contacts may be made with the same station if different band is used for each contact.

6) 100 bonus points will be added for every VE and VO station contacted. Bonus points to be added to total score at the end.

7) Entries will be classified as either single or multioperator stations. Individual operators of multi-operated stations can submit their logs singly and compete as single operators, instead of submitting a group log. Logs from multi-operated stations, or Group logs must compete for multi-operated station awards.

8) A multiple of one is given for each country worked including one's own on each band. e.g. If one country is worked on 3 bands, 3 multipliers are given.

9) CARTG log sheets are available for SAE or IRCs. Separate pages will be used for each band. Information contained will be band, exchange numbers, times in GMT, station calls, zones, countries, exchange points and power. Logs must be received not later than December 1, 1972. Send them to: Canadian Amateur Radio Teletype Group, 85 Fifehire Road, Willowdale, Ontario, Canada.

10) To score, the total exchange points multiplied by number of Countries worked, multiplied by number of continents (maximum 6). Finally bonus points added.

Scoring Example

Exchange points 2020, countries 40, continents 5.
 Score: $2020 \times 40 \times 5 = 404,000$ pts, Bonus: 6 VE
 Contacts = 600 points. TOTAL SCORE = 404,600.

Awards

Fifteen plaques will be sponsored by C.A.R.T.G. members and the *RTTY Journal*. High Score USA — Gold Medallion and Ribbon by *RTTY Journal*. High Canadian Score — Gold Medallion and Ribbon — Canadian Director's Award. "Green RTTYer" High Score (never participated in any RTTY contest) — Sidney Burnett Memorial Plaque. 10 Meter High Score — plaque by C.A.R.T.G. High Score for low power stations (under 100w input) — plaque by *RTTY Journal*. SWL Printer High Score — plaque by C.A.R.T.G. High Score Multi-Operated Stations — plaque by *RTTY Journal*. Certificates for top scores in each USA and Canadian district and in each country.

QST

Strays

The Lincoln Amateur Radio Club will operate with the call KTØNEB from the Nebraska State Fair through September 6, on all bands around the clock. An appropriate QSL card will be available.

Updating that 35 wpm list on page 110 of the June issue, that name Benkey should have been Barkey and he holds the call WA8YVR.

An amateur radio exhibition station will operate from August 31 through September 9, at the Fairview Shopping Plaza (Montreal, Quebec) with the call VE2CWR. Activities include operation on 80 and 20 meters (cw and ssb), 2-meter fm, plus displays of antique gear, vhf equipment and SSTV. A special QSL card will be available to those contacting the station. Amateurs are invited to visit the exhibition located off the Trans-Canada Highway, exit 33.

AMATEUR RADIO PUBLIC SERVICE
NTS RACES AREC
In the Public Interest, Convenience, Necessity HRH

CONDUCTED BY GEORGE HART,* WINJM

IS THE PSHR TOO EASY?

THE BPL KEEPS getting smaller and the "Pisher" remains the dominant Honor Roll feature in this department of *QST*. Some have said that BPL is hard and PSHR is easy, and that's the reason. Others have said BPL is so easy, who wants it?

Actually, neither of them is particularly hard to achieve, if you consider the easiest way in each case. We hate to reveal how easy they might be, lest we get a rash of entries from those who prefer to utilize subterfuge rather than extending a real effort. However, the easiest way to make BPL is to originate 100 messages in a single month (four a day average would easily do it). These could be confirmations of contest or other QSOs, requests for QSL cards, birthday greetings, and all sorts of similar innocuous things, addressed to other hams. It would require the writing and transmitting of 100 messages, presumably in nets, but they could all be sent (perhaps by RTTY) to the same station for distribution. Nothing to it, really. There's your BPL. Report it to the SCM and there you are.

To achieve the minimum number of points to make PSHR can also be a fairly easy task. A phone-only amateur can do it by reporting into ten nets, and handling 20 phone patches, for example, without performing a leadership function and without help from a real emergency. If he operates cw, he can also report into 10 cw nets and handle only 10 phone patches and still make it.

While neither BPL nor PSHR is "something for nothing" (assuming the honor system), it does seem, on close analysis, that PSHR is easier. On the other hand, since it is a lot larger, its occupants are not quite such a select group as the BPLers. If we assume that it is the intention to make them both

*Communications Manager, ARRL.

about equal in effort required and accept the evaluation that PSHR is essentially easier to achieve, should we then strive to make PSHR harder or BPL easier? And if one of these, how to do it?

A lot of questions to digest in one sitting. Let's take them one at a time. First question, is it the intention to make them about equal in difficulty? Yes, the original Board Motion in 1969 required the headquarters to create a PSHR "similar to...and equal in stature to" the BPL. An honest attempt was made to do this, at the same time establishing the incentive of versatility.

Second question: is PSHR really easier? You can't make the PSHR, as you can the BPL, by doing just one thing (exception: handling emergency traffic during a real emergency). You have to be versatile, and to get into the upper echelons of PSHR you have to perform a leadership function. Note, for example, in July *QST*'s PSHR that not one of the scorers above 45 points made PSHR without performing a leadership function, and very few made it using one mode only.

So, where are we? Still think BPL is that much harder, considering not just the labor of making it, but the achievement of qualifications that make it possible? Oh sure, we could arbitrarily reduce the PSHR to the same size as the BPL by making 50 points the qualifying mark instead of 30 as now; or, we could expand the size of the BPL by lowering the requirements or by upping traffic count (e.g., more credit for originations, which two NTS Area Staffs have recommended); or we could change the PSHR point system to make it more difficult to acquire points to make the monthly listing; or we can eliminate one or the other.

Or, we can leave things exactly as they are. The easiest way always is to reduce the requirements, but this seldom improves quality and frequently lowers it.

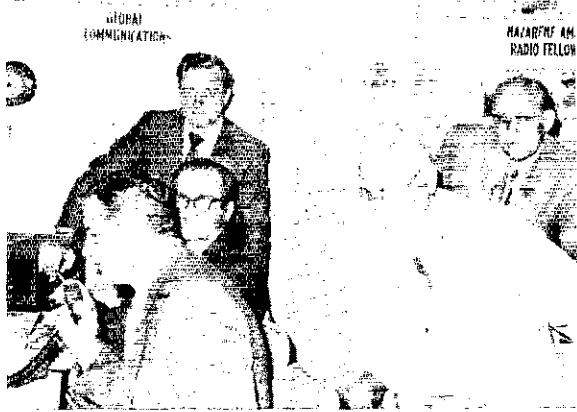
So this is just exploratory, a request for comments. Is PSHR too easy? Is BPL too tough? What should we do to equalize them, if anything?

- WINJM.



WA6IQK and XYL WN6EOO (background) participated in the Isleton, CA, flood emergency (reported in this month's Public Service Diary) from Sacramento Red Cross Headquarters. (Photo by K6FO)

At a recent assembly of the Church of the Nazarene held in Miami Beach, FL, the Nazarene Amateur Radio Fellowship set up their club station, WA0HPW/4, at a booth in the exhibit area. Shown left to right are W8TQD, K3WMH, WA9TRK, K4IE and W7OAW.



Traffic Talk

Every once in a while we get a letter from an operator who operates entirely or mostly by phone to the effect that we ought to have a traffic honor listing for those who handle traffic by modes other than cw. One such received just recently reminds us that it has been a long time since we pointed out that BPL is open to all traffic handlers, regardless of the mode used.

Then why the cw-oriented name? That's a long story, son. You may not believe it, but way back in the dark ages of amateur radio there was no voice operation (that's right, none at all). All ham traffic was handled by code, most of it on straight keys, most of them made of brass. *Voila*, the BPL! When phone operation started becoming popular in the early thirties, and some (not much) traffic was handled by that mode, such traffic was simply included as a part of each amateur's traffic total without thought to the fact that it wasn't really "brass pounding." Still later, when occasionally a phone-only amateur made the requirement for BPL, there was no thought to keeping him out of the BPL listing, which is and always has been an honor listing for all, not just cw, traffic handling.

Why do we keep such a name, then? It's tradition, son — same reason we keep the "Relay" in ARRL, although relaying is no longer our principal activity, nor even a significant part of our function as an amateur radio membership society. Of course there is a good financial reason (besides a tear-drenched tradition) why we don't eliminate the Relay from our name, but no such thing exists as concerns BPL. Accordingly, back in the late 40's a move was started to change the name of BPL to something else, and Message Pushers League seemed to be the favorite suggestion. However, in a poll of CD appointees, the whole idea was "shot down" and subsequently forgotten. We are quite willing to abide by tradition, and "Brass Pounders League" has a certain nostalgic appeal that couldn't readily be achieved by a more descriptive name — at least not by any that has come down the spout so far.

This is not to propose that the subject be reopened and another vote taken. It is only to assure anyone who had any question on the matter that BPL is open to all traffic-handlers, not just those who literally "pound brass." If you achieve 500 or more message points in a calendar month, or a total of 100 or more in the "origination" and "delivery" categories, report it with a complete breakdown into categories to your SCM (see address, p. 6) for your BPL listing. You don't have to be an appointee or even an ARRL member to qualify.

What are we saying? Report your traffic total anyway, even if it doesn't qualify for BPL. It all helps the amateur public service record.

National Traffic System. We have been reminded that it's about time for another explanation of the summary statistics which appear in this column every month, that most readers have no idea what they signify.

First of all, let's make it clear that the summary is not supposed to represent a competitive listing

of nets to see how they stack up against each other. The circumstances under which each net operates are so different one from the other that comparisons are completely meaningless. The summary is supposed to represent a statistical picture of how NTS performed during the particular month in question. Comparisons, where made, are with previous performance of the same net for the same month in previous years, or with performance of the entire system as indicated by "records" in

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for June Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
K9ONK	182	689	670	19	1560
W3VR	527	462	320	119	1428
WABETX	1096	86	54	10	1246
WA3HGX	300	481	151	300	1202
WA9VAS	127	485	65	420	1097
WA8VYQ	21	515	503	5	1044
W7BA	25	498	441	54	1018
K9ZSO	—	435	—	435	870
W6LCK	11	440	368	7	826
W3EML	43	303	234	—	580
WA3JGM	69	272	227	9	577
W6BBO	25	270	247	11	563
W8MCR	57	247	170	77	551
KSTY	2	267	267	—	536
WA4ACK	21	253	236	7	517
W1OJM	5	251	251	—	507
W4VKF	9	249	242	6	506
WB4AIW	33	234	212	22	501
K9ZSQ(May)	—	407	—	407	814

More-Than-One Operator Station

WA9CQ	124	1426	1298	118	2966
-------	-----	------	------	-----	------

BPL for 100 or more originations-plus-deliveries

K9YFK	245	W8OCU	136	WB2NRK	114
WA9GU	241	W9MSG	134	WB2UVB	113
W3ZRO	212	K8NQW	132	W6LXB	112
K3WRY	197	WA3CFU/3	131	WA9ZLN	112
E2SIN	190	WA3QOZ	129	WA2EPI	107
K8ONA	175	W9ESI	128	W2URP	107
K9EY	166	W5TI	127	WB4NCH	104
K2KTK	158	WN3RIY	126	WA3ATO	102
WA9SU	156	WA9ZAZ	126	WB8HDP	101
WN3RCI	152	W2OE	124	WB8DFK	100
K3NYX	142	W3TN	115	W8VYQ(May)145	
WB6VTK	137	WASZKE	115	K9YFK(May)209	

More-Than-One Operator Station

WB9BQ 278, W9WSV 232

BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listings: WA3QU, WA3QOZ, WB4PSP, W8VW, WA9YVT.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations 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.



A WestCARS-7255 Executive Meeting was held on June 11, in Fresno, CA. Pictured standing, left to right: W6HDV (Secretary), W6GFO, K7ZAU, WA6QKE (President), W6LHQ (Chairman of the Interference Committee), WA6TYR and WB6OAO. Kneeling, left to right: K6KOC, WA6NJA, WB6ABW and WA6CPP.

each of the columned categories. In explaining, we'll assume the reader has at least a rudimentary knowledge of NTS principles. Please observe the columns from right to left, and we'll number them for convenience.

(1) *Net*. The name of the NTS net or entity, in abbreviated form, starting with area nets, then region nets, then the three Transcontinental Corps (TCC) entities and finally the section and local nets lumped together in the word "Section."

(2) *Sessions*. The number of directed sessions conducted and reported by the net or entity during the month. Statistically, lack of a report is lack of a session. Note that TCC functions are also reported in this column, but not counted as net sessions.

(3) *Traffic*. The total number of times during the month that a message was sent from one net station to another net station at the specific instruction of the NCS. This does not include messages reported in but not cleared.

(4) *Rate*. The average number of messages per minute passed on that net during the month. It is determined by dividing the total traffic count for the month by the time (in minutes) that the net was in directed session during that month. This statistic does not apply to TCC or to section or local nets.

(5) *Average*. The average message handlings per session, obtained by dividing the traffic count by the number of sessions.

(6) *Representation*. If every region in the area is represented in the area net at every area net session, or every section in the region is represented in the region net at every region net session, the percentage is 100. Anything less reduces the percentage below the perfect mark.

TCC entities (by area) include only the number of functions and the total out-of-net traffic handled during the month. (In-net TCC traffic is included in net reports, so this would be duplicative.)

Section and local nets are lumped together as to sessions (2) and traffic (3), with identity of each net reporting footnoted in abbreviated form.

The "Summary" is the total in the case of sessions (2) and traffic (3), the identity of the net with the highest rate (4) and the overall average (5) of all NTS nets reporting.

The "Record" is the best that has ever been achieved in that category for that particular month in all NTS history. If the "summary" figure exceeds the "record," then the former becomes the new record in subsequent listings; otherwise, the old "record" carries forward for another year. Since NTS is now 23 years old, the records are getting harder and harder to beat.

June reports. Bad aurora accounted for most of the missed functions on EAN. CAN reports highest rate ever and first miss in representation in two years. W2FR reports increased traffic on 2RN because of the flood. Howie also notes many stations listed traffic as "P2" rather than its replacement, "Q". Vacations are affecting the RN6 line-up, W7BQ would like to see more RTTY involvement in traffic handling and more traffic originated. W8CHT reports that 8RN did a reasonable job during the floods in the east. However, more practice is needed. Unreported sessions and poor representation are getting W9HRY down. He issued annual 9RN certificates to W9s CXY DND HRY NXG QLW FLF, K4s DZM QCQ PW, WA9ZUE, and initial certificates to WB9s CIL GVT, W9UCR, W4BAZ, WA9ZAZ. New IEN certificates went to WB0s CNM BIY, WA0s AAD RRA. Traffic activity during the week of the flood was three to four times above the normal average on 3RN. More receiving stations would have been helpful.

Net	Sessions	Traffic	Rate	Avg. Rep. (%)
EAN	30	1771	1.260	59.0 96.7
CAN	30	1155	1.043	35.2 98.9
PAN	30	1089	.969	36.3 100.0
1RN	60	527	.365	8.8 92.8
2RN	61	655	.652	10.7 98.7
3RN	60	610	.445	10.2 97.2
4RN	42	383	.331	9.1 67.6
RN5	60	616	.356	10.3 92.5
RN6	60	773	.419	12.9 100.0
RN7	58	188	.231	3.2 62.9
8RN	57	699	.622	11.7 77.8
9RN	56	348	.360	6.2 80.0
TEN	60	721	.626	12.0 74.6
TWN	38	229	.241	6.0 39.3
TCC Eastern	1191	664		
TCC Central	931	568		
TCC Pacific	1181	836		
Sections ²	2232	10,862		4.9
Summary	2934	22,694	EAN	7.8
Record	3242	23,817	1,149	15.9
Late Reports ³				



Calgary, Alberta, AREC contributed to the May 1972 "Miles for Millions - March for Man" Walkathon by their 2- and 80-meter communications. Assistant VHF EC VE6AMC is shown at the communications control center, VE6NQ/6.

1TCC functions not counted as net sessions.

2Section and local nets reporting (65): ANEB, ANED, ANFO, ANER, ANET (AL); IEN, NCN, OrgLO, SCN (CA); ACN (CO); BEM, CN, CPN, NVHF (CT); DEPN (DE); FAST, FPTN, FATT, FM2N, GN, QFN, QFTN, TPTN, VEN; WFPN (FL); GSN (GA); IUN (IL); TLCN (IA); QKS (KS); KTN (KY); LAN (LA); SCN (ME); WMN (MA); MJN, MSN, MSPN, PAW (MN); MON 1, MON 2, MSN, WEN (MO); NJN, NJSN (NJ); NMPTN (NM); NLI (NY); CNL (NC, SC); APRMN, BN, BNR, OSSBN, SSEN (OH); EPA, GCRN, PPTN, WPA (PA); TN, TNN, (TN); TTN (TX); BUN (UT); VSBN (VA); NSN, PSEN, WSN (WA); BEN, WIN, WBSN (WI); APSN (AB); MTN (MB); GBN (ON); WQV/UHF (PQ).

3May net report received before deadline but inadvertently not listed in August QST.

4Section nets reporting: FPTN, GN, QFN, TPTN, (FL).

Transcontinental Corps. WQLCX reports that the South Dakota and eastern floods plus the International Trailer Rally at Louisville, Ky. boosted TCC Central traffic totals. Everyone did a fine job handling emergency traffic. TCC Eastern certificates went to K4VDL and W8VDA/4.

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	119	93.3	1980	664
Central	93	94.6	1186	568
Pacific	118	92.5	1656	836
<i>Late Reports</i> ³				
Eastern	124	96.0	1861	655
Central	93	96.7	998	497

The TCC roster (June): Eastern Area (W3EML, Dir.) - W1s BJG EJJ NJM QYY YNE, W2s FR GKZ, K2KTK, W42s KCU UWA, W2s LZN RKK, W3EML, K3MVO, WA3OGM, W4s SOQ UQ, K4s KNP VDL, W8s IBX PMJ RYP RTN VDA/4, K8KMQ, WA8PM, Central Area (W0LXC, Dir.) - W4OGG, WA4WWT, W84s KPE YCV, W5s MI SBM OU, K6KCB/S, W9s CXY DND HI INH LCX ZHN, K0s AEM DDA, WA0s IAW MLE, Pacific Area (W6VNO, Dir.) - W5RQ, K5MAT, W6s BGF EOT IPW MLF MNY RSY VZI VNO, WA6DEL, W7s BQ DZX LKB EM GHT KZ PL, W0LO, K0JSP.

Independent Net Reports (June)

Net	Sessions	Traffic	Check-in
Clearing House	26	227	400
729U Traffic	44	728	1955
75 Meter ISSB	30	295	1015
IMRA Traffic	48	500	1627
20 Meter North American Tfc	26	377	521
20 Meter ISSB	22	1756	456
Hit & Bounce / MW	30	844	327

Public Service Diary

On April 14, VE7BJO/marine mobile in his fishing boat, was passing Wallace Bay, BC, a small community of a half dozen people, when he saw someone signaling to him. On landing, he found that a woman was in labor. VE7BJO contacted a doctor through VE7BYC and VE7AJO. Another doctor, VE7HV, was monitoring and the two doctors supplied instructions for delivery of the baby by VE7BJO. He then transported mother and child to the hospital. -- (VE7FB)

Public Service Honor Roll June, 1972

This listing is available to amateurs whose public service performance during the month indicated qualified for 30 or more total points in the nine categories below. A delineation of the points awarded for each function is given in the category key at the end of the Honor Roll listing. Please note maximum points for each category. Those making fewer than 45 points are listed with point totals only.

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Total	
Max. Pts.	10	10	12	12	12	20	3	3	5		
W2MTA	10	10	12		12			18	2	231	
WB4NCH	10	10		12	12			3	6	5	112
W3E7T	9	10	12	12	12	10			16	5	86
W2OE	10	10	3	12				3	29	5	72
WA3NAZ	10	10	12	12	12				11	5	72
WB8DEK	10	10	12	12	12	8				5	69
WA0VYB	10	10	12	12	12	13				5	69
WA3QOZ	10	10	12	12	12				6	5	67
WA8ETX	10	10	12	12	12	3	3			5	67
WA8UPI	10	10	12	12	12	3				5	64
WB2AEH	10	10	12	12	12					5	61
WB2CXY	10	10	12	12	12					5	61
WB4PNG	10	10	12	12	12					5	61
WB4SVH	10	10	12	12	12					5	61
K0BAD/4	10	10	12	12	12					5	61
WB8HUP	10	10	12	12	12		3			5	59
WA3JUG	10	10	12	12	12	2				5	58
W7OCX	10	10	3	12	12				6	5	58
WB8KVV	10	10	12	12	12					5	57
WA0VAS	10	10	12	12	12	20	3			5	57
K2KTK	10	10	12	12	12			12		5	56
WB9AHJ	10	10	12	12	12					5	56
WB0CCB	10	10	12	9	12			3		5	56
WA7JQS	10	10		12	12	15				5	54
K1OXD	10	10	12	9	12					5	53
WB2OYV	10	10	12	9	12					5	53
W1YNE	10	10	9	9	12	1			1	5	52
WB8EEZ	10	10	3	12	12					5	52
WA9ZAZ	10	10	12	3	9			3		5	52
WB2WRK	10	10	12	3	12	1	3			5	51
WB3NOM	10	10	12	6	12					5	50
WA2UOO	10	10	12	12	12			1		5	50
K4BR	10	10	12	12	12					5	49
W421Y	10	10	12	12	12					5	49
W7HQ	10	10	12	12	12					5	49
K8NOW	10	10		12	12	7	3			5	49
K0BIX	10	10	12	12	12					5	49
VE3FRU	10	10	12	12	12					5	49
VE3GFN	10	10	12	12	12					5	49
W2TPV/0	10	9	12	12	12					5	48
WB2UFG	10	5	12	3	12					5	47
WB4SOA	10	10	12	3	12					4	47
WB5EIN	10	10	12	3	12					4	47
W6LYY	10	2	6	12	12				5	47	47
WB8CWD	10	7	12	6	12					4	47
WB0CMM	10	10	12	3	12					4	47
WA3GSM	10	10	3	6	12					5	46
W6MNY	10	7	9	3	12					5	46
WB4PTH	10	10		12	12		1			4	45
WA8VYO	10			12	12	8	3			4	45
W2BII	44	W9HR9	40	W3TN	34						34
WR2EEX	44	W1UBG	39	K4KNP	34						34
WA2ICU	44	W2FR	39	W5TES	34						34
K3OIO	44	W2RUF	39	W6YBV	34						34
WA6DEL	44	W3LOS	39	W9Q1W	34						34
WA6TV4	44	W3NEM	39	VF3AJA	34						34
W7GHT	44	W6INH	39	VF3CYR	34						34
K7OUF	44	K0AEM	39	K8YUW/5	33						33
WB1MI	44	VE3EWD	39	VF3GT	33						33
WB8JEL	44	WB2IKL	38	WA2AYC	32						32
WB8V	44	WA0MLL	38	WA2FOO	32						32
WA0QEX	44	WB4EKJ	37	K3KAJ	32						32
VE3JRG	44	WA4UQ	37	W6DEF	32						32
VE3GBR	44	VE3DIO	37	WB8RMV	32						32
VE4SB	44	WB2CHY	36	K8MLQ	32						32
KSROZ	43	W3YA	36	WB9BAP	32						32
WA2EPI	42	WB6AKR	36	VE3EHL	32						32
WB8BPY	42	WA3DUM	35	VE3EQZ	32						32
WASVKE	42	WA3QOR	35	WB0DDQ	31						31
WB4SKJ	41	WB4WHK	35	W2CLU	30						30
WB4YCU	41	K1SKF	34	WB6JOT	30						30
WB4IMH	40	W3OKN	34	WB9BAQ	30						30
		WA3QIA	34								30

*Denotes multioperator station.

Category Key: (1) Checking into cw nets, 1 point each; (2) Checking into phone/RTTY nets, 1 point each; (3) NCS cw nets, 3 points each; (4) NCS phone/RTTY nets, 3 points each; (5) Performing assigned mission, 3 points each; (6) Legal phone patches, 1 point each; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.



WAGYWS operates a message service in conjunction with the Eastern California Museum. The publicity has helped both amateur radio and the museum. Here a visitor observes Bill's traffic handling.

At 1910Z June 11, WB4WYA operating mobile, spotted a forest fire just off the Blue Ridge Parkway about 20 miles south of Roanoke, VA. W4WWQ responded to the 2-meter fm call and reported the sighting to the chief park ranger. Several fires were found when rangers arrived. -- (W4WWQ)

On June 21, a levee burst on the San Joaquin River near Isleton, CA, causing considerable damage. K6QIF, Red Cross disaster communications officer, set up in Sacramento Red Cross Headquarters, using the Mount Vaca Radio Club repeater, WA6UGY. W6GDO, club trustee, installed two UHF base stations at headquarters. RACES RO, WA6HGH, manned the Sacramento Co. c.d. repeater from c.d. headquarters at Sacramento City Hall. Unfortunately, the c.d. repeater would not reach this remote part of Sacramento Co. At the Sacramento Army Depot, KØRBO activated a new Army MARS repeater, and dispatched WA6BAR and WB6BME to the disaster area. The MARS repeater was used for health and welfare traffic. Several four-wheel-drive vehicles moved into Isleton and administrative and health and welfare messages for the Red Cross were sent. The two repeaters handled Red Cross traffic continually for four days - until 2300 June 24. Forty-seven amateur contributed over 1200 hours participation. -- (K6FO)

WN8LCN set up a portable station at the fire house, thereby establishing communications between the two services. K8SWW and WB8AKH provided mobile and handi-talkie communications from the fire scene. Club generators were used for lighting the area during the clean-up activity. -- (W8JWQ)

On May 14, amateurs of the Madison County (IN) c.d. SKYWARN program were alerted via K9LPW repeater to a tornado. SKYWARN Supervisor, WA9CWE, established a net through WA9WVC repeater in Anderson. Eleven 2-meter fm mobiles were dispatched through the county. Portable units were sent to city and county police departments and c.d. The local Red Cross Chapter was manned by WA9OKK. Twenty hams participated in the watch which continued for over two hours. -- (WA9CWE)

On May 17, the Boeing Employees Amateur Radio Society's emergency group of Seattle, WA, was asked to activate a portable station at day-break the following day to aid in the search for two climbers lost on rugged Mt. Garfield. WA7BSQ was dispatched to the scene and had the club station, K7NWS/7 on the air at 1400Z. W7CJL operated from his station in Seattle. Phone patch traffic was handled to Seattle, Tacoma, Everett, Ft. Lawton and McChord Field. Over sixty men and two military helicopter groups were involved. All traffic from the scene of the accident was by amateur radio. Late in the day the bodies were found. -- (W7RJW EC King Co, WA)

During Field Day, WA1EMU, a police officer operating portable atop Windsor Mountain in Western MA, recognized several teenagers being sought by police. He arrested them and had WA1MJE/mobile, at the site, request help from the state police. K10XV/1 responded to the call and police arrived within 15 minutes. -- (WA1MJE)

At the conclusion of Field Day activities, members of the Cedar Valley Radio Club, Cedar Rapids/Marion, IA, were called upon to send for help for a bicyclist who had collided with an automobile. WØLIJ contacted WØLPQ by way of WAØVVA repeater, to summon police and ambulance. WØHUP, WØLTL and WBØBPH assisted at the scene. Assistance arrived within four minutes. -- (WØLIJ EC-RO Zone 9, IA)

During a thunderstorm watch in Tulsa, OK, June 27, thirty-two amateurs participated in weather net operations. Six tornado funnels were reported to c.d, who issued warnings to the public. The WA5LVT repeater was the only common link
(Continued on page 96)

Happenings of the Month



DIRECTOR ELECTIONS NOTICE NOMINATIONS FOR ADVISORY COMMITTEES BOARD MEETING MINUTES

ARRL DIRECTOR NOMINATIONS OPEN

To All Full Members of The American Radio Relay League Residing in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions:

Nominations are now in order for director and vice director in these eight divisions of ARRL. Only ten Full Members need to join together in naming a candidate, by a petition which must reach the Secretary of ARRL by noon EDST September 20.

Democracy within our League starts with these nominations. If more than one candidate is nominated, and each meets the requirements explained below, then all Full Members of the League in the division will have a chance to choose from among the candidates by secret ballot between October 9 and noon of November 20.

The election procedures, outlined briefly here, are specified in the Articles of Association and Bylaws; copies will be sent to members free upon request. An informational pamphlet generally outlining duties and responsibilities of elected League officials is also available for the asking.

Any eligible Full Member of the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf Divisions can be nominated for either director or vice director. If one person is nominated for both offices, his nomination for director will stand and that for vice director will be void; no person may simultaneously be candidate for both positions.

Since all the powers of the director are transferred to the vice director in the event of the director's death, resignation or inability to serve, careful selection of candidates for vice director is just as important as for director. The following form for nomination is suggested:

*Executive Committee
The American Radio Relay League
Newington, Conn. 06111*

We, the undersigned Full Members of the ARRL residing in the division, hereby nominate of as a candidate for director; and we also nominate of as a candidate for vice-director; from this division for the 1973-1974 term.
(Name Call City Zip Date)

OVERSEAS AND ABSENTEE BALLOTS

ARRL members licensed by FCC or DOT but temporarily resident outside the U.S. or Canada are eligible for Full Membership. These members overseas who arrange to be listed as Full Members in an appropriate division prior to September 20 will be able to vote this year where elections are being held.

Even within the U.S., Full Members temporarily outside the ARRL division they consider home may now notify the Secretary prior to September 20, giving the current QST address and the reason why another division is considered home (e.g., holding an amateur call appropriate to the division). So if your home division is the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf, but your QST goes elsewhere because of a different residence, please let the Secretary know, as soon as possible but no later than September 10, so you'll receive a ballot for your home division.

The signers must be full members in good standing. The nominee must be the holder of at least a General Class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full Member of the League for a continuous term of at least four years at the time of his election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, is commercially or governmentally engaged in frequency allocation planning or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in Newington, Conn., by noon EDST of the 20th day of September, 1972. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his



The March *QST* article, "Broadband Solid-State Power Amplifiers for Ssb Service," won the *QST* Cover Plaque Award for Roy C. Hejhall, K7QWR. Presenting the plaque at a Motorola function was Thomas J. Connors, vice president and general manager of the Semiconductor Products Division at left.

signature to more than one petition for the office of director and one petition for the office of vice director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominators are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and vice director but members are urged to interest themselves equally in the two offices.

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

Voting by ballots mailed to each Full Member will take place between October 9 and November 20, except that if on September 20 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are: *Central*: Philip E. Haller, W9HPG and Edmond A. Metzger, W9PRN. *Hudson*: Stan Zak, K2SJO and George A. Diehl, W2IHA. *New England*: Robert York Chapman, W1QV and Roger E. Corey, W1AX. *Northwestern*: Robert B. Thurston, W7PGY, and David O. Bennett, W7QLE. *Roanoke*: Victor C. Clark, W4KFC and L. Phil Wicker, W4ACY. *Rocky Mountain*: Charles M. Cotterell, W0SIN and Allen C. Auten, W0FCN. *Southwestern*: John R. Griggs, W6KW and Arnold Dahlman, W6UEI. *West Gulf*: Roy L. Albright, W5EYB and Jack D. Gant, W5GM.

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

For the Board of Directors:

July 1, 1972

JOHN HUNTOON, W1RW
Secretary

HAROLD C. BIRD, W8DPE

We regret to report the death on July 5 of Harold C. Bird, W8DPE, first director from the

Great Lakes Division who served from January 1, 1947 to January 1, 1950. Hal was SCM of Michigan from 1938 to 1947; assistant director from the Great Lakes Division; secretary-treasurer, Associated Public Service Communications Officers, Michigan Chapter; communications officer, County of Oakland Civil Defense; member of the Oakland County Radio Club and the Quarter Century Wireless Association. He was, we understand, always available to help newcomers get into amateur radio, too. A retired telegrapher for Western Union, Hal was 77 years old.

ADVISORY COMMITTEE NOMINATIONS

One of the many ways in which members help steer the course of the League is through advisory committees in specialized fields — presently contests, VHF Repeaters, and DX. There is a maximum of eleven members in each group, and initial appointments of terms up to three years are authorized. The full rules may be found as an addendum to the Articles of Association and By-Laws, edition of March 1, 1972. (Copy on request to members; a stamped, self-addressed envelope of standard business size would be appreciated with the letters "AABL" on it.)

Candidates for committee membership may be nominated at any time by three sponsors, each of whom is a Full Member of ARRL. Each candidate must have been a League member for a minimum of two years; licensed as a Technician or higher for three or more; and currently and consistently active and qualified in the specialty area of the field served by the advisory committee.

This is a call for nominations; convenient forms may be obtained by writing the secretary at ARRL Hq. The President, in consultation with the committee chairman and liaison members, on or about November 1 of each year, will select replacements for members whose terms are expiring, or shall reappoint them for a subsequent term as appropriate. A file of eligible nominees will be maintained for use as a source of replacements.

A member's initial term of office will be either for two or three years as designated by the President, with approximately one-half the initial members having two-year terms. Members may be reappointed for no more than two consecutive two-year terms, but are again eligible for appointment to committee membership after a lapse of one year.

The incumbents, with date of expiration of current term, are:

VHF Repeater Advisory Committee

Gilbert J. Kowols, W9BUB, Chairman, 216 Belle Plaine Ave., Park Ridge, IL 60068, January 1, 1973.

Arthur M. Gentry, W6MEP, 7832 Jellico Avenue, Northridge, CA 91324, January 1, 1974.

Leon Giannakeff, VE3BUI, 1107-35 Tobermory Road, Downsview, Ontario, January 1, 1974.

Jon Marcinko, W7FHZ, 26501 18th Pl. So., Kent WA 98031, January 1, 1974.

George F. Munsch, W5VPQ, 11314 Janet Lee, San Antonio, TX 78230, January 1, 1973.

George D. Rose, Jr., W4GCE, 105 Middleboro Place, Lynchburg, VA 24502, January 1, 1974.

Howard L. Lester, W2ODC, A.P.O. Box 6, Alplaus, NY 12008, January 1, 1973.

Richard G. Bromley, K1ABR, 12 High View Drive, RFD 5, Cranston, RI 02920, January 1, 1973.

Raymond Gary Hendrickson, W3DTN, 1419 Larch Road, Severn, MD., 21144, January 1, 1974.

Contest Advisory Committee

Leonard Chertok, W3GRF, Chairman, 8301 Temple Hills Road, Washington, D.C. 20031, January 1, 1973.

G. Peter Chamalian, W1BGD, 5C Colonial Drive, Rocky Hill, CT 06067, January 1, 1974.

Kenneth Bay, W4UQ, 1925 Parkland Drive, Lynchburg, VA 24503, January 1, 1973.

Philip J. Goetz, W6DQX, Box 5491, Los Angeles, CA 90055, January 1, 1974.

Katashi Nose, KH6IJ, 4207 Huanui Street, Honolulu, HI 96816, January 1, 1973.

Fred Deziel, W0HP, 2417 West 112th Street, Bloomington, MN 55431, January 1, 1975.

Jack Ravenscroft, VE2NV, 353 Thorncrest Avenue, Montreal, Quebec 780, Canada, January 1, 1975.

Jo. R. Kilgore, W2ELF, 5 Sunnysbrook Court, Stratford, NJ 08084, January 1, 1974.

James T. Rafferty, WA9UCE, 529 Buckingham Place, Libertyville, IL 60048, January 1, 1974.

William H. Parry, K5TSR, 4343 Bright Sun Drive, San Antonio, TX 78217, January 1, 1974.

DX Advisory Committee

Bob Eshleman, W4QCW, Chairman, 3716 Drakeshire Road, Richmond, VA 23234, January 1, 1973.

Ted M. Marks, WA2FQG, 924A Village Drive West, North Brunswick, NJ 08902, January 1, 1974.

Robert B. Vallio, W6RGG, 18655 Sheffield Road, Castro Valley, CA 94546, January 1, 1973.

Norman G. Ray, W7LFA, 14005 132nd Avenue NE, Kirkland, WA 98033, January 1, 1973.

J. O. Baumgardner, W8BF, 20470 Lorain Road, Fairview Park, OH 44126, January 1, 1974.

Robert E. Baird, W9NN, P.O. Box 498, Plover, WI 54467, January 1, 1974.

Clyde F. Norton, W0ELA, 14 Westwood Circle, Minnetonka, MN 55343, January 1, 1973.

Morton Wolfson, VE3MJ, 305 Rosemary Road, Toronto 10, Ontario, Canada, January 1, 1974.

John H. Thompson, W1BIH, P.O. Box 1, Torrington, CT 06791, January 1, 1974.

MINUTES OF THE 1972 SECOND MEETING

of the BOARD OF DIRECTORS

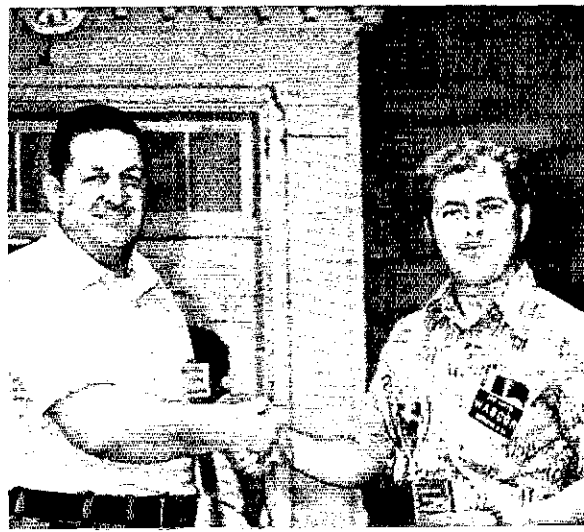
THE AMERICAN RADIO RELAY LEAGUE, INC.

July 20-21, 1972

1) Pursuant to due notice, the Board of Directors of The American Radio Relay League, Inc., met in second session at the Shoreham Motor Hotel, Hartford, Connecticut on July 20, 1972. The meeting was called to order at 9:33 A.M., with President Harry J. Dannals, W2TUK, in the Chair, and the following directors present:

Roy L. Albright, W5EYB, West Gulf Division
Ralph V. Anderson, K0NL, Midwest Division
Max Arnold, W4WHN, Delta Division
Robert York Chapman, W1QV, New England Div.
Victor C. Clark, W4KFC, Roanoke Division
Charles M. Cotterell, W0SIN, Rocky Mount. Div.
Noel B. Eaton, VE3CJ, Canadian Division
J. A. Gmelin, W6ZRJ, Pacific Division
John R. Griggs, W6KW, Southwestern Division
Philip E. Haller, W9HPG, Central Division
Harry A. McConaghy, W3SW, Atlantic Division
Alban A. Michel, W8WC, Great Lakes Division
Larry J. Shima, W0PAN, Dakota Division
H. Dale Strieter, W4DQS, Southeastern Division
Robert B. Thurston, W7PGY, Northwestern Div.
Stan Zak, K2SJO, Hudson Division

Also in attendance, as members of the Board without vote, were Charles G. Compton, W0BUO, First Vice President; R. O. Best, W5QKE, Vice President; and John Huntoon, W1RW, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were the following Vice Directors: Jesse Bieberman, W3KT, Atlantic Division; Edmond A. Metzger, W9PRN, Central; Franklin Cassen, W4WBK, Delta; George A. Diehl, W2IHA, Hudson; Paul Grauer, WA0LLC, Midwest; L. Phil Wicker, W4ACY, Roanoke; Larry E. Price, W4DQD, Southeastern; Jack D. Gant,



The West Virginia Field Day Trophy was presented to Bob Jarvis, WABCGR (right) for the Tri-State Radio Association by George Puzzuole, K8QEW, president of the West Virginia State Radio Council.



Mel Wilson, W2BOC/W1DE1 (center), won the 1971 ARRL Technical Merit Award for his studies of E-Layer propagation in the vhf range. Making the award at the Rochester Hamfest are Harry J. Dannals, W2TUK, president of ARRL (left), and Harry A. McConaghy, W3SW, Atlantic Division director.

Lincoln Cundall, W2QY, was picked as Western New York Amateur of the Year. The plaque is presented at the Rochester Hamfest by ARRL Canadian Division Director Noel B. Eaton, VE3CJ (left).

W5GM, West Gulf. There were also present Honorary Vice Presidents W. M. Groves, W5NW, F. E. Handy, W1BDL, and Carl L. Smith, W0BWJ; Treasurer David H. Houghton; General Counsel Robert M. Booth, Jr., W3PS; Assistant General Manager Richard L. Baldwin, W1RU; Communications Manager George Hart, W1NJM; Senior Assistant Secretary Perry F. Williams, W1UED; QST Technical Editor Doug DeMaw, W1CFR; and Public Relations Consultant Don Waters.

2) On motion of Mr. Gmelin, seconded by Mr. Clark, *unanimously VOTED to adopt the agenda* for the meeting as distributed, with the addition of reports of Item 6(k), "Special Committee on the Amateur's Code," and 6(l) "Advisory Committees."

3) On motion of Mr. Albright, seconded by Mr. Thurston, *VOTED* that the minutes of Board meetings will show the name of the person seconding each motion.

4) On motion of Mr. Thurston, seconded by Mr. Eaton, *unanimously VOTED* that the minutes of the 1972 annual meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

5) On motion of Mr. Chapman, seconded by Mr. Gmelin, *unanimously VOTED* that the reports of the Officers to the Board of Directors are accepted and the same placed on file.

6) At this point, extensive oral reports were offered by the officers of the League. During the course of these reports the Board was in recess from 10:44 until 11:01 A.M.

7) The Board was in recess for luncheon from 12:40 until 1:23 P.M.

8) Mr. Eaton, as chairman, presented the report of the Finance Committee; Mr. Gmelin, as chairman, presented the report of the Planning Committee; Mr. Arnold, as chairman, presented the report of the Membership and Publications Committee; Mr. Haller, as chairman, presented the report of the Public Relations Committee; Mr. Groves, as chairman, reported for the Merit and Awards Committee; Mr. Chapman, as chairman, presented the report of the Committee on the ARRL Foundation; Mr. Griggs, as chairman, pre-

sented the report of the Special Committee on a Hoover Memorial Station; Mr. Dannals, as chairman, presented the report of the Ad Hoc Committee on Goals and Objectives; Mr. McConaghy, as chairman, presented the report of the Special Committee on Reapportionment of the Atlantic-Hudson Divisions; Mr. Chapman, as chairman, presented the report of the Special Committee on Technical Symposia; Mr. Clark, as chairman, presented the report of the Special Committee on the Amateur's Code. Mr. Albright, as liaison director, reported for the VHF Repeater Advisory Committee; Mr. Clark, as liaison director, reported for the Contest Advisory Committee; Mr. Strieter, as liaison director, presented the report of the DX Advisory Committee.

9) On motion of Mr. Shima, seconded by Mr. Albright, after discussion, *unanimously VOTED* that the General Manager shall publish annually in *QST* a "pie-chart" showing the major sources of ARRL income and expense. The format to be as recommended by the Finance Committee.

10) On motion of Mr. Eaton, seconded by Mr. Gmelin, *unanimously VOTED*, at 2:55 P.M., that the Board does now resolve itself into a Committee of the Whole, for the purpose of considering staff remuneration. By request, the members of the headquarters staff departed from the meeting, and the Chair appointed Larry J. Shima as secretary of the Committee. The Committee arose at 3:15 P.M., and staff members returned to the meeting, whereupon the Board recessed until 3:26 P.M. The Chair presented the report of the Committee; on motion of Mr. Eaton, seconded by Mr. Griggs, *VOTED* to adopt the report of the Committee. Mr. Gmelin requested to be recorded as voting opposed.

11) Moved, by Mr. Eaton, seconded by Mr. Shima, that the Board of Directors adopt the ARRL Travel Policy recommended by the Finance Committee. After extended discussion, moved, by Mr. Gmelin, seconded by Mr. Chapman, to refer the matter back to the Finance Committee for further study; on a roll-call vote, the motion to commit was rejected, 4 votes in favor to 12 opposed; Messrs. Arnold, Chapman, Gmelin and McConaghy voted in favor; all other directors voted opposed. After further discussion, moved, by

Mr. McConaghy, seconded by Mr. Gmelin, to lay the matter on the table; a tie vote of 8 in favor to 8 opposed was broken by the Chair voting opposed, so the motion to table was lost. After further discussion, moved, by Mr. Gmelin, seconded by Mr. Strieter, to reconsider the earlier motion to table the matter; on a roll-call vote, the motion to reconsider was rejected, 5 votes in favor to 11 opposed; Messrs. Arnold, Chapman, Gmelin, McConaghy and Strieter voted in favor; all other directors voted opposed. The question then being on Mr. Eaton's original motion, the same was ADOPTED on a roll-call vote, 13 votes in favor to 3 opposed; all directors voted in favor except Messrs. Chapman, Gmelin, and Strieter, who voted opposed.

12) Moved by Mr. Albright, seconded by Mr. Shima, in order to achieve uniformity of reporting which will permit more efficient record keeping and analysis, that officers and directors requests for authorized administrative expense reimbursement be submitted to headquarters on forms designed by the Finance Committee. After discussion, moved, by Mr. McConaghy, seconded by Mr. Chapman, to lay the matter on the table; but the motion to table was rejected. After further discussion, the question then being on Mr. Albright's motion, the same was ADOPTED.

13) Moved, by Mr. Gmelin, seconded by Mr. Cotterell, that By-Law 12 of the League's By-Laws be changed to read as follows: . . . He shall attend all meetings of the Board. By March 1 of each year . . . each director shall file with the secretary a written report . . ." After discussion, on a roll-call vote the motion to amend the By-Laws was rejected, 7 votes in favor to 9 opposed; Messrs. Clark, Cotterell, Gmelin, Griggs, Shima, Strieter and Zak voted in favor; Messrs. Albright, Anderson, Arnold, Chapman, Eaton, Halter, McConaghy, Michel and Thurston voted opposed.

14) Moved, by Mr. Cotterell, seconded by Mr. Gmelin, that a new director-elect be reimbursed for actual expenses incurred on the League business, between the date of being declared elected and the date of assuming office, subject to the following limitations: (1) The amount to be reimbursed not to exceed 10% of that year's allocation to his division; (2) Any amount expended to be deducted from the first year's allotment to his division; (3) All expenditures so reimbursed to be in accord with Board authorized policy in effect at the time such expenditures were incurred. But, after discussion, the motion was rejected, 5 votes in favor to 11 opposed.

15) Moved, by Mr. Clark, seconded by Mr. Shima, that effective January 19, 1973, By-Law 30, and By-Laws 32 through 36, be amended to set forth committee responsibility as follows:

30. The following standing committees are established:

- International Affairs
- Plans and Programs
- Membership Affairs
- Management and Finance
- Legal and Regulatory

31. The International Affairs Committee, as directed:

- Maintains liaison with IARU member societies
- Provides representation at international meetings
- Maintains liaison with U. S. Government Agencies in international matters.
- Encourages the growth and strengthening of IARU member societies
- Encourages the growth of amateur radio in under-developed countries
- Performs appropriate studies
- Makes recommendations for Board action in international areas
- Develops planning and strategy for improving and expanding international frequency assignments to the amateur service
- Provides consulting assistance
- Monitors expenditures in the areas of the committee's jurisdiction and prepares an annual report

33. The Plans and Programs Committee, as directed:

- Develops and appraises short and long term plans for ARRL
- Reviews, refines and makes recommendations regarding new programs and undertakings
- Makes feasibility studies
- Monitors and appraises role of ARRL vis-a-vis changing technology, social trends and needs
- Appraises, on a continuing basis, changing needs for frequency band allocations and sub-band assignments
- Monitors and encourages public relations and undertakings, recommending to Board for action programs and enterprises designed to enhance the public image of amateur radio
- Monitors expenditures in the areas of the committee's jurisdiction and prepares an annual report

34. The Membership Affairs Committee, as directed:

- Performs studies and makes recommendations for Board action in areas of membership interest pertaining to:
 - Affiliated club matters
 - Field Organization affairs
 - Membership awards and recognition
 - Publications, new and existing
 - Membership services provided by Headquarters

Navy MARS had an exhibit at the National Orange Show in San Bernardino which attracted some photogenic spectators who posed with the booth operators. From left, Bill Lentz, W6VOZ/N0PWH; Dianne Twigg, New Zealand Orange Queen; Curly Schrader, NRU San Bernardino; Gayle Gorrell, California Citrus Queen; and Jack Hughes, WB6SOI/N0UUG, 11th Naval District MARS director.



Membership growth
 Voting and election matters
 Appraisal of membership attitudes, problems,
 needs and commitment
 Prepares an annual report

35. The Management and Finance Committee, as directed:

Makes recommendations to the Board regarding changes in management structure and procedures to improve operations

Performs continuing reviews of all aspects of League management performance and effectiveness, as well as League finances

Provides advisory services to the Board and the General Manager in areas of staff management structure and remuneration

Makes recommendations to the Board in connection with audit and tax matters

Acts as advisor to and supervisor of the Treasurer in regard to the investment of the League's funds

On an annual basis, and with the collaboration of the General Manager, reviews and approves the operating budget for the coming year

Formulates budgetary projections for the intermediate and long-term requirements of the League
 Prepares an annual report

36. The Legal and Regulatory Committee, as directed:

Conducts studies of proposed rule and regulation change requests

Conducts studies and engages in consultation activities in connection with litigation or potential litigation affecting the League

Provides assistance to the General Counsel in connection with Board recommendations for petitions and comments to the Federal Communications Commission and/or other governmental agencies and/or quasi-governmental agencies

Monitors progress of Board recommendations in the legal and regulatory fields and makes recommendations for Board action as appropriate

Monitors expenditures for legal assistance and prepares annual report

After discussion, on a roll-call vote as required, the By-Laws were amended, 15 votes in favor to none opposed; Mr. Albright abstained.

16) On motion of Mr. Michel, seconded by Mr. McConaghy, after discussion, unanimously VOTED that all divisions desiring shall be furnished a small display unit which shall consist of a cover cloth with ARRL emblem emblazoned thereon, sample publications, appropriate signs, membership applications and other items as deemed necessary by the Staff in order to promote the ARRL at conventions, hamfests, and similar amateur gatherings.

17) Moved, by Mr. Thurston, seconded by Mr. McConaghy, that a trial "tear-out" be inserted in QST which may be addressed to the respective division directors by clubs or interested individuals desiring bookings of either "Ham's Wide World" or "This is Ham Radio;" In addition it shall contain a listing of countries authorizing 3rd party traffic and reciprocal operating privileges. After discussion, on motion of Mr. Gmelin, seconded by Mr. Griggs, VOTED to amend the motion to refer the matter to the General Manager. The question then being on the motion as amended, the same was unanimously ADOPTED.

18) Moved, by Mr. Arnold, seconded by Mr. Michel, that League members who have reached the age of 65 and have been a continuous member for a minimum of 25 years shall be tendered the opportunity of obtaining Life Membership for 50% of the current rate. But, after extensive discussion, the motion was rejected.

19) On motion of Mr. Haller, seconded by Mr. Clark, after discussion, VOTED, 9 in favor to 5 opposed, that the Board establish a working fund of \$5,000 for use in preparing a film for future replacement of "The Ham's Wide World," and that the General Manager and Public Relations Committee supervise the production.

20) The Board was in recess for dinner from 5:53 P.M. until 8:26 P.M.

21) Moved, by Mr. McConaghy, seconded by Mr. Chapman, that the Merit and Award Committee study the desirability of augmenting the 50-year membership award. After discussion, moved, by Mr. Clark, to amend the motion to request the committee to consider additional lapel pins for membership terms between 25 and 50 years; but there was no second, so the motion to amend was lost. The question then being on the original motion, the same was unanimously ADOPTED.

22) On motion of Mr. Griggs, seconded by Mr. Thurston, after discussion, VOTED that the Herbert Hoover, Jr., Memorial Committee be continued in operation through January, 1973, and to continue its study, with a report of its deliberations and recommendations to be given to the next Board meeting, and further, that \$500 be authorized to cover committee expenses. Mr. Albright requested to be recorded as voting opposed.

23) On motion of Mr. Shima, seconded by Mr. Albright, after discussion, unanimously VOTED



Emergency communications following the Logan County floods earned the West Virginia Amateur of the Year Award for Willie Flannery, W8EKC. Presenting the plaque during the State ARRL Convention is West Virginia SCM Don Morris, W8JM.

that the Board of Directors adopt the following long range goals and milestones for the American Radio Relay League, Inc.:

THE BASIC PURPOSE OF THE AMERICAN RADIO RELAY LEAGUE, INC., IS TO SUPPORT AND ENHANCE AMATEUR RADIO:

I. By developing the Amateur Radio Service as a national and international resource.

through:

- A. Advancement of the state of the art.
- B. Dissemination of information.
- C. Encouraging the interest of youth in amateur radio.
- D. Providing emergency communication services to the public.
- E. Promoting international people to people contact.
- F. Providing our countries with a trained cadre of operators and technical personnel.

II. By strengthening membership in the amateur radio fraternity, both in numbers and commitment.

through:

- A. Improving the leadership credibility with the membership.
- B. Developing a new organizational concept based on a team approach.
- C. Strengthening membership services.

III. By fostering the proper use and improvement of our operating privileges.

through:

- A. Strengthening ARRL position with governmental agencies.
- B. Promoting and supporting the IARU and its member societies.

IV. By assuring effective management and direction of our organizational resources.

through:

- A. Assuring a sound financial position.
- B. Preserving and strengthening our headquarters resources.

24) On motion of Mr. Shima, seconded by Mr. Albright, after discussion, VOTED, 10 in favor to 5 opposed that the Board of Directors adopts the revised organization chart recommended by the Ad Hoc Committee, effective August 1, 1972. Messrs. Chapman, Gmelin, Haller, McConaghy and Michel requested to be recorded as voting opposed.

25) On motion of Mr. Compton, seconded by Mr. Thurston, after discussion, VOTED, 12 in favor to 4 opposed, that the Board of Directors adopts the position responsibilities recommended by the Ad Hoc Committee for the positions of President, Vice Presidents, and General Manager. Mr. Gmelin requested to be recorded as voting opposed.

26) On motion of Mr. Eaton, seconded by Mr. Shima, after discussion, VOTED that the Board authorize the Ad Hoc Committee to continue in

existence until the January 1973 Board meeting to continue efforts through the development of procedures phase.

27) On motion of Mr. McConaghy, seconded by Mr. Chapman, after discussion, unanimously VOTED that the recommendations of the working report of the Special Committee for Reapportionment of the Atlantic and Hudson Divisions be further studied by the Planning Committee.

28) On motion of Mr. Clark, seconded by Mr. Arnold, unanimously VOTED that the recommendations of the Ad Hoc Committee on the Amateur's Code be accepted, and that the revised text be employed in future printing.

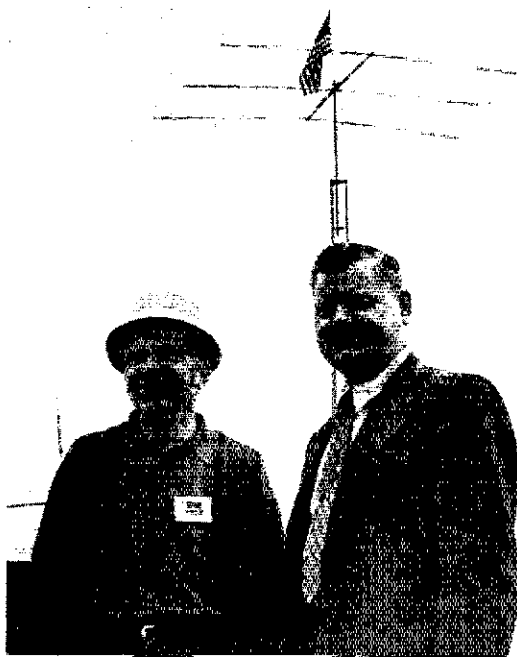
29) On motion of Mr. Gmelin, seconded by Mr. Chapman, unanimously VOTED at 10:15 P.M., that the Board recess. The Board reconvened at 9:02 A.M. on July 21, with all directors and other persons hereinbefore mentioned in attendance.

30) At this point, in view of Vice President (and IARU President) Robert W. Denniston's absence because of family illness, the General Manager reported to the Board on participation in the Region I IARU triennial conference during May, and Mr. Eaton reported on the meeting of the Region II IARU Executive Committee.

31) On motion of Mr. Cotterell, seconded by Mr. Shima, after discussion, unanimously VOTED that the Public Relations Consultant and the Public Relations Committee study the feasibility of conducting a major membership drive in 1973.

32) On motion of Mr. Strieter, seconded by Mr. Arnold, after discussion, unanimously VOTED that the League sponsor a competition to design an official ARRL QSL card to be used in celebration of the upcoming Bi-Centennial of the U.S. The competition shall be open to all U.S. licensed amateurs. The winning entry is to be used as the basis for printing plates which will be made available by the League to interested printers at the actual cost of plate preparation. Amateurs may then purchase the QSL cards as they wish from normal commercial outlets. The winning designer to receive an appropriate plaque and suitable publicity in *QST* not later than December 1973.

In this FD photo, the object at right resembling the Washington Monument is actually the Washington Monument! ARRL President Harry J. Dannals, W2TUK, is given a tour of the Department of State Amateur Radio Club setup on The Mall in Washington, D.C. by club prexy John H. Swafford, W4HU. There is no truth to the rumor that W3DOS/3 used the Monument as an antenna support.



33) On motion of Mr. Griggs, seconded by Mr. Gmelin, after discussion, VOTED that the Membership & Publications Committee undertake a study of the *License Manual* with the aim of recommending its updating and such other revisions as may be considered necessary.

34) On motion of Mr. Albright, seconded by Mr. Shima, VOTED that wherever feasible, printed circuit templates published in *QST* be full size.

35) The Board was in recess from 10:15 A.M. until 10:32 A.M.

36) Moved by Mr. McConaghy, seconded by Mr. Griggs, that approval be granted to hold a 1976 Atlantic Division Convention in the Philadelphia, Pa. metropolitan area, date and exact location to be determined; but, after discussion, Mr. McConaghy withdrew the motion.

37) On motion of Mr. Haller, seconded by Mr. Zak, unanimously VOTED that upon determination of the time and place for the holding of an Executive Committee meeting, all directors and vice directors be so notified.

38) Moved, by Mr. Shima, seconded by Mr. Albright, that the General Manager shall publish Board and Executive Committee actions in *QST* grouped as follows: International Affairs; Plans and Programs; Membership Affairs; Management & Finance; Legal and Regulatory. As published in *QST*, the minutes would show the sponsoring director or officer and a summarized version of the motion as finally acted upon. Detailed minutes would continue to be published in Directors' Letters and a copy of the minutes would be available to any member upon request. After extensive discussion, on motion of Mr. Gmelin, seconded by Mr. Chapman, VOTED to refer the matter to the Membership & Publications Committee, with instructions that the study include ascertaining opinions of members as to publishing the minutes and how many members actually read the minutes.

39) Moved, by Mr. Arnold, seconded by Mr. Thurston, that any club submitting a Life Membership application shall have the option of retaining \$3.75 of the first quarterly payment; but, after discussion, the motion was rejected, 6 votes in favor to 8 opposed.

40) On motion of Mr. Zak, seconded by Mr. Shima, after discussion, VOTED, 10 votes in favor to 4 opposed, that the Planning Committee, in cooperation with the Communications Manager, study the feasibility of ARRL purchasing or constructing portable 2 meter FM repeater equipment for use in emergencies. Same study to include

other such emergency equipment as deemed appropriate.

41) Moved, by Mr. Anderson, seconded by Mr. Arnold, to amend By-Law 19 by substituting the word "February" for the word "January." But, on a roll-call vote as required, the motion to amend the By-Laws was rejected, 2 votes in favor to 14 opposed; Messrs. Anderson and Haller voted in favor; all other directors voted opposed.

42) On motion of Mr. Chapman, seconded by Mr. McConaghy, the following resolution was unanimously ADOPTED by a rising vote of applause:

WHEREAS, Roland B. Bourne, W1ANA, served as curator of the ARRL Museum from July 1963 until his death on February 8, 1972, and

WHEREAS, his skill, historical knowledge and craftsmanship in rehabilitating exhibits have brought the museum into national recognition, and WHEREAS, his friendliness and outgoing spirit in correspondence and with visitors has greatly stimulated contributions to the museum, adding to its completeness, now therefore,

BE IT RESOLVED, by the Board of Directors of The American Radio Relay League in meeting assembled at Hartford, Connecticut this 20th day of July, 1972, that the ARRL Museum of Amateur Radio is hereby dedicated to the memory of

ROLAND B. BOURNE

and further

BE IT RESOLVED, that an appropriate copy of this action be properly displayed at an appropriate place within the museum.

43) On motion of Mr. Gmelin, seconded by Mr. Thurston, unanimously VOTED (Canadian Director Eaton abstaining), that the General Counsel continue in discussions with the Federal Communications Commission to emphasize the need for an increase in the frequency of field examinations and in the number of examination points.

44) On motion of Mr. Clark, seconded by Mr. Chapman, unanimously VOTED that the Board of Directors endorses the concept and structure of the Amateur Satellite Service Committee, recently established, and endorses the policy of continued ARRL support to this phase of amateur activity.

45) On motion of Mr. Strieter, seconded by Mr. Arnold, after discussion, unanimously VOTED (Canadian Director Eaton abstaining) that the League General Counsel be instructed to request the FCC to incorporate procedures whereby written examination elements for General Class and higher licenses may be taken in Spanish before the FCC examiners when so requested in advance by the applicant.

46) Moved, by Mr. Griggs, seconded by Mr. Haller, that the Board does hereby instruct the General Manager to emphasize periodically in *QST* the existence of a "gentlemen's agreement" concerning frequencies used for SSTV on the HF



Amateur Radio Week in Kearny, NJ: Charlie Carpenter, W2IXD, club president; Mayor Anthony Cavalier; Police Captain George King, CD Director; Marty Schreck, Jr., K2YFF, chairman for the June 4-10 event.

bands so as to minimize friction and avoid undesirable rule making on the subject. After discussion, on motion of Mr. Clark, seconded by Mr. Strieter, unanimously VOTED to amend the motion to substitute the words "various specialized modes" for "SSTV." The question then being on the motion as amended, the same was unanimously ADOPTED. (Canadian Director Eaton abstained in both actions.)

47) Moved by Mr. McConaghy, seconded by Mr. Thurston, that the FCC be petitioned to provide element examinations for amateur licenses with credits for elements passed. After discussion, on motion of Mr. Gmelin, seconded by Mr. Haller, unanimously VOTED to amend the motion to provide that the General Counsel shall continue his present work toward the stated objective. The question then being on the motion as amended, the same was unanimously ADOPTED. (Canadian Director Eaton abstained in both actions.)

48) On motion of Mr. Zak, seconded by Mr. Shima, after discussion, unanimously VOTED that the Public Relations Committee make a study to determine the best approach to inform the public on malfunctions of RF interference to automobile electromechanical devices.

49) On motion of Mr. Anderson, seconded by Mr. Zak, after discussion, unanimously VOTED that the Membership & Publications Committee recommend minimum qualifications for affiliation of radio clubs.

50) On motion of Mr. Chapman, seconded by Mr. Albright, after extensive discussion, unanimously VOTED that the ARRL sponsor a Technical Symposia to be managed and programmed by the League General Manager or his designee, and held in the Washington, D.C. area in 1973.

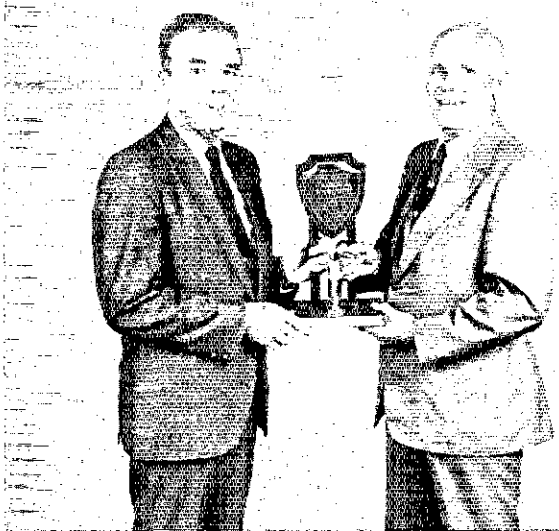
51) On motion of Mr. Thurston, seconded by Mr. Chapman, unanimously VOTED that this Board go on record as being opposed to any form of compulsory amateur call sign changes, such as that currently being reported in the amateur press.

52) On motion of Mr. Gmelin, seconded by Mr. Michel, after discussion, unanimously VOTED that in view of the invitation by the President of the United States to all countries to help in the coming celebration of the U.S. bi-centennial, the ARRL through the IARU, shall invite member societies to take part in appropriate related amateur radio activities. Further that the President of the IARU be instructed to submit to the Board at the next meeting a tentative plan for IARU participation in any activities that may be held during the bi-centennial year.

53) On motion of Mr. Clark, seconded by Mr. Chapman, after discussion, unanimously VOTED that a study be undertaken by a special committee, with the assistance of the General Manager, into the need and feasibility of augmenting building resources at headquarters to accommodate the needs and activities of ARRL.

54) Moved, by Mr. Griggs, seconded by Mr. Thurston, that the Board does hereby instruct the General Counsel to petition the Federal Communications Commission to grant single letter (suffix) call signs to amateurs who have been licensed continuously for fifty years. After discussion, on motion of Mr. Arnold, seconded by Mr. Chapman, unanimously VOTED that the matter is laid on the table.

55) On motion of Mr. Albright, seconded by Mr. Shima, unanimously VOTED that the Board express its appreciation to the headquarters staff



Tennessee's Outstanding Amateur of 1971 is J.D. Hattaway, WA4BXZ, left, here receiving a trophy from Fred Dellinger, WB4MPJ, chairman of the Tennessee Council of Amateur Radio Clubs. The award, presented at the Crossville Hamfest in July, was based on WA4BXZ's work as a club officer, as a District MARS director, as an instructor for Novice and General licensing classes and for work with disaster organizations.

for its excellent work in preparing the 1972 *Radio Amateur's Handbook*.

56) Moved, by Mr. McConaghy, seconded by Mr. Griggs, that the FCC be petitioned to provide a rule and general order which would automatically open all band segments to emergency net operations, in time of declared emergency conditions of a given location. But, after discussion, the motion was rejected, 3 votes in favor to 9 opposed. (Canadian Director Eaton abstained.)

57) The Board was in recess for luncheon from 12:20 until 1:20 P.M.

58) On motion of Mr. Zak, seconded by Mr. Clark, unanimously VOTED that the ARRL Board of Directors approve holding a 1974 ARRL National Convention in New York City on July 18-21, 1974.

59) Moved, by Mr. Gmelin, seconded by Mr. Arnold, that the Ad Hoc Committee on long range planning work in close cooperation with the Amateur Satellite Service Committee to institute a long range plan for the use of space communications by amateurs. Further that the Ad Hoc Committee make planning for space communications its number one priority. After discussion, on motion of Mr. Strieter, seconded by Mr. Albright, unanimously VOTED to amend the motion by deleting the last four words and substituting therefor, "one of its higher priorities." After further discussion, moved, by Mr. Shima, to refer the matter to the Planning Committee; there was no second, so the motion to commit was lost. The question then being on the original motion, the same was rejected.

60) On motion of Mr. Clark, seconded by Mr. Albright, unanimously VOTED that the Planning Committee be instructed to study, in cooperation with the Communications Manager, the feasibility

and possible benefits of establishing an ARRL national Advisory Committee to function in the area of emergency communication activities, and to make appropriate recommendations.

61) Moved, by Mr. Strieter, seconded by Mr. Zak, that the General Manager is directed to cause the *QST* column "Recent Equipment" to be modified to include the following: (1) All significant operating parameters of specimen equipment are to be measured in the technical laboratory; (2) Results of these measurements are to be reported in the review article in the form of a tabular summary; (3) Where appropriate, manufacturers specifications of claimed performance are to be compared with actual measurements in the summary; (4) When an item of obvious widespread amateur interest is not offered by the manufacturer for review, the technical staff is authorized to purchase the subject equipment on the open market for review. The equipment acquired thereby to be retained for League use where appropriate and needed, otherwise to be sold on the open market, provided that the total cost of implementation of this provision shall not exceed \$2500 annually. But, after discussion, on motion of Mr. Clark, seconded by Mr. Chapman, VOTED that the matter is laid on the table; Mr. Griggs requested to be recorded as voting opposed.

62) On motion of Mr. Griggs, seconded by Mr. Gmelin, after discussion, unanimously VOTED that the Board does hereby instruct the Membership and Publications Committee to study the feasibility of producing a simple, easy to read book on "how to get into amateur radio," and to distribute it via newsstands for sale to the general public at low cost.

63) Moved, by Mr. McConaghy, seconded by Mr. Shima, that the automobile allowance be raised to 15 cents per mile under 500 miles, and 12-1/2 cents per mile over 500 miles. But, after discussion, on motion of Mr. Compton, seconded by Mr. Shima, unanimously VOTED that the matter is referred to the Finance Committee for study.

64) On motion of Mr. Clark, seconded by Mr. Thurston, unanimously VOTED that the Planning Committee is instructed to study, in cooperation with the Communications Manager, the role, functions and responsibilities of the office of Section Communications Manager, and to make recommendations for any changes deemed desirable.

65) At this point, upon invitation from the Chair, the several vice directors and honorary vice presidents in attendance offered various comments.

66) Moved, by Mr. Griggs, seconded by Mr. Gmelin, that henceforth any appointment of any member to any of the League's Advisory Committees by the League President shall be subject to the approval of the Executive Committee, and receive the advice and consent of the division director concerned. But, after discussion, on motion of Mr. Clark, seconded by Mr. Shima, VOTED that the matter is laid on the table.

67) On motion of Mr. Arnold, seconded by Mr. Albright, after discussion, unanimously VOTED that the President establish an Ad Hoc Committee to establish basic guide lines for League policy regarding space communications and that the sum of \$500 be made available for committee expenses.

68) On motion of Mr. Clark, seconded by Mr. Zak, unanimously VOTED that the matter of establishing club areas for contest purposes be referred to the staff for determination and implementation upon completion of a current study by

the Contest Advisory Committee to improve upon existing rules for club contest participation.

69) On motion of Mr. Clark, seconded by Mr. Strieter, VOTED that the rules and regulations concerning advisory committees are amended as follows: Paragraph 5, line 3, change "May 1" to read "November 1," Paragraph 5, after ". . . COMMITTEE AFFAIRS." add: "THE TERM OF OFFICE SHALL BEGIN JANUARY 1." Paragraph 6, after ". . . AS APPROPRIATE." add: "MEMBERSHIP BECOMES EFFECTIVE ON JANUARY 1." Paragraph 8, line 1: Change to read "One member of the Board of Directors, a vice director, or an elected officer. . ." Paragraph 10, after ". . . so identified." add: "Special studies and other tasks may be assigned to the committee by the Board and staff as appropriate."

70) On motion of Mr. Compton, seconded by Mr. Thurston, the following resolution was unanimously ADOPTED:

WHEREAS, Miss Doreen Cromarty, supervisor of the membership records section in the Circulation Department rounded out 25 years of service in March 1972, and

WHEREAS, throughout that time she has contributed energy and intelligence to the work of the League, thereby contributing greatly to good relations with the members of ARRL,

Now therefore, BE IT RESOLVED, that the Board of Directors of the American Radio Relay League do hereby convey to Doreen Cromarty their deep appreciation and warm thanks for her continued faithful service to the League and amateur radio.

71) On motion of Mr. Compton, seconded by Mr. Griggs, VOTED to take from the table Mr. Strieter's motion concerning the "Recent Equipment" column in *QST*. On motion of Mr. Compton, seconded by Mr. Thurston, unanimously VOTED to amend the motion by striking the text and substituting therefor the following: that the General Manager with the assistance of the Technical Department staff, develop an alternate plan for amateur equipment evaluation and reporting. Report to the Board of Directors by September 30, 1972 estimates for staffing, acquisition of additional test equipment, and development of standards for testing amateur equipment. The question then being on the amended motion, the same was unanimously ADOPTED.

72) On motion of Mr. Best, seconded by Mr. Strieter, unanimously VOTED that through our President the Board express to Vice President Robert W. Denniston that we hope and pray for the speedy recovery of his family.

73) On motion of Mr. Best, seconded by Mr. Chapman, the following resolution was unanimously ADOPTED:

WHEREAS, Miss Leitha M. Phillips, order and billing supervisor in our Circulation Department, in February 1972 completed 25 years of service, and WHEREAS, throughout that time she has exhibited great attention to detail and devotion to duty, contributing to the reputation of the League among those who distribute the bulk of ARRL publications,

Now therefore, BE IT RESOLVED, that the Board of Directors do hereby express to Leitha M. Phillips their deep appreciation and warm thanks for her continued faithful service to the League and to amateur radio.

74) On motion of Mr. Arnold, seconded by Mr. Thurston, unanimously VOTED that the Member-

ship & Publications Committee is authorized an additional amount not to exceed \$600 for expenses during 1972.

75) On motion of Mr. Clark, seconded by Mr. Shima, unanimously VOTED that the staff is instructed to establish and maintain permanent records for reference use in assisting the membership to secure and defend automobile call letter license privileges.

76) On motion of Mr. Clark, seconded by Mr. Zak, after discussion, unanimously VOTED that the Merit and Awards Committee be instructed to investigate the practicality of issuing one or more additional pins to mark membership tenure in the interval between 25 and 50 years.

77) On motion of Mr. Clark, seconded by Mr. Griggs, unanimously VOTED that the sum of \$500 be allocated to the Planning Committee to enable completion of its work during the remainder of 1972.

78) On motion of Mr. Chapman, seconded by Mr. Compton, the Board was in recess from 3:32 to 3:40 P.M.

79) Moved, by Mr. Haller, seconded by Mr. McConaghy, that the minutes of this meeting show that the Board discussed FCC RMs 1951 and 1980. After extensive discussion, moved, by Mr. Albright, to amend the motion to add RM 1615; but there was no second, so the motion to amend was lost. After additional discussion, the original motion was ADOPTED.

80) On motion of Mr. Compton, seconded by Mr. Griggs, unanimously VOTED, at 4:35 P.M., that the Board does now adjourn *sine die*.

81) (Total time in session as a Board, 14 hours, 46 minutes; as a Committee of the Whole, 20 minutes. Total direct appropriations, \$7,100.)

Respectfully submitted:
JOHN HUNTOON, W1RW
Secretary

Minutes of

EXECUTIVE COMMITTEE MEETING

No. 341

July 19, 1972

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Shoreham Motor Hotel, Hartford, Connecticut, at 4:26 P.M. July 19, 1972. Present: President Harry J. Dannals, W2TUK, in the Chair; First Vice President Charles G. Compton, W0BUO; Directors Victor C. Clark, W4KFC, Noel B. Eaton, VE3CJ, John R. Griggs, W6KW, and Robert B. Thurston, W7PGY; and General Manager John Huntoon, W1RW. Also present were General Counsel Robert M. Booth, Jr., W3PS, and a number of other directors and vice directors.

On motion of Mr. Eaton, affiliation was unanimously GRANTED to the following societies:

Badger Amateur Radio Society (Univ. of Wis.), Madison, Wisconsin; Charlotte Amateur Radio Club, Charlotte, N.C.; Chula Vista Junior High School Amateur Radio Club, Chula Vista, Calif.; Cyclone Amateur Radio Club of the Union Drive Association of Iowa State University, Ames, Iowa; The Douglas Aircraft Company Amateur Radio Club, Inc., Long Beach, Calif.; Dummy Load Radio Club, Martin, So. Dakota; Guelph Amateur Radio Club, Guelph, Ontario; Heelan Amateur Radio Club, Heelan High School, Sioux City, Iowa; Hoosier Hot Shots Amateur Radio Club, Sau

Pierre, Ind.; IBM Explorer Post 204 B.S.A., Endicott, N.Y.; Indxers, Indianapolis, Ind.; Kalamazoo Central High School Electronics & Amateur Radio Club, Kalamazoo, Mich.; Konocit Amateur Radio League, Clearlake Highlands, Calif.; McLean Amateur Radio Association, McLean, Virginia; Northern Virginia FM Association, Inc., Arlington, Virginia; Spring Valley High Amateur Radio Club, Columbia, S.C.; Springbrook Operating & Transmitting Society, Nashville, Tenn.; Talawanda High School Amateur Radio Club, Oxford, Ohio; The Thacher School Amateur Radio Society, Ojai, Calif.; Worldradio Staff Amateur Radio Club, Sacramento, Calif.; Yellow River DX Club, Portage, Mich.

On motion of Mr. Thurston, unanimously VOTED to grant approval for the holding of a Southeastern Division Convention in Miami, Florida, on January 20-21, 1973, and a Great Lakes Division Convention in Muskegon, Michigan, on March 23-24, 1973.

On motion of Mr. Clark, unanimously VOTED to grant Life Membership to the following applicants:

Lane Abbott; Fred W. Abide, Jr., K5AEU; Rita Adams, WB9GBO; Hugh G. J. Aitken, WA1FBE; Richard H. Allardyce, W2GOF; Otto D. Allen, K0APA/WA7LOD; Gary Anderson, W2UCZ/WB4HFH; James R. Anderson, W4KEY; Gerd A. Asche, VE7AOK; Otis L. Atherton, W2TOI; Larry Atkinson, K0JWN; George W. Ayer, WA5LJE; William D. Baisley, KH6EQM; Douglas P. Barack, WA8GML; Roger W. Bassett, W9RAF; J. R. Bassil, VE3YT; Thomas L. Basso, K1CEC; Philip E. Battey, W3FZV; Robert R. Beatty, III, K4IEX; Francis J. Beck, W3POG; Harold L. Beddor, W7JPD; James E. Beistle, K5VYY; Nelson L. Bell, W0OOT; Julian R. Benjamin, W4RZN; Glen D. Benskin, K6UH; Howard P. Bicking, K3ZIG; Charles F. Biele, W2AOS; M. Daniel Blackburn, III, K5ZCO; Gilbert L. Boelke, W2EUP; James Bolton, Jr., WA4WJG; Hall S. Bond, K5ZSB; Stuart E. Bonney, W5PAQ; James G. Botts, K4EJQ; H. E. Boughan, W0AAW; Ronald H. Bradford, WB6ZWN; Victor J. Braidwood, K2DE; James W. Brant, WA6AOP; James R. Breen, WB6ZOK; Stanley J. Briggs, W8MPD; Herrick B. Brown, W4ZZ; John C. Brown, WB4PRF; Leonard L. Brown, W2DFK; William B. Brown, W4OUK; William F. Bruce, K3DAP; Kelly W. Bryan, W5ITU; George Buchanan, WN2FVX; Harry J. Burhans, Jr., W3HUS; Wilmer T. Burns, K3PHY; Lloyd A. Burrows, W5SIG; Fred L. Capossela, Jr., W2IWC; Quentin C. Cassen, W6OAP; Joel E. Chalmers, K1MTJ; Benjamin F. Christie, K2BF; Josephine S. Clarke, WB6ZUC; James T. Colby, Jr., W1QHS; Herman Cone, III, WB4DBB; R. B. Corns, K4MC; Wayne Cox, W8IUC; John C. Criner, Jr., WB4WBP; Minor W. Cross, Jr.; Edward B. Crossman, WA4SUF; Merle R. Crowley, W1GZS; Paul G. Dalman, WA3CHW; Robert O. Daniels, W0WXL; Vincent S. Daniels, WB4USR/SV0WJJ; Philip H. Dater, WA5JDZ; William H. Davis, Jr., WA3NAZ; Philip DeJarlais, W0JHS; Vernon L. Dillaplain, W5EOO; Edward R. Doubek, W9LJL; Roger C. Dow, WN4UEI; J. Elgan Dreibelbis, K17HHD; Dennis A. Drudge, WA9ZKN; Richard K. Eckert, Jr., WB4PYU; Stuart C. Edmonds, W0GW; Noel C. Edwards, Jr., W6IF; Kurt J. Eisenach, K0HKZ; William A. Ellis; Peter Erk, WA9TCR; Martin J. Feeney, Jr., K1OYB; H. Dewey Fesperman, WB4CEQ; Creath D. Fletcher, Jr., W6LYY; Harold J. Franklin, WA6CCM; Paul Friesen, VE3AQV; Richard E. Fry, K8RHR; Thomas G. Gabbert,

K3NZV; Richard Garlock, WA8SNR; Robert W. Gavin, K7PKT; Omer D. Getz, WA7OCV; Gilbert M. Gibbs, WA5YKK; Millard L. Gibson, W7JIE/WB6NMZ; Roy L. Gillett, Jr., W5MIE; William Gilroy, WB2LFV; Martin B. Gold, W3SB/WB2RCL; Allen Goodfellow, K2AYW; Gordon M. Goodfellow, WB5BEE; Douglas Griffin, WA1KRX; Robert E. Grinder, WA1QFZ/W6UYS; Robert W. Gumm, WA0NVX; R. Leo Gunther, VK7RG; Warren P. Hager, K2UFM; C. Michael Hall, WB9DUD; Edwin A. Hall, W1TRD; John H. Halstead, Sr., K0MVF; Alfred E. Hampton, W4BMO; Bruce M. Handy, WA8FTA; Joan N. Haro, WA5WGA; Robert E. Harper, W1FKP/WA8YSE; Norman G. Harrill, W4GOO; Gardner L. Harris, K2IQR; Philip Harris, WB2IQG; Robert C. Harsh, W4LPZ; James F. Hartley, W1DIS; James M. Hartshorne, W2RKG; Arthur P. Hasbrook, W5HWM; Owen W. Hawkins, Jr., WB4DKE; Clarence I. Haylett, HP1CH; William E. Haynes; Robert P. Healey, W1STW; Lawrence K. Heatwole, WN4WXD/9; Charles E. Henderson, WA5MYZ; Walter D. Herbert, K6LJW; William M. Hildebrand, W8EX; R. F. Hill, WB4JMG; Kazuyuki Hirobe, JA1JDP; A. E. Hirsch, Jr., K2SKV; George C. Hirst, WA8FMA; Weldon I. Hogue, W0IHI; Aubrey L. Hogue, Jr., W5TIL; Howard A. Holmes, WA6AVE; W. Stuart Home, WB6VRJ; Herbert Hoover, III, W6APW/WB6JIV; Ernest W. Horne, WA1FXU; E. T. Huddleston, W4HFR; Robert H. Hunter, WB2PNN; Dean L. Hutchinson, W0PWV; Herman R. Jacks, K7NER; Charles H. Jackson, W6GBG; William P. Jackson, Jr., K4AJG; Peter Urs Jacoby; Barry L. Johnson, K3RKE; A. Lloyd Jones, VE5J1; Edwin R. Jones, W7WPO; Elmer D. Jones, K4EUX; Dane C. Jordan, W6MWI; Kenneth L. Joseph, W4SIG; Chester F. Kaney, W9ECE; Roger C. Kaney, W9ZRU; John R. Kardehl, WB6ATM/H18XJK; David L. Kavan, WB2BED; E. Daniel Kay, Jr., K4HTY; O. D. Keaton, WA4GLS; Donald K. Kelley, WA0TJR; Arthur G. Kennard, WA2DXB; Robert E. L. Kennedy; Thomas E. Kennedy, WA1NVH/DJ0ZE; Sam G. Kihler, K4DNU; Kenneth P. Kling, W8VZT; R. C. Koch, W0WNY; Richard A. Kolter, WA0OVV; Regis K. Kramer, W4LFE; Stephen A. Kriso, K2OMP/W2BRJ; Kurt Ladwig, DL1VQ; Leon Lapkiewicz, K3TGM; James F. LaPorta, W5QGZ; Henry Lathrop, WB4ICK; Howard B. Lawton, WA3OTZ; Richard S. Lenaghan, VE8YE; Harry E. Lestajette, W7HHB; Lyle E. Lettzer, Jr., WN4YZB; Ernest L. Lindquist, WA7LRP; John E. Lomax, WB4GTW; Robert R. Losinski, WB0CCB; Joseph W. Long, WA2EJT; J. C. Ludwig, Jr., K4DFI; Douglas J. Lundberg, WB2FAR; Gary J. Lundberg, WA2-KMK; Frank W. Lynes, VO2KR/G3JKZ; Harold E. McClellan, W9FS; John R. McClenon, WB4WDL; Lewis G. McCoy, W1ICP; Arthur W. McLaughlin, W6THD; Frank B. McLaughlin, K0HWB; William B. McLeod, W4FKG; Charles W. Malewski, W0BAZ; Dale F. Mangels, WA7RWP/OX4; Joseph B. Matczak, W1RWK; M. Walter Maxwell, W2DU/W8KHK; David F. Mayhew, WA9ZVC; Donald J. S. Merten, K2AAA; Norman E. Meyers, WA8FKQ; Patricia Casey Miller, WA7GVV; Bill L. Mitchell, ex-XW8AX; WA6MEI; William F. Mitchell, Jr., WB4BWK; Harold Moore, W6DEF; Robert B. Morgan, WB5AOH; John A. Muhl, W0AIF; Joseph Mullan, W3RLR; Wendell P. Munro, W2HCP; Harry H. Murdock, WA7LQV; Ronald D. Murdock, WB5FIX; I. G. Murphrey, W4JWJ/SV0WU; Walter H. Murphy, WA5OCV; M. R. Neary, W6MUG/W7KEV; George E. Neilson, W9OTX; Wayne M. Nelson, W4AA; Walter M. Olson, W4OMI; J. S.

Overstreet, Jr., W1GTK; Paul W. Overturf, WA5-TIX; Claude L. Owens, WB6MDN; Garnet C. Owens, WN4TMZ; John C. Papp, W5UC; Edward C. Parish, WA2SCA; William C. Parris, K4GHR; Raymond Pautz, Jr., WA0KDE; Edvins Penikis, VK1VP; Louis E. Persons, W4PIG; Frank J. Pfeiffer, Jr., K9QMJ/W9CSC; J. Ernest Phillips, VE2-AYB; Bruce M. Plantin, K0RTX; Robert D. Plummer, W3ETJ; Benjamin F. Poinsett, K3KZV; Victor D. Politi, W1NU; Doris Porter, WA7JDO; Frederic J. Porter, Jr., WA1LQE; Don A. Premo, W3FWS; Charles B. Raybuck, W4YFB; Duane C. Redline, W3UQH; Gerald F. Regan; R. S. Rennie, VE3IR; Howard W. Reynolds, WA3EOU; Francis E. Rhodes, W5OUD; Brian C. Richardson, WB4QOM; William D. Ricks, K4RUT; M. D. Riddell, VE3QU; Fernand E. Rivard, 5VZYH; E. E. Robinson, III, W5YTN; John P. Roccaro, WA3-OIN; Ira Bruce Rogers, K6GAP; John J. Rosich, WB9CUC; Walter J. Rottenkolber, WB6RWQ; James A. Rupp, K3VHQ/DAQR; Joseph L. Saunders, K4GNP; Isaac J. Savoie, W5SSWS; H. Dave Schmidtke, W0BE1; Frederic W. Schremp, W6JAG; William Schuchman, W7GAF; Clarence S. Schultz, W0CHJ; Ralph C. Scott, K4AWY; Robert M. Seals, K9AHK; Mike Sefcik, K4ND; Henry G. Shaleen, W9EAL; Theodore E. Sharp, K6UYK; William Shibley, W3Q1I; John F. Shumaker, W2UJ/9; Warren A. Singer, WB4TAC; Charles E. Sketchley, K2POD; Robert J. Slagle, K4GR; Thomas K. Snell, K4HCW; Everett R. Snider, W7OEB; Raphael Soifer, K2QBW; R. A. Soules, WA6RXT; Frank C. Spear, K8ZPO; Jack Spencer, W9YF; Richard C. Spencer, W4UGE; Peter E. Sterling, K1TEV; Derwin H. Stevens, W1UYK/WA2DHA; Walter J. Stewart, W4URF; Donald R. Storey, VP9GQ; d Bruce E. Strem, WA3KZF; Leon W. Stuber, W8PH; Nicholas W. Sues, W7ZMD; Harris M. Sullivan, W9GHD; Walter J. Sutkowski, K2DPL; Mark T. Swearingen, W0LI; Joseph R. Swingle, W9DGW/8; Gene Sykes, W4BRB; John S. Tanner, K6EJF; Ralph C. Taylor, W0LQ; Richard M. Taylor, WA0NVN; Warren E. Taylor, WB0FAB; Francis A. Thompson, W9GDY; James B. Thompson, VE3BCA; A. K. Thurber, VE1AJT; James Tomashek, WA9NTV; C. A. Tomaszewski, WB6-IEN; James E. Totten, WA8HUB; Robert E. True, W3QD; Robert Tucci, WA3PID/DJ0ZX; Blake C. Tucker, WB4PLL; Fred J. Vandamme, VE2AVR; Donald I. Van Dorn, WA2ULP; Markus Vest, HE9FGT; Christian Vinson, W2GJJ; Willibald Vollkommer, W2HO; Robert C. Wagnon, W91UP; Reginald J. Walker, VE2YG; Sanders B. Walker, III, WB4EVH; N. York Walker, WA9YXF; William L. Walters, WA2IBM; Michael J. Ward, W6INA; Francis A. Watson, WN3QMM; John E. Wesson, WB5-AKZ/HK3; L. H. Westwood, VE3QG; Danny C. Whittington, WA5NLJ; Louis Wiederhold, WA1-HGE; William F. Wilbur, WB2MDP; Robert F. Wille, K2RQU; Carlin R. Williams, KH6AM; Robert L. Williams, K6EMN; John C. Willmuth, K3-BIX; Ellis P. Wilson, WN2LAQ; Ronald J. Wilson, WA8CVH; Frank J. Wojcik, W2SNJ; George R. Wood, W1SR/W1MTQ; Robert W. Wood, K0HUD; Walter Wooten, W1NTH; W. Wayne Wright, WB4HMY; Frank J. Zerilli, WB4PGO; Walter F. Zumbach, WA3AQA; Joseph L. Zwirn, K0PML.

There being no further business, the Committee adjourned, at 5:15 P.M.

Respectfully submitted,
JOHN HUNTOON, W1RW
Secretary



Correspondence From Members -

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

STORMY FD

● I happen to have been one of many members of the RACES networks and others working desperately to pass messages in or out of the flooded areas in southern New York and northern Pennsylvania, as the aftermath of the passage of Tropical Storm Agnes, from June 22 through the weekend. It may have been unfortunate that Field Day was scheduled for that same weekend, but the operators trying to make contacts for Field Day, in many cases, paid no attention to the traffic being handled. All too often, our traffic handling was interrupted by some station with a long "CQ Field Day," and if nobody called him back he would repeat.

There is a difference between preparing for any emergency and providing communication facilities in that emergency, and it seems to me that the second should take precedence. Apparently some seekers after high Field Day scores disagree or do not care. Certainly they are in the minority but they give amateur preparedness for providing emergency communications a bad name. I wonder if they want the Amateur Radio Service to end up with the kind of reputation that the Citizens Radio Service has acquired because of the relatively small number of "scoff-laws" in that service who operate as they please without regard for the other license holders. — *Ivan H. Loucks, W3GD/K4GD, Ulysses, PA*

● . . . It made mighty grim listening to hear, incessantly, "CQ Field Day," on top of stations that were trying to handle real emergency traffic. These rude, and obviously very poor operators, made no effort to listen and identify what was going on. To add to the tragedy, most of the stations heard here appeared to be operating from home locations. This, in itself, defeats the objective of Field Day, which, alone, has perhaps the only redeeming feature of all ARRL contests — emergency preparedness.

Of course, Field Day was scheduled far in advance of the flood, and you could not very well notify everyone through WIAW, though you did ask amateurs to exercise caution. However, one could hope that individual amateurs would recognize the situation, and react accordingly. With the widespread news media coverage on radio and TV, no one could have been unaware of the tragedy which was unfolding throughout the nation.

The weekend's activities served to reinforce my view that only minimal intelligence and social awareness are to be found in the average contest operator, in any event. This I can accept — under normal circumstances. It just means that I have to refrain from enjoying my pursuits whenever he is prowling the bands. I accept it, even though I am at a loss to understand what it is that he is trying to prove . . .

To this observer it was as though ARRL had suspended "The Amateur's Code" for the weekend. Doesn't it bother you that you wilfully

encouraged abandonment of paragraphs 1, 3, 4, 5, and 6 of this code of conduct which you established many years ago? It is now very clear that ARRL cannot long continue to cater to such limited, selfish, and socially-unaware, special-interest groups in the face of real needs on the part of the majority of League members. To continue is to give the lie to everything you have represented for fifty-eight years. — *L. W. Aurick, K3AZ/W2QEX, Lancaster, PA*

● . . . Being a native of Kingston, Pennsylvania and having a "mild interest" in the disaster, an attempt was made this afternoon (June 24) to communicate with someone residing in that general locale. After scanning the bands for about an hour and after calling "CQ Northeast Pennsylvania" (which was promptly answered by a W6 with a 5-8 report), a W3 was finally heard, just as he was giving his QTH as NE Pennsylvania. Luckily though, my call was answered with a "Can't copy Old Man, too much QRM," and Field Day operations on the frequency were not interrupted.

Thank you, fellow hams, for not allowing this minor incident in the Northeast to interfere with our emergency practice, and for restoring my faith in the common sense and intelligence of the public-serving operator. — *Jack Long, WB5GGY/WA3GKO, Dallas, TX*

● How much better it would have been had more hams simply listened.

Too often, well-meaning operators would try to "help" Net Control relay information. The sad result was total QRM of the net for precious seconds and minutes. Granted, the FCC blocked off some kHz for emergency-only traffic; however, when some hapless Field Day station strayed into the no-go space other well-intentioned OMs would QRM the net to shoo the interloper off.

I think one of the main problems as I listened were some of the net contributors. Communications too often floundered while an operator would keep his microphone open while talking to other operators in the shack, while requesting information on the telephone or looking up frequencies. Some operators insisted on repeating (rambling?) their message when one shot would have done it. Other operators apparently forgot they were using vox, or maybe the other guy wasn't and the result was frequent doubling or tripling on the net frequency.

The watchword is brevity. Unless an operator is sure about what he wants to say, he should keep quiet. When a station ends a transmission, that is the time to cue the other operator in by saying "Go" or "Over."

Agnes proved it for me. In an emergency normal ham operating procedures have got to go. There's a job to be done. — *John B. Meagher, W2EHD, Closter, NJ*

● The amateurs in this area with the most serious interest in emergency communications were

precluded from contesting by hurricane Agnes. From 0855 June 22 to 1750 June 26, our Lancaster County emergency net logged 70 hours of operation. We have no neat log to submit but I believe our operation was more meaningful than any Field Day operation. — *George S. Gadbois, W3FEY, Radio Officer, Lancaster County, Lancaster, PA*

● Due to the floods caused by tropical storm Agnes, many East Coast amateur radio operators were unable to participate in the annual Field Day festival. Instead they participated in local and state ARPSC and RACES operations, supplying most urgent communications for the flood stricken areas.

Somehow, through the Field Day madness, and ORM, ARPSC and RACES were able to clear required frequencies and pass essential messages.

The cooperation of the amateur radio fraternity and the excellent communications carried out by the ARPSC and RACES organizations add more brilliant chapters to our amateur radio history. — *Richard L. Siff, WA4BUE, Radio Officer, NORVA, Virginia Beach, VA*

THE VHF MANUAL

● Was pleased to see so much fresh material in the new *VHF Manual* and the generous use of solid-state circuits. The fm chapters by W1KLLK should prove very popular now that fm and repeater operation are so widespread. The space devoted to the hazards of rf power, particularly at 420 MHz and higher, was information long needed for the high power amateur on the ultra highs. It has been difficult to find in the professional publications until recently — and was a problem that W3GKP and I gave serious attention to, when we embarked on Project 2304. — *Paul M. Wilson, W4HHK, Collierville, TN*

BUGGY EXCLAMATION?

● In March Correspondence W3QY objected to SO as an exclamation point and suggested Since this could be mistaken as DDT, which is now largely banned, it might get us farmers in a lot of trouble. — *Robert G. Tischer, Starkville, MS*

BAND PLANNING

● I have noted the proposal for 220- and 420-MHz band plans, and must agree with your presentation, with one minor exception. I would like to see a slight increase in the cw allocation in the 220-MHz band. I believe that in view of the tremendous increase in activity on 220 in moon-bounce and other weak-signal efforts, an increase to 100 kHz for each of the two cw segments would not be out of order.

I am sure that your plans will meet with approval from a majority of amateurs interested in the 220- and 420-MHz bands. — *Jack C. Parker, W9GJJ/5, Edinburg, TX*

● This is to advise that the Lafayette Amateur Radio Club, Inc., at its last regular meeting voted to endorse and adopt the Texas Vhf-Fm Society plan for 2-meter fm channels as published in May *QST*. — *Lionel "Al" Oubre, K5DPG, Lafayette, LA*

● A comment on a fine, well thought out proposal for two meters "Towards A National Plan for 2-Meter Fm Channels," May *QST*. It can't

possibly work. It's just too logical and foolproof. Besides, it might mean that someone would have to change and it's well known amateurs are stubborn and boneheaded. But, please try anyway. *Harry David Bush, WA0IHW, Cedar Rapids, IA*

50 YEARS AGO

● Thank you so much for the 50 Year ARRL Pin. It's really neat!

It started me thinking back to the DeForest Galena Detector, the Brandes "Superior" Headset, the William B. Duck Co. "NAA Receiving Transformer," the Nutmeg Test Buzzer and the Murdock Condensers that brought in my first spark signals in the summer of 1920.

Then I thought of the nice letters you have been receiving from your December '71 *QST* article "We Got Across . . ." I thought it great, too. Curiosity got me and I dug out my logs of the Preliminary Trans-Atlantic Tests, held the first week of November 1921 to determine which stations would have a clear band for the up-coming Tests in December. With my 1/4 kW spark transmitter, I failed to qualify for the 1000 mile requirement.

So, I mostly listened. These are the stations I logged that were participating in the Trans-Atlantic Tests beginning the night of Dec. 7, 1921, using a two-step amplifier:

- 1 — *IARY, 1BCG, 1RZ, 1XM*
- 2 — *2AAX, 2AKO, 2AWF, 2AWL, 2BAK, 2EH, 2FD, 2FP, 2KP, 2XQ*
- 3 — *3PB, 3DH, 3GE spark, 3HG, 3JF*
- 4 — *4BQ, 4BY, 4EL, 4EN, 4GL, 4XB*
- 5 — All spark: *5DA, 5EV, 5HK, 5IS, 5JD, 5LO, 5NC, 5NS, 5PE, 5QS, 5ZL, 5ZZ, CW: 5JL*
- 8 — *8ACE, 8DY, 8AFC, 8AQA, 8AUO, 8BFX, 8BX, 8BK, 8BOX, 8BUM, 8DR, 8DZ spark, 8IL, 8KM sp, 8ML sp, 8TK sp, 8XF, 8ZG, 8ZU*
- 9 — CW: *9AW, 9ANR, 9BBE, 9BIL, 9DWJ, 9LQ, 9ZB, 9ZV, 9ZY SPARK: 9AAW, 9ABV, 9ACB, 9AEG, 9AFC, 9AFX, 9AIR, 9ARG, 9AMA, 9ANI, 9ANO, 9AOU, 9AQE, 9ARG, 9ARI, 9AXU, 9BKH, 9CP, 9DFE, 9DPH, 9DQO, 9HI, 9HT, 9KF, 9LE, 9MC, 9NX, 9TL, 9WI, 9WU*

CANADA: 3BP

"SPARK vs CW": Now the debate grew hotter and hotter. Calls in italics were among those who successfully got across. Nostalgia! I wonder how many of these operators are still active on the bands? *Aiva "Al" Smith, W0DMA, Caledonia, MN*

LONG-HAUL ACTION

● I just thought I'd let you know of the fun I've been having with the transmitter I built from your design "A 10-Watt, One-Tube Transmitter", *QST*, March, 1971.

In less than three short weeks of operating, I was frankly astounded with my results on 40 meters: sixteen states worked in sixty-two contacts, covering all of the American call areas and VE3-land.

One DX station was worked (FM7WT) with an RST 579 report (I would say I've averaged RST 579 on all contacts, regardless of distance). All this was done with a "compromise" antenna which is nothing much to boast about.

The final sentence in the article is quite true: this little rig will provide plenty of long-haul action with practically any antenna system. It's great! — *Edward P. Swynar, VE3CUI, Oshawa, Ontario*



CONDUCTED BY BILL SMITH,* KØCER

Uhf Rf Hazards

THE TOLERABLE LEVEL of exposure to rf radiation for humans is the subject of considerable disagreement in professional circles. Though the general problem of safety in the presence of high rf fields has been under investigation for many years, reliable information for guidance of the thousands of people now almost routinely exposed to what may be dangerous radiation levels has been described by responsible writers recently as "pitifully inadequate."

If you have not read of the experience of Bob Richardson, W4UCH, with his 432-MHz amplifier, it might be well to look up his letter in "Technical Correspondence", March 1972 *QST*, page 56. Dick Knadt, K2RIW, discussed safety standards in connection with his outstanding 2-part *QST* article describing his 432-MHz kilowatt amplifier, May 1972 *QST*, page 61. In a recent letter Dick calls attention to two very detailed articles on this complex subject in *Proceedings of the IEEE*. Both are invited papers; long, but exceptionally readable for this often rather hard-to-read but respected journal. They are well worth the attention of any amateur who proposes to work with high power levels in the bands above 300 MHz.

Because these papers are themselves largely digests of experience reported elsewhere, it is dangerous to quote from them here, as the context in which any significant numbers are given is necessary for full understanding of the authors' statements. Michaelson, "Human Exposure to Radiant Energy - Potential Hazards and Safety Standards," runs to 26 pages and has 292 references (*Proc. IEEE*, April, 1972). Johnson and Guy, "Biological Effects of Electromagnetic Waves," fills 24 pages and gives 149 references. It will be found in the June issue of the *Proceedings*.

* Send reports and correspondence to Bill Smith, KØCER, ARRL, 225 Main St., Newington, CT 06111.

With tentative standards set by various investigating agencies and governments ranging over an incredible spread, from 0.01 to 10 $\mu\text{V}/\text{cm}^2$, the best advice is to play safe. Do not work on high-powered rf amplifiers with shield covering removed. Protect the eyes, especially. Avoid the main lobe of any uhf directive antenna at distances under 50 feet, when the transmitter is delivering more than a few watts of power. Avoid long exposures at any appreciable power level.

When better precautions are available, we'll give them full publicity. Meanwhile, good common sense and a considerable safety factor are recommended. As in working with high supply voltages, eternal vigilance is all-important. — KØCER and WIHDQ

OVS and Operating News

50-MHz sporadic *E* observers of long standing are hailing summer '72 as one of the best ever. There has been an exceptional number of multihop openings, and foreign DX has added to the excitement. Around the country by call area, this is what has been reported. WAIDFL, Revere, Mass., had June contacts with such DX as FPØCA, VP5RS, KP4DKE and W6s. Steve says the low point was the June contest during which *E* was poor, at least in New England. WAINNW, Littleton, Mass., was pleased to work WIHOY/KP4, XE1PY, California and Arizona in late June and early July, plus more common single-hop distances. WA1ESZ, Concord, NH, worked many 4s, 5s, 8s, 9s, 9s and FPØCA. Dale also worked 50 stations during the June 17-18 aurora and heard VE4MA.

WA2MZH, New York City, worked multihop to W6 in early June and the aurora. K2UTC, White Plains, NY, reports much single-hop *E* over the eastern half of the country. No W3 reports were received this month.

With clinched fist, Bob Sutherland, W6PO, seems to say, "The darned thing finally worked." Bob made his first 144-MHz moonbounce contact June 11 working VE7BQH. Bob had assistance in building the 160-element collinear from K6KBE, left, K6MYC, second from right, and Bob's son, WA6QCD, partially hidden behind the tower.



K4EJQ, Bristol, Tenn., says June brought most every form of known 50-MHz propagation and that the band was open "about 75 percent of the time." WB4MJY, Charleston, SC, says June 10 was exceptional. Jim worked 32 W6s and 7s. WB2LAI/4, Va., worked VE1s UW and TO July 5. WB4VLH, Paducah, Ky., says June 12 was his best opening. Ted worked 8P6EN, VP5RS, KP4s and the western U.S. Ted's first aurora experience was June 17-18 when he worked 8s and 9s. June 27 and 28 produced E to VE1ASJ and W6 — "sounded more like 20 meters than 6." W4UCH, Sterling, Va., worked VP5RS June 12 for his 35th country on 50 MHz. Who has more than 35 countries on six?

WA5QCP, El Paso, worked multihop on six June days and says the first two weeks of June provided many good E contacts. June 30 was exceptional, and Dick worked several W1s, an area not often heard in West Texas. WA51YX/5, San Antonio, moved into a new house in June and was not active the entire month, but noted eight days of multihop, and E muf frequently running into the fm broadcast band. The first half of July was likewise exciting. The strongest multihop opening to New England Pat has observed came on July 9.

WA6JRA says the June 10-12 contest was excellent with all U.S. call areas, except KL7 and KH6, worked by the southern California gang, along with a helping of KP4s. During the same period, WA6HXM worked New England states. June 13 found KP4s and VP5RS rolling into Los Angeles. W6YKS, Stockton, found conditions extremely good throughout June, but no new states. June 9 was a highlight, with the band open throughout the southeastern U.S. W6DPD, Fresno, reported the same openings, plus working VP5RS June 13.

K7ICW, Las Vegas, worked 43 states in June alone. The 12th was Al's banner day, including contacts with 8P5EN, VP5RS and W1HOY/KP4, in an opening lasting some 18 hours. K7BBO, Tacoma, Wash., likewise reported VP5RS and W1HOY/KP4. K7HSJ, Bend, Oregon, caught a 12-hour E opening June 10. The June 17 aurora lasted 2-1/2 hours at K7HJS, Hillsboro, Ore., as Don worked 6s and 7s.

K8UNV, Patriot, Ohio, worked 6s June 2, VP5RS June 9, 8P6EN and XE2XN the following

day, two KP4s and VP5RS on the 11th, and 8P6EN and KP4ANG June 28. VE1KO was worked July 2, completing a nice assortment of DX. WB8FVL, Parkersburg, W. Va., found several June openings to New England and on the 16th, worked WB2RLK/VE1, Nova Scotia. During the June 18 aurora, he worked 12 states on the aurora, plus VP5RS and KP4s earlier in the month on E.

WB9EDP, Chicago, worked his share of the DX — Wyoming and Utah are samples. K9OXY, operator of W9YT at the University of Wisconsin, says, "E below average for June." He worked 8P6EN June 12. Where was he the rest of the month?

W0MOQ, Mt. Vernon, Iowa, says his best June openings came on the 4th, 6th, 9th, 10th and 28th. Art reports renewed interest in six meter cw with much activity heard, "better than the good ole days of 1957-'60." W0PFF, Ames, Iowa, listed several E openings. Jim commented that the contest was unusual: "No good East Coast contacts were made...best openings to the south and west." He worked several difficult sections including Wyoming, Arkansas and Mississippi. July 3 Jim worked W1HOY/KP4, the first Caribbean DX he heard this summer. WA0DGL, Colorado Springs, sold his fm gear to get on 6, and was excited by 6-meter E, catching his first opening July 12. WA0VJF, Overland Park, Kansas, called the June 2 E the best he has ever heard. Jon worked all U.S. call areas in 3 hours, plus XE2AB. June 13 Jon worked VP5RS after hearing that station's code wheel but no other signals. He wonders how many Caribbean openings are missed due to lack of activity. WA0VJF worked KP4s June 15 and heard Caribbean signals 7 times this summer, compared to twice last year. The June 17-18 aurora was Jon's first buzz experience. While working the expected 5s, 9s and 8s on a northerly beam heading for aurora, WA0VJF briefly heard 8P6EN calling CQ at 0048 GMT, June 18.

A July 10 letter from 8P6EN told us between that date and June 6, he had made 120 contacts including two W6s and one VE2. Alan says openings have been very selective, with one or two stations heard at a time from a given area. States inland from the East Coast are the most often heard, and nothing has been heard from South America. Major openings were June 10, 11, 12, 17, 18, 27 and 28.

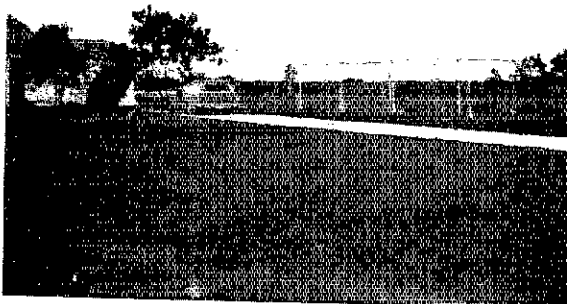
Randy, VE2BYG, says July 2 was interesting. He heard KL7GNE (or a bootlegger), apparently on E backscatter at 0300 GMT. Later, at 1400, KP4s were worked, followed by 8P6EN. During the June 17-18 aurora, Randy heard signals for 10 hours, logging 182 stations in 24 states, plus VE4MA. VE301 reported the aurora hearing much the same as Randy. VE7ANP, Vancouver, reported aurora contacts between 2252 and 0041 GMT with W6s and 7s. Steve heard WA1NNW and K1JRW between 0330 and 0430, June 18, on what was apparently rare auroral-associated E. VE4MA worked K1JRW and W1HDQ by the same medium, at about the same time.

50-MHz WAS applications keep W1HDQ busy checking cards. Ed has examined all the over 100 batches of cards submitted since the first 50-MHz award has issued, and has learned much of interest

This trio made many 50-MHz DXers happy in June by signing VP5RS in the Caribbean's Turks Islands. Left to right: WB4BND, W4GDS and WB5OSN.



WA5HNK tries for the first 50-MHz moonbounce contact with this array of eight 6-element Yagis. The array is 80 feet long, the top bay 30 feet above ground. K5WVX has a similar array used to schedule WA5HNK via the moon. (W5SXD photo)



from them. Once Hawaii and Alaska were the hard states, but recent applicants have had to get Maine, Vermont or Delaware for No. 50. There is good activity in all three hard ones. Look for Delaware when the Philadelphia or Southern New Jersey stations are in. Vermont may come in with VE2, or possibly Upstate New York. Maine may show up with New Hampshire or north-of-Boston Massachusetts stations.

Awards since last month's column are as follows: 102 - WA6JRA, 103 - WB6WAX, 104 - W7FN, 105 - WB6IMV. Other cards in process include those from K7ZOK, who shares with W7FN the distinction of making it a second time. K7ZOK also holds No. 49, won when he was W0FKY, Grand Junction, Colorado. Don, W7FN, won No. 37 as W6PUZ. WA6JRA, holder of one of two all-ssb awards issued to date, is going now for an all-cw 50-MHz WAS, with Iowa, Delaware and Maryland to go. W6ABN is on the same track, 5 stations away. K6QEJ can't be far away, either. Next, 144-MHz WAS?

WA5FDZ, the recipient of a number of QSLs for alleged contacts with him operating portable in New Mexico says, "Not so, don't even operate six." And the call CE1AA worked by several in May is the work of a bootlegger, according to CE1AA himself. Others who thought it "cute" to use bootleg calls this summer have been found out.

First 50-MHz EME QSO

WA5HNK and W5SXD, Houston, pictured in our August QST column, p. 88, and K5WVX and W5WAX, Muskogee, Oklahoma, close to completing exchanges on 50 MHz via the EME route, finally made it at 0433 GMT on the 30th. Communication was first established on cw, using the calls W5SXD/5 and K5WVX. Then changing operators and signing WA5HNK and W5WAX/5, a try was made on ssb, with only partial readability.

Their similar 48-element arrays of 8 6-element Yagis each (see photo herewith) were aimed east, at the rising moon, for maximum horizon gain. This is a must, with antenna gains estimated at 18 dB over a dipole, but it also adds to the noise problems. The arrays are not rotatable, in the usual sense, but can be moved by hand for various "windows." Good tapes were made several times earlier in the month. We now have confirmed EME communication on all amateur bands from 50 through 2400 MHz.

144-MHz DXing has been interesting this summer and I suspect there has been more 2-meter E than reported, especially on the fm channels, which often have continuous occupancy. In addition to those openings reported earlier, W4AWS, Largo, Florida, heard K2RTH and W8KAY around 0100 GMT, June 9. July 1 produced several contacts. K1MTJ, Portland, Maine, worked K4BDJ, Georgia, at 0108 GMT during an opening which lasted but 2 minutes. You have to be quick! K2RTH, Franklin Square, NY, worked W0EMS,

Omaha, earlier the same evening, at 0043. WA4TTG, Chesapeake, Va., scored heavily July 1. Barry worked W0LER and W0RLI, Minneapolis, and K9YYF, Granite City, and W9AAG, Woodhull, Illinois, between 0130 and 0200. WA4WJP, Morehead, NC, is reported to have heard W0LER. John, W0LER, raised WA4TTG on a CQ after watching the E muf soar to TV channel 7. John also heard W9AAG on E backscatter calling CQ at 0138 GMT and an unidentified W2 ragchewing at 0206 as the band closed. July 15 K2RTH and K0WLU, Wagner, SD, heard one another off and on between 1800 and 1850 GMT, but couldn't get together.

We're likely to have a number of meteor scatter contacts to report next month after the passing of the Perseids, but W3JLU started early working KSBXG, Oklahoma, July 16, on a random weekend schedule. W3JLU has word that WA1JTK, WIAZL, WA2DIR and WA2WOM are nearing EME activity. WA2DIR has an array of four 14-element Yagis.

One the subject of EME, W6PO (exW6UOV), San Mateo, has done well with his early moonbounce work. VE7BQH was Bob's first contact, June 11. The day before Bob heard SM7BAE, Sweden, calling CQ Moonbounce! Also on July 8, Bob heard DK1KO, for five minutes. The German has an array of four 11-element Yagis aimed on the horizon. W8KPY, near Dayton, using for 15-element Yagis, heard his first lunar echoes July 10 and then on the 13th, worked VE7BQH for his first EME contact, followed by W6PO on July 18.

Last month we reported early results of the June 17-18 aurora. We have these additional reports. WA2UDT, Plainfield, NJ, had 15 contacts in 6 states and heard W0LER and W0EMS. Bill says it was the first aurora he has worked in several years. WA2QQR, States Island, said the aurora was pronounced on his small a-m transceiver and attic Yagi. WA3HMK, Lancaster, Pa., worked Vermont and Virginia. K3HEC, operating W3OLV, Hanover, managed contacts with 25 stations from Maine west to W0NEN, Kansas City. W3JLU, Pa., calls the aurora "quite good." Al worked many 9s plus VE2YUK and VE3ADJ. He is pleased with his new Bob Sutherland 8827 kilowatt amplifier and says WA2WOM and W2AZL are budding similar finals.

K8HWW, Michigan, worked three new states during the buzz session, Rhode Island, Vermont

and Maine, bringing him to 27 states. K9UNM, Fort Wayne, Ind., had an aurora field day working the eastern seaboard from New Hampshire to North Carolina. K9KQR, Chicago, says, "we finally got aurora — and a good one!" Dick contacted ten states, and worked as far south as Oklahoma. W9YT worked 9s, 0s and VE3LC ADT and EMS. VE3EMS, Ontario, worked from Maine to South Carolina to Illinois in the course of 21 contacts. Pete heard many new calls indicating new stations coming on two meters.

Tropo DX was beginning to come into the summer picture with periods of excellent 'local' openings to 500 miles or so by mid July, but no long haul. WB2LAI/4, Va., found good conditions the evening of July 9. Bill worked K2GB, 380 miles, who was running 360 milliwatts, a-m! Bill runs schedules with K1SAK, RI, over a 400-mile water path. K4MSG, Avon, NC, located on Hatteras Island, on the Outer Banks, has an excellent location to study over-water tropo. Although running low power, Paul would like schedules. Write him at Box 2606, Avon, NC, 27915. WA9QZE, near Chicago, worked K0WLU, SD, during the contest for a new state. K0WLU now sports a 44-element Yagi array and 100 watts cw and ssb.

From Barbados, 8P6EN, is seeking schedules. While I do not have details of his equipment, Alan was very active on 144 MHz in Australia. The path from the U.S. mainland to Barbados in the Caribbean should be interesting. His address is P.O. Box 177, Bridgetown, Barbados, British West Indies.

220 MHz activity grows each month. K4GGI/1 says a new Massachusetts station is WA1LXU, running a dozen watts. WB8IDD, in his *Great Lakes 220-MHz News*, has several interesting reports. WA9UQQ, Marengo, Ill., has a 4CX250B amplifier and ssb humming; W8WVS, Dayton, is running low power; K8BBN has recently moved from Ohio to Frankenmuth, Michigan and plans 220 activity; K9UVJ, Fort Wayne, Ind., has a 6360 active; WA8PKB, Ohio, has a fine 80-watt ssb signal; W8HGX, near Detroit, has a 4CX250B surplus linear converted; K8HWW is testing a 29-element spiral Yagi and wants to locate a HA-2 to convert to 220. K7HJSJ, Bend, Oregon, has a new 40-element Yagi array for 220 meteor scatter.

The annual vhf conference at Western Michigan University will be held this year on October 21. For details write VHF Conference, P.O. Box 243, Battle Creek, MI 49016.

432-MHz DXers got a rare taste of aurora the evening of June 17. W4FJ, Richmond, worked K8UQA, Cleveland, at 2330 GMT after first noting 432 aurora 15 minutes earlier. Ted heard K8DEG,

Ohio, for two hours with an excellent signal, and W3RUE, Pa. W4FJ reports also that W3RUE worked K2RIW and that W8YIO, Michigan, worked W2AZL, NJ. This opening is apparently the longest on record at 432 MHz.

A new station in Maryland is K3AAF with two 15-element Yagis. He is also active on 50 and 144 MHz with 220 and 1296 in the planning stage. W1YTW, Kittery, Maine, has a new kilowatt, and K1OJQ, Quincy, Mass., has four Tilton Yagis and a pair of 2C39s. K1ABR, RI, has 20 watts and a 56-element array and, according to the *Northeast Vhf Association Newsletter*, has worked 11 states.

K8ZES says W8QOB, Colliers, W. Va., will soon be active with a tripler. K8ZES, Galion, Ohio, has four 17-element Yagis and a ssb 4CX250B. K2OVS, N.Y., says a good coastal opening produced nine states the evening of June 15. Jay worked North Carolina for the first time, bringing him to 15 states worked.

K5VWW, exW2CUX, is drumming up 432 business from Houston, running a kilowatt and looking for schedules. Also active in Houston is W5LDV, and W5SXD, Bellaire, has a kilowatt and 40-element collinear.

W6FZJ, San Jose, has been heard on EME by VE7BBG so Joe isn't far from his first EME contact.

W0LER, Minneapolis, finally found an active Nebraska 432 station July 10 and worked W0NGG for state number 13. Sunrise tropo July 13 allowed W0EYE, near Boulder, Colorado, and K0CER, SD to exchange S9 signals over a 500-mile path.

At Winnipeg, VE4MA says June conditions were generally poor, but he continues to work W0PHD, Minn., and K0AWU, N.D. Andy now has an array of four W0EYE Yagis, as does VE4AS.

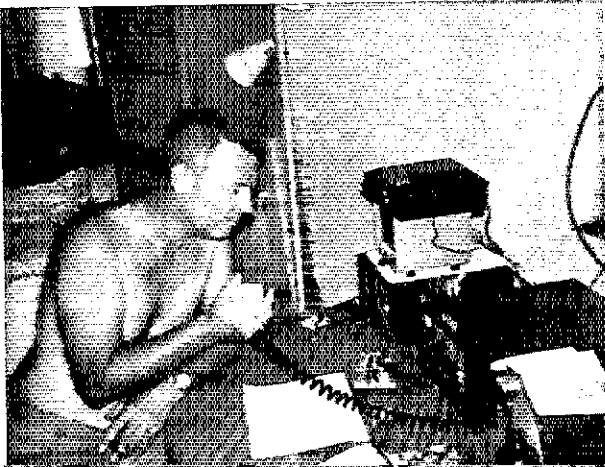
Will we have the first 432-meteor scatter contact to report next month? Several well-equipped stations had August Perseid schedules, including W2AZL, W4FJ, W5SXD, W6FZJ, W7JRG, W0DRL, W0EYE and W0LER.

1296 and Up is top priority for northeastern experimenters. K2OVS, N.Y., has several projects underway, including a Nippon NEC 1090 stripline preamp. Jay says W1OOP and gang have good success with the device; under 3 dB at 1296. WA2LTM has confirmed his May contact with W1AJR on 2304 MHz — 192 miles between fixed stations, a new distance record for such operation. W1AJR has a converted surplus rig delivering 30 watts to a 4-foot dish. WA2LTM, who now has three states on 2304, runs about 20 watts to a 3-foot converted TV dish. Doug says that K1PXE, Conn., has 7 states and a best DX of 350 miles on 1296 with a single-tube tripler and 29-inch dish.

Model Control in the 50-MHz Band

Remote control of models, mainly aircraft, has been a peripheral aspect of amateur vhf work since the 1930s. The first information for amateurs in this field was the work of the late Ross Hull and Roland Bourne, summarized in *QST* for October, 1937. Their sailplane, first flown that year, is a dominant feature of the ARRL Museum, 35 years

VP5RS, operated here by WB4BND, worked 1100 stations in 44 states on 50 MHz with a TR-6 and 5-element Yagi. A mechanical code wheel kept a signal on the air at all times, aiding in spotting band openings.



later. *QST* has carried up-dating articles at intervals ever since, but RC has never exactly "caught fire" as a ham-radio pursuit, though model flying is a major hobby activity today.

Initial work was done in the 5-meter band, and in recent years the upper part of the 6-meter band has seen some RC use. Other frequencies in the 27- and 72-MHz regions tended to take RC out of the ham field for a while, because of the ease of obtaining licenses for use of these nonamateur channels. But in recent years the rapid growth of radio control interest and the increasing sophistication of the methods employed have led to a resurgence of interest in the 6-meter band, and an increasing number of model flyers are licensed amateurs. Most equipment now available to RC enthusiasts has provision for 6-meter operation. This interest is, in fact, something of a two-way street. Torrey Willtams, W4VSD, long-time ham and RC enthusiast, tells us that today not a few people who get Technician tickets simply to fly aircraft with 6-meter control systems are becoming active communicating hams as well.

As might be expected, there are some dark clouds on the RC horizon resulting from potential, if not actual, interference between communications and radio-control signals in the 6-meter band. ARRL has been asked by RC people to assist in preventing these clouds from becoming a full-fledged storm. To this end, we publicize the frequencies used in radio control work: 53.1, 53.2, 53.3, 53.4 and 53.5 MHz, and ask that communicators, and particularly repeater operators, avoid putting long-range signals on these channels.

An investigation of the interference potential of the two uses of the band is under way. We also hope to find out if there have been proven instances of a 53-MHz amateur signal causing loss of control of a 53-MHz model. Such instances are thus far only in the rumor stage, with no documented proof. Most receiving equipment for use in aircraft is extremely simple, in the interest of light weight and compact construction. It is not the sort of thing that would be expected to perform well in critical situations as to overloading or image-frequency reception. Some of the better RC receivers do have fairly good *i-f* selectivity, however, and it would appear that signals a few kHz away from the RC channel in use should not cause trouble, except when they are strong enough to overload the mixer.

When more is known of the problem, we'll be reporting details here, or elsewhere in *QST*. In the meantime, interference data and suggestions are solicited from qualified RC hams. — *WIHDQ*

ECVHFS 220-and-up Contest, Sept. 9-10

Last year the East Coast VHF Society inaugurated a 220-and-up contest, to be run concurrently with the ARRL September Vhf Party. Considering the small amount of publicity given it, the turnout was good. Entries were received from six call areas, and VE3. Awards were won by W1DC, K1J1X, WA2LTM, W2OMS, and K2RTH. Activity was reported on 220, 432, 1296, 2300, and 5650 MHz.

The special competition will be repeated this year, in a form identical to 1971. If you are interested in the bands from 220 up, dig out August, 1971, *QST*, and follow the simple rules given under "Contest Within a Contest" on Page 92 of that issue.

457-

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

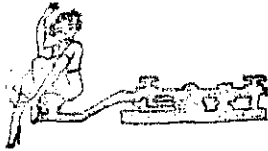
W1ANG, Clayton W. Howard, New London, CT
 Ex-1CMP, William E. Jackson, Bridgeport, MA
 W1KMR, Milton D. Corbett, Medford, MA
 W1PBT, Joseph M. Backard, Plaistow, NH
 W2BVO, Joseph C. Whiteley, Newark, NJ
 K2DFE, Wilson R. Harris, Berlin, NJ
 W2DHN, Leonard Victor, Syosset, NY
 W2IKM, Arthur P. Jones, Delmar, NY
 K2IU, John W. Wolfe, Oneida Castle, NY
 K2LVN, Andrew J. Svecz, III, Pennsville, NJ
 W2PLV, Elton Sockwell, Bridgeton, NJ
 W3BTR, Robert L. Murray, Uniontown, PA
 W3LDY, John C. Eklund, Corapolis, PA
 WA3NSF, Therman B. Walton, Fairchance, PA
 W3RSB, John H. Elder, Jr., Pittsburg, PA
 W3UL, Clarence P. Trimmer, Carnegie, PA
 WB4CGJ, Burton L. Walker, Falls Church, VA
 W4FPK, Robert J. Miller, Miami, FL
 W4GW, Ralph R. Kibbler, Miami, FL
 WB4KER, Norman L. Fox, II, Allensville, KY
 W4ODH, Erwin A. Pihl, Sanibel, FL
 K4WOA, Tony Z. Kennedy, Arlington, VA
 W4YQW, Henry E. Pierce, Meadowview, VA
 WA4ZLZ, Robert E. Parsons, Falls Church, VA
 W5AMO, Josephus G. Morgan, Beaumont, TX
 K5CDA, Max V. Stout, Ozone, AR
 W5EAO, Dorothy M. Farley, Brownsville, TX
 W5FY, R. Fro Hotz, New Braunfels, TX
 W5HUU, Horace E. Wilson, Amarillo, TX
 W5NF, Eugene C. McNally, Pasadena, TX
 *W5SY, Dave Abtowich, Jr., Terrell, TX
 WA5TLQ, Clarence R.E. Knetsch, New Braunfels, TX
 K5VUY, Norval A. Hensley, Sr., Houston, TX
 WA5YSL, Billy G. Gully, Shawnee, OK
 WA5ZGU, Spencer E. Walthal, Austin, TX
 W6BXG, Jack Stewart, Laguna Beach, CA
 W6EGJ, Charles O. Parrish, Seal Beach, CA
 W6HQA, Howard D. Coleman, Inglewood, CA
 WB6MDT, Louis R. Vaczovsky, El Cerrito, CA
 W6TQQ, Lloyd J. Stocks, San Gabriel, CA
 K6VUE, Miriam L. Reinhardt, San Jose, CA
 WA6YVW, William D. Nesbit, Paradise, CA
 W6ZJY, Lawrence F. Ewig, Lakewood, CA
 W7ESJ, Edward F. Conyngham, Portland, OR
 WA7FEG, Paul E. Maxwell, Tucson, AZ
 W7FXD, Oran H. Northcutt, Seattle, WA
 W7MPO, Richard S. Griffith, Tucson, AZ
 W7OUE, Clara R. Rhein, Mesa, AZ
 WA7SCP, Irving L. Pate, Mountlake Terrace, WA
 W7WUW, Kenneth L. Skinner, Tempe, AZ
 WB8AKJ, Edwin F. Jenkins, Cleveland, OH
 W8DPE, Harold C. Bird, Pontiac, MI
 W8ES, Harold J. Nafzger, Columbus, OH
 WA8GFP, Harry G. Garland, Grosse Pointe Shores, MI
 W8OTC, Joseph S. Kaczor, Fair Haven, MI
 W8VHW, Willis W. Williams, Euclid, OH
 W9DRF, Homer Hudelson, New Castle, IN
 *WB9GLU, David G. Brown, Wilmette, IL
 W9INY, Victor R. Roszhart, Bartonville, IL
 W9KQZ, Harley M. Snyder, Indianapolis, IN
 WA9OTI, Donald L. Price, Rushville, IN
 W9OTL, Clarence R. Wentland, Madison, WI
 W9BHH, Lyman E. Nylander, Duluth, MN
 W9BTX, Ralph E. Evans, Webster City, IA
 W9CMY, Wayne A. Mohr, Bellevue, NE
 W9FYT, Lawrence J. Hokanson, Wheaton, MN
 WA9PIF, J. Wendell Gorr, Chadron, NE
 W9TSB, Vernon R. Fassett, East Grand Forks, MN
 WA9ZJT, Ray A. Miller, Liberal, KS
 VE3QJ, Richard C. Cuming, Hamilton, ON
 VE6AND, Robert S. Pierce, Red Deer, AB
 VE6CJ, George K.A. Glagow, Edmonton, AB
 HC2KM, Pedro Manrique, Guayaquil, Ecuador, SA
 HP1MH, Moises C. Henriquez, Panama, Panama
 ZS11M, Ray B. Alexander, Pinelands, South Africa
 *Life member

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

The YL at the Keyer

AT A RECENT YL convention a gal mentioned that a neighbor came over to see what radio activity was all about, and after she had taken in the equipment and the shack, and had been given the story of operating, she said, "But I thought you all *talked* like we see them on TV; when did you start this stuff?"



The YL explained that some of us, in fact a great majority of us *talk*, but that there is a segment who are die-hard cw operators whose greatest pleasure is listening to that code, and slinging it back with the same speed and facility as speaking.

We *all* start with it. And we swear, in the humiliated tears of our "buck fever," that we will get that required speed and then go on fone — and stay on fone, never again to wrestle with that awful code. Then something happens. Something as *unexplainable* as why we prefer certain authors, or want to get an amateur license — we "fall in love" with cw.

We meet the difficulties of "rig hr" and "wx is" and the other spelling impossibles by taping a list at eye level so we can slide "cloudy," "sunny," "snow," "raining hard" off the key without

* YL Editor, QST. Please send all news notes to WB6BBO's home address: 1036 East Boston St., Altadena, CA 91001.

pausing to remember the letter sequence. Moving from 5 to 7-1/2 wpm we feel a great superiority over a beginner who is stumbling at the spot we just left. We graciously help him from our proud new level, then promptly fall flat on our faces when we catch someone who is faster. About the time we hit that awful 10 wpm "plateau," and are certain that the goal of putting the key away forever is beyond our ability, we find we are gaining a familiarity we didn't think we had, and that the code is coming easier to our fingers.

The hypnotic smoothness of that level, and our marking time copying on and on at the speed brings a sudden recognition of "using a new language" with comfort. We hear someone carrying on a contact and think "I know that fist" long before the call letters are signed. But the identification of fists is only the beginning. We learn a quality in the sending that tells us if our contact is tired, or excited, or feeling a bit lazy (the code seems to almost yawn no matter what the speed). The sending indicates the mood as clearly as a tone of voice. There is a distinctive sound to the type of key used, from the tape-like perfection of the electronic keys, to the many bug fists that betray the training of the operators. And too, there is the hand sending that seldom appears outside of the Novice frequencies and is a joy to read.

Right then we are "hooked." We hunt for, and haunt the high speed code practice schedules. The Qualifying Run becomes a never ending challenge that increases our enjoyment of code. We drive ourselves right up the wall some nights by deliberately trying to copy speeds higher than we can handle. Just the satisfaction of getting even one recognizable word out of five minutes of copy triggers a desire to qualify at that speed.

To WB2JCE, W8DUV, W2RUF, W1YPH, WA4BVD, VE6YL, and the hundreds more women in amateur radio around the world who enjoy pounding brass, their preference can be classed with those who are only happy with ATV, RTTY, or voice operation. We may try the other forms of emission, but when we push the knob of our keys we are, in the words of a popular song of a few years ago, "Doin' what comes naturally."

Add Sydney Haynes, WN6RTR to the growing list of 9 year old YLs. In addition to radio, she is involved in Ballet, figure skating, and plays the piano. Sydney operates 80,40, and 15 meters, and loves to ragchew. (VE2AQV/W6 photo)



K8CKI, Lillian Abbott, President Buckeye Belles, (left) Lucy Benner, WA8BWD, club Secretary (right) with Ohio Governor John J. Gilligan, as he signs the Proclamation announcing Buckeye Belle Week in Ohio. (K8UZ photo)



1972 YLRL Anniversary Party Rules

Cw Starts: October 18, 1972 1800 GMT
Ends: October 19, 1972 1800 GMT

Phone Starts: November 1, 1972 1800 GMT
Ends: November 2, 1972 1800 GMT

Eligibility: All licensed women operators throughout the world are invited to participate. YLRL members only are eligible for the cup awards. Non-members will receive certificates. Only YLRL members are eligible for the Corcoran Award. Contacts with OMs do not count. Net contacts do not count.

Operation: All bands may be used. Cross band operation is not permitted. Only the contact with each station will be counted in each contest.

Procedure: Call "CQ YL."

Exchange: Station worked; QSO number; RS or RST; ARRL Section or country. Entries in log should show time, band, transmitter and power. *Log must be signed.*

Scoring: A. Phone and cw will be scored as separate contests. Submit separate logs for each contest. B. All YLs located within an ARRL Section score one (1) point for each QSO with another station located within an ARRL Section. Score two points for each contact with a station not located within an ARRL Section, i.e. DX. Definition of DX: All stations not located within an ARRL Section. DX YLs will score two points for each contact with a station located within an ARRL Section. Score one point for each contact with another DX station. (Note: Please know your ARRL Section. A list may be found on page 6 of QST, or send s.a.s.e. to the YLRL contest chairman for a list.) Multiply number of contact points by total of different ARRL Sections and/or countries worked. C. Contestants running 150 watts, or less dc input at all times may multiply the results of B by 1.25 (low power multiplier) D. Ssb contestants running 150 watts PEP, or less at all times may use the low power multiplier. (Results of B by 1.25)

Awards: Highest cw score — Gold Cup (YLRL member only anywhere in the world.) First, second, and third place phone score (not combined) and highest cw and phone log in each district and country will receive a certificate.

Corcoran Award: Highest combined cw and phone scores. For YLRL Members only within an ARRL District.

DX Only: Highest combined cw and phone scores from North and Central America, including the Greater and Lesser Antilles, will receive YLAP Hager Plaque for YLRL members only. Highest combined score from any other part of the world will receive a duplicate award.

Logs: Copies of all logs must show claimed scores and be signed by the operator. Please check your logs carefully. Be sure that they are complete. No logs will be returned. Be sure copy is legible, carbon copies are easily smudged. Mail copies of

logs to: Betty Marsh, KL7FIW, 2411 King Road, Fairbanks, AK 99701.

New CLARA Certificate

The Canadian Ladies Amateur Radio Association will offer a new certificate beginning September 17, 1972, when the club's "Certificate Launching Day" will find the gals from all the Canadian Divisions working around 14.160 MHz., for the VE women who are interested in earning it, and around 14.280 MHz., for the women in the United States.

Requirements: CLARA members must work 12 YLs in six call areas, no more than five of which can be VE3 women. Other YLs, and OMs in Canada and continental United States, work ten YLs in five call areas, not more than four can be VE3. DX stations work five YLs in three call areas with no more than two VE3 prefixes. Canadian Call Areas: VE1, VE2, VE3, VE4, VE5, VE6, VE7, VE8, VO1, VO2. All bands, and all modes are permitted, but no cross band contacts. QSLs must be dated September 12, 1972, or after, to be counted. GCR rules apply to this certificate. QSLs must be in the applicant's possession. Do not send QSLs, send log data only. Seal endorsements apply for each 12,10, 5, additional contacts under the same rules as for the certificate.

Send \$1, or IRC equivalent with the log data to the certificate custodian. For endorsements, send log data with s.a.s.e. (Canadian Stamps, or IRC equivalent). Certificate custodian is Cathy Hrischenko, VE3GJH, 30 Lisburn Crescent, Willowdale, Ontario, Canada.

TYLRUN Annual Party

The Texas YL Round-Up annual party will be held at the Laquita Motel (South), in Dallas, Texas, on November 3,4, 1972. Registration \$3.50. Deadline for registration will be October 15, 1972. All licensed YLs and XYLs are invited to attend. Plans include activities for the OMs who may wish to accompany their ladies. Send registration to Ruth Jones, K5GMI, 3440 Shady Hollow Lane, Dallas, Texas, 75327

1972 YL Club Officers

The Ladies' Amateur Radio Club of Chicago (LARK) have elected new officers for the year 1972-73. President, Carol Bourne, WA9NEJ; Vice



Mae Hipp, K7QGO, 1972 YLRL President presiding at the Sixth International YLRL Convention in Long Beach, Calif. in May (WB2YBA photo)

president, Verna Franz, K9LUI; Secretary, Adeline Weiland, W9LDK; Treasurer, Val Hellwig, K9ZWW. TYLRUN 1972 officers are: President, Jane Eastman, WA5JFZ; Vice-president, Viola Block, K5GNG; Secretary, Audrey Beyer, K5PFF; Treasurer, Cindy Dougharty, WSZPD. The Texas Round-Up Net was organized in 1955.

K8CKI, Lillian Abbot

The OM, Jim K8CKJ, promised Lillian a fish dinner if she passed her General Class test and paid up with a can of sardines. Lillian's pet project is

the spring, the fall GCARA Code and Theory classes program. A family undertaking with OM K8CKJ handling the theory end, and Lillian and a nephew, W8UQI taking turns at the code, Lillian is also the "gal Friday" for both. She is responsible for the major amount of the planning, scheduling, and publicizing this activity that is an introduction into amateur radio as well as the hard facts of radio laws, electronics and learning the code. Her idea is to have a class that will develop interest from the moment of registration. Each new class is planned to begin with a program at the first session including GCARA officers, the instructors themselves, and a showing of the ARRL film "Hams Wide World," to give the beginner an idea of the results of all the hard work of earning a license. Some of the classes have had as high as 107 participating. This fall there are plans for a General-Advanced course, if there are at least 50 applicants.

A member of ARRL, YLRL, Lillian is serving a second term as President of Ohio's Buckeye Belles. Her major on the air interest is cw, and DX-cw style. Her other activity is participation in the two Buckeye Belle sponsored nets. Another of her many hobbies is sewing which includes making all her own clothes.

QST

ARPS

(Continued from page 74)

to the police department, weather bureau, c.d., emergency operating center and Oklahoma highway patrol. -- (KSOVT, EC Tulsa Co., OK)

On July 3 at 0400Z, WA2RTS received a call from TG9MP requesting emergency medical traffic into the Childrens Hospital Cancer Research Center in Boston, MA. Since band conditions were quite bad, WA2RTS suggested that communications be reestablished at 1815Z, at which time he learned that a physician, whose 3½ year old daughter was suffering from cancer of the kidney, needed to consult a colleague. The doctor in Boston relayed the procedure for treatment to WA2RTS, who dictated it to TG9MP. -- (WA2RTS)

On July 8, WA2ZBN/mobile near New Rochelle, NY, notified WA2KZD via WA2SUR repeater that he and his family were stranded on the thruway because a wheel had fallen off his camper. WA2KZD notified police and WA2ZBN's relatives. Eleven other amateurs assisted through the night until the camper was towed to the home of K2JQB to await repairs. -- (WA2KER)

On June 27, the Birmingham Amateur Radio Emergency Service was in session because of a

tornado warning for northwestern Jefferson Co. (AL). During the alert, torrential rains flooded some sections of Birmingham. The BARES conducted a flood damage survey for the Red Cross. Twenty-one amateurs took part in the alert. -- (K4AOZ)

On July 3, the BARES began a weather watch on 2-meters. The Red Cross emergency center was manned by W4CUE transmitting weather bulletins. During the alert, a possible tornado was sighted. WB4JOY/mobile investigated and reported trees and power lines down. Nineteen amateurs were involved in the alert. -- (K4AOZ)

Forty SEC reports were received for the month of June, representing 12,065 AREC members. This is two more reports and three fewer members than the previous June. Sections reporting: Alta, Colo, Conn, Del, EBay, EFla, ENY, EMass, Ind, Iowa, Mar, Mich, Mont, Nebr, Nev, NC, NNJ, NTex, Ohio, Okla, Ont, Org, Oreg, RI, SV, SDgo, SBar, Sask, SDak, SNJ, Tenn, Utah, Va, Wash, WV, WFla, WMass, WNY, WPA and Wis.

Briefs

Updating the July report of the January VHF SS, Ohio should show scores for W8s LG1/RQV as follows: W8LGI 88-4-1-ABCD

QST

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

HOW:

Say, are we high-frequency types getting left out of ham radio's current repeaters kick? How about somebody designing something along that line for hf, a jumbo job that works with high efficiency all the way from 160 through 10 meters? We'd prefer its output proportional to signal input, a repeater that won't be captured or even slightly perturbed by megawatts. A passive design will suffice, and here's a tall order: input and output frequencies identical.

Ought to be available on a world-wide basis, too, and do equally well for cw, ssb, a-m, fm, RTTY, SSTV, emission modes broad, narrow and as yet uninvented. Whatever goes in must come out. While we're at it, wouldn't it be neat if we could incorporate a "silence zone" in its function, an effect that would cause near-by stations to disappear completely in favor of DX? Now *there's* a trick! Too much to desire, no doubt, but such a unique hop-over gimmick sure would cut QRM and increase population possibilities on short-wave bands.

For good measure, since variety is the spice of life, this super-repeater ought to be programmed somehow to vary in performance. Maybe we could pulsate or jog the thing on an hourly, daily, monthly and annual basis; even over, say, a 10- or 11-year cycle and from minute to minute at times. Commercials might scowl at this inclusion but we hams would find things interesting, indeed, propagation conditions rarely identical two days running.

Yes, how about a design for this impossible dream? No need to sweat it with slipsticks, computers and parts catalogs, though. As the Immortal Bard almost once said, "There is more twixt heaven and earth, Horatio, than is dreamed of in our technology." Old Mother Nature, with a mammoth mirror-like miracle we hf DXers take so much for granted, beat us to it long ago.

† † †

WHAT:

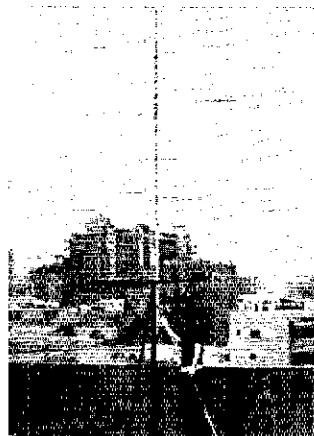
Here we go again! Those months are at hand when DX men with 28 MHz on their minds quiver.

* c/o ARRL, 225 Main St., Newington, CT 06111.

6W0/WA2BAV and 5U7AV were among calls signed by WB2AQC's XYL when Eva and George journeyed through several African countries this summer. The Dakar hotel top and Niamey front yard are intriguing QTHs of the Month. Photos of other stops along the WB2AQC-WA2BAV DXpeditionary route appear on following pages.

shiver, quake and shake. Skip skeptics predict that old ten is on the verge of becoming a DX disaster area. But, though pessimists said this last fall and the fall before, we've got two more fantastic 28-MHz years back to back in our fat little logs. Will Ma Nature keep her big "repeater" fired up with sufficient sunspots for a joyous 1972-'73 ten-meter season? Keep a grip on your bandswitch, OM. The answer to this crucial question is imminent.

10 phone enthusiasts Ws 1GNX 2HAE 3HNK 4YOK 6AM 8K0I 9LNQ, Ks INOK 3YVN 4BZH 8PYD, Was 1HAA 8TDY, WB4s SIJ and SXX write "How's" about working stuff like this when those crackerjack 1971-'72 openings delighted the 28-MHz throng before petering out by late spring: A2s CAB CAE CAY CRD, CEs 5G0 6EZ 8A0, CN8s BF HD, CP1EU, CRs 3ND 4BC 4BS 6FL 6GA 6JI 6J0 6K0 6KW 6LW 6TP 7AC 7BI 7CH 7FR 7GJ 7IA 7LE, CTs IBH 1IC 1QN 1TX 1UF 2BB 2BG 3AS, CZs 1BBR 2CN 8BE, forty DA-DJ-DK-DLs, DJ6QT/5T5/5U7, DL3ZM/YV5, DM3QO, EAs 1FD 3NA 4LK 5JM 6BJ 7AD, EI9BC, EL2CB, ET3JH, Es 2MA 2SI 2XN 3KW 3OX 3ZZ 6AST 6BG6 6BNH 6KAW 8FE 0ZZ, FH8CG, FK8CD, FL8MM, FR7AN, FY7AD, forty-two Gs, G3MUL/CE3, GBs 2SM 3LP, GlS 3GAL 3NVW 3SXG 3ZX 4AHP, GMs 3VEY 5ATK 5AWT 6MS, GWs 2NNE 3NWV 3UCB 4AES 5YI, HA5KDO, HG4s KYJ YD, HB9s AIB APG IC KC, HC1s RF WK, HIs 7JMP 8XGM 8XLS, HKs 1CEY 3CMI 4DF 0AA 0BKX, HL9UX, HP1s DV GU XYZ, HR2s GK HHP, Is 1AYP 1NUC 2LAA 2TPL 3BBZ 3PRK 4PGD 5GKS 6FLD 8KBT 0AMU 0VGS, IP1s DNT RB, ISs 1AOV 1BHS 0IGD, IT9s GAI JT, three dozen JAs and JHs, JE1GTS, JR1MTS, JY8JY, K0DAS/KH6, KA2s AI EB OM OW, KCs 4DX 6BF 6BK, KG4s AM CS, KG6s ALV JBO SL SW, KH6s APS COB DLW FF GHZ HCM HJ RS, KJ6s BZ CF, KL7GIC, KP4s BBN CL SHD DIW DJI DLO DLW DMR DNQ NY, KR6s (now KA6s) AY ES HB QZ, KSs 4CJ 6DH 6DY, KV4AD, KW6GK, KX6s BU DU IP, KZ5s BB EE JF JK ZZ LAs 2XC 2PH 4IG 8ZL, LG5LG, LUs 2DEK 2DGO 2EH 2FAO 5DDM 5DVO 5HEN 6DKX, LX1s DO JW RF RR, LZ2EE, M1B, OAs 4AIW 4OS 4PF 8V, OD5s CS EJ, OEs 2SKI 2WB 3ZDB 6HZG 9SKI, OHs 1AD 2BO 3MF 0NI 0NJ, OKs 1AGO 1FF 1MPP 2BYW, ONs 4XG SKP 5MG 5TO, OXs 3JW 3WQ 4AH, OZs 2LW 5BF 7BO 7RD, PA6s GMH GN LOU





EL2AV (WA2BAV) operates at EL2DF near Monrovia while host Robert watches. WB2AQC also performed there as EL2AU. At right George himself regales the 14-MHz gang from Sierra Leone as 9L1GP while Eva awaits her turn as 9L1EP.

PMP SOM, PJs 1AA 9JR, PYs 1CAD 1MCC 2DEH 2DLC 3APH 8GS, PZIs AH CU, RB5s EAE EDU VAS, RQ2GCV, RP2PBF, SK6CW, SMs 2CUD 4BVS 5EXE 6ADW 7BDT 7EDI, SPs 1EXU 3DOD 3DOI 5PWK, ST2SA, SVs 1AE 0WJJ 0WOO, TF3EB, TGs 7MT/VP1 9AD 9DX 9VN 9YN 0AA, TIs 2WX 8PE, 1R8s CO MR, UAs 3HB 50A 50E, UB5s VL WJ, UC2AAH, UKs 3R 6LAZ, UO5OAD, UP2s OX PBJ PD PG, UR2BW, UW6NZ, UY5YB, VKs 2ADE 3PP 3QV 4VU 9FH, VO1BL, VPs ICP 1AA 2AAC 2AAP 2EEE 2GBL 2GVW 2KF 2LAT 2MYV, Ws 4IZ/KV4 4WER/HPI 0YVA/YV, WAs 1CQA/HCI 2BVU/3D6/4X4 6F8C 6GLD/6Y, WB5FGI/YV, XEs 111J 11LLS 1SSY 2LLS, YA2KO, YB3AA, YNs 1AL 1AZ 1DS 2DX 4SB 0HSM 0VMA, YOs 2BM 3AC 9KAG, YS1WPE, YUs 1BCD INGO 1OCF 2ADE 2CB 2LW 3CND 3ER 4EBL, YV5s BPG CVE, ZC4RS, ZD3Q, ZEs 1DG 3JU 4JS 6JL 6JN 8JD 8JJ, ZLs 1AGO 1LI 2ACP 2BE 3FO 3GO 3GQ 3UK, ZP5AQ, ZSs 11H 1OU 3AW 3CJ 3HX 3KC 4RH 6BMD 6DW 6ME, 3B8s CG CV CZ, 3D6AD, 4U1ITU, 4X4s GV HF IV, 4Z4s GG HF, 5H3LV, 5N2AAN, 5VZYH, 5X5NK, 5Z4LW, 5W1AU, 6Ds 1AA 4FFC, 6W8AL, 6Y5s CV 6V, 7Q7s AA CY, 7X0WW, 8P6DR, 8R1G, 9G1s DY WW YA, 9Hs 1CH 1CV 1R 3B 3C, 9J2s RO XZ, 9K2CA, 9L1s JT

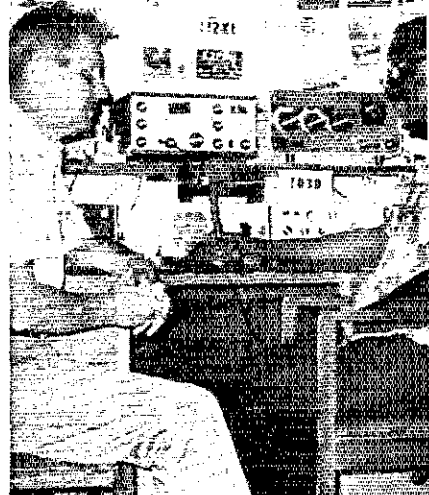
VW, 9Q5s BW EL GE 1A, 9U5BB, 9Y4s T and VU. Oh, we almost overlooked dispatches from VE3 3CUI 7BBL and listener E.Hamill which contributed some of those goodies. Last 10-meter call for your 5BDXCC coming up? Could be, at least for a few years. If space permits we'll check 28-MHz radiotelegraph reports next month to see what species will probably be back on ten for your autumnal DX pleasure. How's DX at your end?

† † †

WEREABOUTS - "OSLers of the Month" for this run include HCs 1EG 8FN, HK1CIW, JA1OAF, 1DIs ABZ ACF, JY9EA, ON8VL, PA0LOU, SM5EAC, SV0WU, VK5XK/VK9, W2PPG, WA2WUV, YK1AA, ZD8JT and 9X5VA, all commended for quick QSL comebacks in "How's" correspondence from WIRML, Ks 4SD SPYD, WA6CPP, WN4ZGE, VE7s BAF and BZY. Any especially snappy QSL receipts out your way for our applause? . . . Received a QSL from PY5ASN meant for the previous holder of my call, Jim of San Jose. (WN6OSS) . . . QSLs forwarded to me through the VE6 bureau in October through December, 1971, were lost in the mails. This was immediately after last year's U.S.-Canada Test so

TU1AZ, seated and surrounded by fellow TU2s, welcomed roaming WB2AQC and WA2BAV to his hamshack in Abidjan where the pair signed TU4s AC and AB. That's 5T5YL and WA2BAV watching Alban, 5T5AD, check the bands in Mauritania where Eva and George signed WA2BA/5Y5 and WB2AQC/5T5.





5U7AW demonstrates his Niamey layout to guest 5U7AV (WA2BAV) while visitor 5U7AU (WB2AQC) mans the camera. At right WB2AQC, about to try his DX luck as ZD3S, visits Cecil, ZD3D, in Bathurst where XYL WA2BAV later chimed in as ZD3R.

many W/Ks may be expecting my cards in reply. Please repply because I do try to QSL thoroughly. (VE6YL) . . . In attempting to obtain cards from many countries I've found International Reply Coupons to be an expensive waste of time and money. Extracting DX QSLs appears more difficult now than during my late '60s W2DY days. (K4SD) . . . Just received 420 QSLs via the local bureau, some evidently more than a year in transit. Please pass word that I do QSL 100 percent and will answer those belated cards as quickly as possible. (KP4DJI) . . . Canadians occasionally are heard signing their VA prefix, suffixes unchanged. VA8RA QSOs, for example, are QSLs to VE8RA. (DXNS) . . . Halp! WIRML could use advice on running down wallpaper from JW2IK, OX3YY; W2AH will settle for scoop on JW8IJ; K4HPR hungers for hints leading to the pasteboards of CN2BE '58, VQ1GDW '64; and WB2FJX tries to trace VS9AWR operator Bill of October '65. Any 'alp?

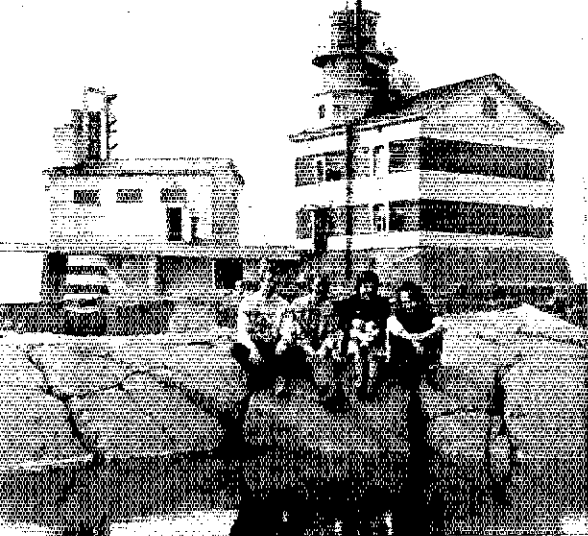
ASIA - YA1GNT (W4GNT) is the new QSL manager for Afghanistan and Camel Drivers Radio Club. Box 279, Kabul, is still okay but W/Ks can save postage by mailing to Ed S. Popko, PAA/Kabul, Dept. of State, Washington, District of Columbia, 20251. (FDXC) . . . 9M2IR is a pos-

sible source of XU1AA QSLs for QSOs dating from March 5, 1972, self-addressed envelopes and IRCs requested. (DXNS) . . . Received a card from 4S7AB on my third try with s.a.e. and mint Ceylon postage. Sunil indicates that many unanswered QSLs are received for QSOs with some sick chap persistently pirating his call. (K8PYD) . . . Effective July 1, 1972, International DX Association, K3RLY, becomes QSL manager for my W/K contacts. QSOs with stations in other areas will be handled by JA1KSO. I'll be retired in 1973 and on the air more regularly. (YK1AA)

AFRICA - We QSL 100 percent on receipt but we insist on correct Greenwich times and dates, and do please spell out the month in dating QSOs on QSLs; "14 July 72" for example. We consider the ET3TRC address to be Ethiopia's official QSL bureau. (ET3s DS GK JH) . . . With my surname it's not uncommon for my radio mail to wind up in Switzerland instead of Swaziland. (SWL Karl Muller, P.O. Box 283, Mbabane) . . . ZD8JT apparently welcomes s.a.s.e. bearing U.S. postage. (K8PYD) . . . My QSOs at EL9A through 1974 will be QSLd thoughly in response to self-addressed stamped envelopes via WA6TWG. (W7CED) . . . F6BFH agreed to forward incoming cards to F5QE who resumes FB8WW QSL

WA2BAV/TJ1 enjoys the hospitality of TJ1BF (4X4RH) in Yaounde where Haim is the only regularly active Cameroon DXer. At right Eva tries the mike of TY3ABF in Contonou where she and George were briefly popular as WA2BAV/TY3 and WB2AQC/TY3.





OJØ SUF was the May DXpeditionary handiwork of (from left) OH2BHU, K9TZH, OH2BLD and OHØMA. Bob, Jim, Benny and Kee amassed more than six thousand QSOs and 140 countries from Market Reef using an FT-101, dipole and ground-plane. This place is a much less pleasant vacation spot in mid-winter as previous "How's" photos will attest.

management. (DXNS) . . . Algerian stations tried 7X7 calls with single-letter commemorative suffixes this summer. 7X2MD was active as 7X7Y. QSLs can go via ARA. (VERON)

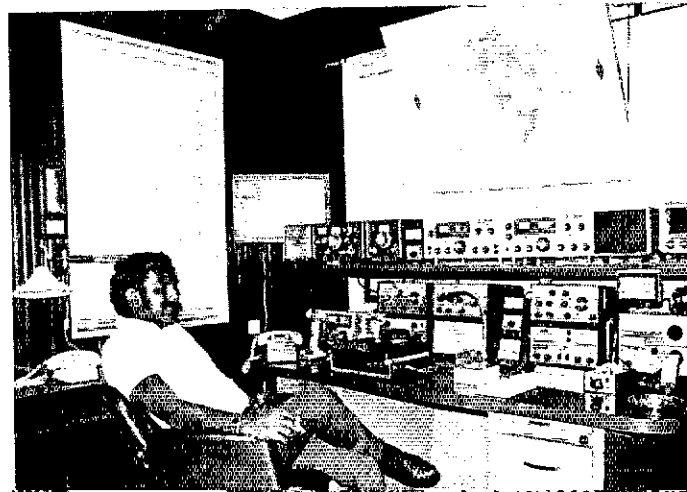
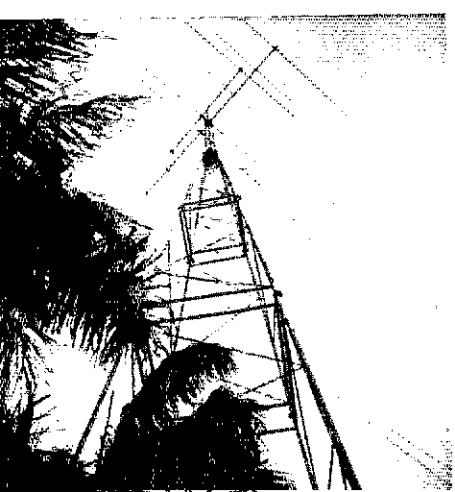
EUROPE - Despite claims to the contrary, he advised that ZB2A, RAF Amateur Radio Club, Gibraltar, BFPO 52, is still the official ZB2A bureau and has been so for many years. (ZB2A) . . . My QSL managership for OY7JD dates from July 1, 1972. (W3HNC) . . . I manage 12HBW QSLing for U.S. contacts only. (W4CNZ) . . . QSLs received via the DARC bureau for our FØAFV/FC and FØAHY/FC contacts, as well as those via DIs 5UAC and ØUP, will be answered. (DL7PD) . . . HV3SJ operation by operator Wolf in late June may be QSLd to EP2WB. (WCDXB) . . . Do YUs QSL? Eight QSOs with Yugoslavia but no cards yet. (WN4ZGE) . . . Bet the next WN4ZGE s.a.s.e. from your ARRL Bureau branch contains one or more. Jim. Central European amateurs have been reliable QSLers via bureaus over past years though transit time may be wearying. (W9BRD) . . . Reminder: QSLs for Iceland-stationed W/Ks operating portable-1F may go via P.O. Box 44, Keflavik Airport, Iceland. (DXNS)

OCEANIA - KH6BZF expects to continue QSLing for Kure island KH6EDY contacts made after February of this year depending on delivery

of more 1972 logs. (WCDXB) . . . Confirmation of my October Lora Howe island contacts as VK2BQQ/LH will be 100 percent. (VK2BQQ) . . . QSLs for KH6GLU's QSOs at 9M6AB on June 4-6, 1972 should go via K3RLY. Other 9M6AB contacts are confirmed through JA2KLT. (DXNS) . . . Maybe there's a postal route to one or more of your recent captures in the OTH list to follow. Be aware, however, that each suggestion is necessarily neither "official", complete nor accurate . . .

- C31s CD FE FH (via DLØLJ)
- DJ4IJ, S. Schmidt, Wurzerstr. 10,8 Muenchen 22, Germany
- FL8NP, P.O. Box 4, Djibouti, T.F.A.I.
- FR7AI/t, Y. Hoarau, 4 eme Km, St. Francois, Reunion Is.
- HBØs XKJ XKJ (via ON4QV)
- IS1MUA, Box 25, Cagliari, Sardinia, Italy
- JA2QVO, 2-80 Ousu Minatoku, Nagoya, Japan
- JA2RGH, 25 Aza-Maruyama, Hekinan, Aichi, Japan
- JY4IA, P.O. Box 2353, Amman, Jordan
- KA1MI, USCG Loran Stn., Marcus Is., FPO, Seattle, WA 98782
- KX6EB, E. Blaszczyk (W3KVQ), P.O. Box 997, APO, San Francisco, CA 96555
- PQ-PR-PS-PT-PU-PYØMI, P.O. Box 19094, San Paulo, Brazil
- PQ-PR-PS-PT-PU-PYØWH, P.O. Box 19073, San Paulo, Brazil
- PU-PV-PY-ZV7APS, P.O. Box 12178, Copacabana, 20000 Rio de Janeiro 68, Brazil
- PY2WH, P.O. Box 19073, Sao Paulo, Brazil
- TL8RD, Box 22, Bangassou, C.A.R.
- TU2CN, P.O. Box 4708, Abidjan, I.C.R.
- TY4ABJ, P.O. Box 317, Cotonou, Dahomey
- VK2BQQ/1h (to VK2BQQ or via QIA)
- VK9JV, J. Vogel, Box 530, Rabaul, T.N.G.
- VP2VAR, P.O. Box 328, Torola, B.V.I.
- VQ9DC, Box 188, Mahe, Seychelles
- YBØs ABB ABD (via WASMUM)
- 3D2EO, P.O. Box 29, Tavua, Fiji
- 5A3TB, Box 121, Tripoli, Libya
- 5Z4NR, Box 18010, Nairobi, Kenya
- 9K2AR, Box 15002, Kuwait
- 9K2AU, c/o U.S. Embassy, Kuwait

PZ1 makes quite a splash on the SSTV scene from Paramaribo. John's 127-foot tower helps dump consistent monitor-quality video into the States and far beyond. (Photo via K4PRT)



C31FG (to ON6SR) S21AB (to ON4AB)
 C31FI (to F6ACU) S21IR (to VE7BWG)
 C31FN (via PA0PMP) TT8AC (via DJ1LPL)
 C31FU (to PA0KX) VK9JW (to VK3JW)
 CR3RY (to CT1RY) VK9KE (via R5GB)
 DJ7MG/OH0 (to DJ7MG) VK9XW (via W2GHK)
 EL9A (via WA6TWG) VK0RC (via K3RLY)
 ex-F7CP (to W2ZRX) VP2LH (to W2BP)
 F0AFV/FC (via DJ5UAC) VP2VV/FS (via F6AEV)
 F0AHY/FC (via DJ0UP) WA9OTH/TF (via WA9PZU)
 FB8WW (via F5QE) WB2QCJ/mm (to WB2QCJ)
 FO8DM (via FO8DF) XV5AC (via W1YRC)
 FP0AA (to WA0KXJ) XW8EV (via K3NAS)
 FP0AZ (to VE7AZ) YK1AA (see text)
 FP0VQ (to W5VQ) YU3GP/p (to SM5EEJ)
 FP0ZZ (to WA2FBI) ZD8JT (via ZD8AR)
 GB3ENF (via G3VZN) ZK2DX (via WB5BHN)
 HC2YL (HC2OM) 3D2GC (via KH6HFH)
 HK4OF/0 (to HK4OF) 5H1LV (via K3RLY)
 I2HBW (see text) 5H3JL (via W9NNC)
 JY9LOM (to K6LOM) 5H3KF (to 9J2CS)
 LA4C (via LA7GJ) 5U7AK (via DJ9KR)
 LZ90D (via LZ1KVV) 5W1AL (via WB5BHN)
 OR4ES (via ON4VL) 7X0UG (via OK1CRA)
 OY7JD (via W3HNC) 9G1CV (via VE3FCL)
 OY8KR (to OZ8KR) 9H1CV (via R5GB)
 PJ8MS (to WB2VKO) 9H3ITF (to 9H1E)



ETs JH DS and GK do their part to keep Ethiopia workable. Jay, Dave and Bill all radiate from Addis Ababa, 14-MHz preferred.

The preceding mailing data was a gift to you from Ws ICW 1PL 1RML 1YL 2BP 4CNZ 6AM 6GSV, Ks 4SD 8PYD, WAs 2DHF 6CPP, WBs 4SUJ 4SXX 9CIS, WNs 4ZGE 6OSS, VE7s BAF BZY, W. Renner, Columbus Amateur Radio Association *CARAscope* (W87CQ), *DX News-Sheet* (G. Watts, 62 Bellmore rd., Norwich N.72 T, England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (K4KQ), International Short Wave League *Monitor* (E. Chilvers, 1 Grove Rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club *Bulletin* (K2KGB), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall Ct., Bellwood, Illinois, 60104), Nigeria Amateur Radio Society *News* (5N2ABG), North Texas DX Association *Bulletin* (W5SZ), Northern California DX Club *Dxer* (Box 608, Menlo Park, California, 94025), Southern California DX Club *Bulletin* (W6EJJ), *VERON's DXpress* (PA6s INA TO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club (W7YBX). Thanks, team!

† † †

Whence:

We're heavily pictorial this vacation month but there are a few data we'll try to find space for. Certainly we ought to comment on this wildly fruitful DX summer on old 160, PY1DVG's new inverted-V knocked off such stuff as DL9KR, Els 8H 9J, EL2CB, many Gs, GC3ZES, GW3UPK, HB9NL, KP4AST, KV4FZ, OK1ATP, OL1AOH, VP8KF and WIHGT. FP2BQ, who regularly transmits for North America on 1827 kHz at 0100-0200 GMT, worked EL2CB, Gs 3TSA 6BQ, GC3ZES, OL1s AOH APC, W4EX and ZD9BM. EL2CB's log includes DL9KR, EI9J, OK1ATP and WIHGT. W4EX cracked the equatorial barrier for ZL1s AYG MQ, VKs 5BC and 7JB, while W4BRB pierced the QRN for CX3BH, VP8KF and other nifties. Based on only fragmentary returns courtesy Geoff Watt's *DX News-Sheet*, it looks as though 1.8-MHz summer DX doldrums are now a thing of the past. . . . I'll be beaming Statesward from PS7-land the last two weeks of next month.

SU1MI, Egypt's only YL ham, likes liesurely cw work on 14,032 kHz at 0200-0400 GMT almost daily. Moona's admirer is her proud husband, Dr. Mohd Taher. You've probably worked or heard SU1MI's dad, SU11M. (Photo via DLs 1FL 8DU)



Operating News

GEORGE HART, WINJM
Communications Manager
ELLEN WHITE, WIYL
Deputy Communications Mgr.
ROBERT L. WHITE, W1CW; DXCC
GERALD PINARD, *Training Aids*

WIAW Emergency Bulletins. This year's FD almost was QRM'd by a real emergency. In some places, FD activity or plans for same were completely wiped (washed?) out by the Agnes floods. It could have been worse. It could have been the other way around - a real emergency QRMD by Field Day. Imagine the spectacle of an amateur radio emergency preparedness exercise interfering with amateurs trying to conduct emergency communications in the real thing! According to some reports this actually happened. Fortunately, such reports are very few. The cancellation of FD was seriously considered but, after careful examination of all aspects, it was decided that this wouldn't be necessary or in any case effective at such a late date. A great many participants wouldn't get the word and would g.a. as planned.

Instead, WIAW started transmitting, the Friday night before Field Day, a warning to all amateurs that an emergency condition existed in certain states in the northeastern part of the U.S., asking all amateurs, and especially FD participants, to avoid operating on any frequencies on which emergency operations were taking place unless to participate in such communications, and even threatening disqualification of FD groups interfering with emergency operations in any way. The bulletin was transmitted on regular bulletin schedules and at extra times and was widely copied. A few alert and enterprising OBS appointees picked it up and retransmitted it.

But as widely as WIAW is copied, there were still many FD participants (a majority, we would venture) who did not hear about it, and there were many cases of FD stations blundering onto an emergency frequency. In 99.99% of such cases, they quickly vacated when advised. One or two reports of blatant disregard have been received, and

are being chased down for further details. Several casual listeners have complained that they heard stations trying to get through to the disaster areas with inquiry messages being unable to do so because of the mass of FD activity. However, by and large, the frequencies on which the really important and necessary communications were

Are You Listening?

With each new development in the art of communication, the world becomes smaller. Man is able to talk to his "brothers" in many different ways - voice, the pen, forms of code, pictures, telephone, satellites, and so on. Sometimes the methods become very sophisticated and technical, and the world loses some of its vastness. We find that strangers who live far away are very much like us in their thoughts, ambitions and desires.

Unfortunately, in our endeavor to be heard, some of us appear too busy to listen.

There is a great deal of pleasure and information to be derived from just "reading the mail." LISTENING is an art. Have you tried it lately? Some people say very little because they have very little to say. But this doesn't stop many others, who never stop talking and therefore don't get much chance to listen.

In all this technological advancement, one of man's greatest gifts is the capacity to *listen*. The emphasis is on "communication," but there has to be two sides to it, and listening is one of them. It is often ignored, as we all too often fail to stand by to see if the other fellow has anything to say. Or, if we do, we think about what we are going to say next instead of listening to him!

Can't tell, you might even learn something from him - IF YOU LISTEN! (Adapted from *RTTY News*, bulletin of the Canadian Amateur Radio Teletype Group.)



Representing Wisconsin hams since the early 60s are three ex-SCMs and the incumbent. From left to right: Joe Taylor W9OMT (present SCM), Sid Pokorny W9NRP, Ken Ebner K9GSC, and George "Bud" Woida W9KQB (affectionately known as "Old Geezer"). (Photo by K9PKQ)

WIAW SPRING-SUMMER SCHEDULE

(April 30-October 29)

(The specific frequencies shown below are approximate and indicate general operating periods)

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.-1:00 A.M. EDST and Sunday 3 P.M.-11:00 P.M. EDST. 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. If you wish to operate, you must have your original operator's license with you. The station will be closed May 29, July 4, and September 4 and 7.

Times/Days GMT	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000	← CW BULLETIN ¹ →						
0020-0100 ⁴			3.7 Nov. ⁵	14.080	14.080	7.15 Nov. ⁵	14.080
0100	← PHONE BULLETIN ² →						
0105-0130 ⁴			3.990	30.190	145.588	1.820	21.390
0130	← CODE PRACTICE ¹ (35-15 wpm TThSat, 5-25 wpm MWFSn) DETAILS BELOW →						
0230-0300 ⁴			3.580		1.905		3.580
0300	← RTTY BULLETIN ³ →						
0310-0330 ⁴			3.625	14.095	7.095	14.095	3.625
0330	← PHONE BULLETIN ² →						
0335-0400 ⁴			7.290	3.990	7.290	3.990	7.290
0400	← CW BULLETIN ¹ →						
0420-0500 ⁴			3.7 Nov. ⁵	7.080	3.990	7.15 Nov. ⁵	3.580
1300	← CODE PRACTICE ¹ (15-25 wpm MWF, 35-15 wpm TTh) DETAILS BELOW →						
1700-1800		21/28cw ⁷	21/28ssh ⁸	21/28cw ⁷	21/28ssh ⁸	21/28cw ⁷	
1800-1900		14.290	14.080	14.200	14.080	14.200	
1900-2000		7.080	7.290	14.095	7.290	7.080	
2000-2030		21/28ssh ⁸	21/28cw ⁷	21/28ssh ⁸	21/28cw ⁷	21/28ssh ⁸	
2030			CW BULL. ¹		CW BULL. ¹		
2100-2130		7.15 Nov. ⁵	21.1 Nov. ⁵	7.15 Nov. ⁵	21.1 Nov. ⁵	7.15 Nov. ⁵	
2130			RTTY BULL. ³		RTTY BULL. ³		
2200		CPN ⁶	7.095 ⁴	3.625	14.095 ⁴	CPN ⁶	
2300			0N ⁶		RTTY BULL. ³	CPN ⁶	
2330	← CODE PRACTICE (10-13-15 wpm) DETAILS BELOW →						

¹ CW Bulletins (18 wpm) and code practice on 1.805, 3.580, 7.080, 14.080, 21.080, 28.080, 50.080 and 145.588 MHz.

² Phone Bulletins on 1.820, 3.990, 7.290, 14.200, 21.390, 28.590, 50.190 and 145.588 MHz.

³ RTTY Bulletins sent at 850 Hz shift, repeated with 170 Hz shift, on 3.625, 7.095, 14.095, 21.095, and 28.095 MHz.

⁴ Starting time approximate, following conclusion of bulletin or code practice.

⁵ WIAW will tune the indicated bands for Novice calls, returning the call on the frequency on which called.

⁶ Participation in section traffic nets.

⁷ Operation will be on one of the following frequencies: 21.02, 21.08, 28.02, 28.08 MHz.

⁸ Operation will be on one of the following frequencies: 21.270, 21.300, 28.590 MHz.

Maintenance Staff: W1s, Q1S, WPR, YNC.

WIAW CODE PRACTICE

WIAW transmits code practice according to the following schedule. Approximate frequencies are 1.805, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

35-30-25- 9:00 AM EDST TTh 1300 TTh
20-15 6:00 AM PDST

The 0130 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period. To improve your fist by sending in step with WIAW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and QST practice text (from the issue 2 months previous) to be sent in the 0130 GMT practice on the following dates.

Speeds	Local Times/Days	GMT
10-13-15	7:30 PM EDST dy	2330 dy
	4:30 PM PDST	
5-7½-10-	9:30 PM EDST SaTThs	0130 MWFSn
13-20-25	6:30 PM PDST	
5-7½-10-	9:00 AM EDST MWF	1300 MWF
13-20-25	6:00 AM PDST	
35-30-25-	9:30 PM EDST MWF	0130 TThs
20-15	6:30 PM PDST	

Sep. 8:	It Seems to Us
Sep. 12:	Correspondence
Sep. 20:	League Lines
Sep. 28:	ARPS
Oct. 2:	World Above
Oct. 4:	YL News

being conducted were well protected and well observed by the contesting fraternity.

On the Saturday of FD, FCC issued a limited declaration of emergency under Sec. 97.107 of its regulations, declaring five kHz each side of 3815 and 7215 as emergency channels, and of course WIAW carried this announcement (on extra schedules) also. The choice of frequencies (in extra and

(Continued on page 106)

**IN A COMMUNICATIONS EMERGENCY,
MONITOR WIAW FOR SPECIAL BULLETINS AS FOLLOWS:**

Phone: On the hour GMT

RTTY: at 15 minutes past the hour GMT

CW: on the half hour GMT

DX CENTURY CLUB AWARDS

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given including deleted countries. All totals shown represent submissions received through June 30, 1972.

Honor Roll

G3FKM	322/343	W3KT	321/349	WB6OOP	320/329	G3BVN	318/340	WASELL	317/323	W9TKV	315/334
G4MJ	322/343	W3LMO	321/338	W8BT	320/341	G3F XB	318/340	W6ABA	317/325	W9YFV	315/343
G8KS	322/344	W3NKM	321/342	W8CI	320/328	G3HCT	318/333	W6DZ	317/333	W6AUB	315/327
GW3AHN	322/345	W3RNO	321/343	W8KIT	320/340	G3TA	318/337	W6GPB	317/342	W68MB	315/332
HB9J	322/350	W3WCH	321/340	W9GIF	320/337	I1AMU	318/341	W6KZS	317/323	YV5AP	315/328
HB9MQ	322/344	W4HYU	321/343	W9GIL	320/341	K2YLM	318/322	W6SQP	317/326	YV6HP	315/321
K2BK	321/340	W4DOS	321/332	W9RCJ	320/336	K4JLL	318/331	W6WV	317/328	D9GPB	314/319
K4LNM	322/340	W4LKN	321/337	W9SFR	320/339	K4JC	318/325	W7ADS	317/340	DL1HH	314/328
OE1ER	322/349	W4OM	321/347	W9CZJ	320/328	K6DC	318/339	W7HA	317/331	DL7BA	314/335
VF2NV	322/344	W4OPM	321/340	Z11HY	320/348	K9FCE	318/331	W8DMD	317/343	F3AT	314/331
W1HX	322/346	W5AO	321/344	4X4DK	320/342	GN4NC	318/343	W8KJA	317/345	G5HDA	314/330
W2AGW	322/350	W5KM	321/348	DL7EN	319/338	PY2CK	318/345	W8QJK	317/338	HB9KB	314/332
W2CTO	322/346	W5MCK	321/346	GI3VI	319/338	PY2CQ	318/323	W8JW	317/327	K6VVA	314/327
W2DXX	322/332	W5PQA	321/343	K1LXG	319/330	PY2PA	318/323	YV580A	317/322	OK1ADJ	314/323
W2HTI	322/342	W5QC	321/336	K1SHN	319/327	PY2SO	318/323	DL7HU	316/329	VF3MJ	314/318
W2NUT	322/342	W6ANN	322/344	K4EZ	319/330	W1CBZ	318/337	G3FO	316/342	VR3KB	314/341
W2OKM	322/344	W6HJL	321/345	K6CH	319/342	W2CYS	318/344	G6KL	316/335	W2LAX	314/335
W2RGV	322/342	W6CQO	321/350	K6OJ	319/344	W2RDD	318/336	G3IIM	316/342	W2PN	314/320
W2SGC	322/342	W6PZ	321/346	K6YKA	319/324	W2WV	318/345	J22WJ	316/331	W2UVE	314/326
W3MP	322/348	W6HX	321/348	K8ONV	319/332	W2ZLV	318/322	K2UVU	316/333	WB2FMK	314/320
W4GXB	322/347	W6OSU	321/337	K4TV	319/345	WA2RLQ	318/323	K4KQ	316/340	W4AVY	314/330
W4HL	322/341	W6FTD	321/345	V74QM	319/346	WB2HXD	318/323	K4FDV	316/334	W4CBB	314/328
W4VPD	322/343	W6WQO	321/342	W1DK	319/340	W4IF	318/334	K4TWF	316/326	W4EEE	314/335
W5A5Y	322/343	W7MB	321/349	W1EZ	319/342	W4SSU	318/330	K5AAD	316/323	W4VMS	314/320
W5UX	322/341	W7PHO	321/343	W1GL	319/326	W5HE	318/323	K6NA	316/341	W5KIT	314/325
W6AM	322/351	W8MPW	321/343	W1HF	319/334	W5PWW	318/333	K9EZH	316/321	W5HT	314/336
W6CYV	322/344	W8OK	321/336	W1JNV	319/340	W5QKZ	318/330	OH2OV	316/325	W6RSY	314/334
W6LZL	322/342	W8WZ	321/347	W1MV	319/340	W6RGG	318/323	K8BZV	316/337	W6LIZ	314/341
W6NJK	322/340	W8ZCQ	321/339	W2CR	319/340	W6JA	318/336	W2GF	316/339	W6LOZ	314/336
W6FV	322/343	W9DWO	321/348	W2DOD	319/341	W6UOV	318/336	W2MS	316/338	W6VMV	314/324
W6ZO	322/347	W9HB	321/339	W2GON	319/324	W7AC	318/346	W4IC	316/325	W7LNV	314/342
W7AOB	322/338	W9ILW	321/331	W7HO	319/339	W8ARH	318/325	W5FFW	316/337	W9QLD	314/322
W7KH	322/349	W9LNM	321/348	W7LV	319/342	W8CV	318/340	W5GR	316/340	YV5AHK	314/321
W8FE	322/347	W9AHD	321/340	W7MJ	319/335	W8EVZ	318/325	W8HDS	316/336	Z56LV	314/331
W8HAW	322/350	W9FLA	321/348	W7PCJ	319/340	W8KPL	318/339	W5PM	316/334	Z56YQ	314/327
W8FWS	322/350	W9MLY	321/341	W7PDB	319/334	W9JUV	318/341	W6KJ	316/333	D3SDA	313/319
W8CZ	322/349	W9NK	321/347	W7QHH	319/344	W9QON	318/323	W6KUT	316/340	HB9FL	313/333
W8JBI	322/345	W9PQJ	321/341	W7ZX	319/342	W9WYH	318/336	W6EFP	316/325	H1ZGY	313/330
W8NGO	322/343	W9QGI	321/341	W3AFM	319/333	W9BBF	318/340	W6MWW	316/321	J3J3J	313/326
W8PHZ	322/341	W9SYK	321/343	W3DZJ	319/330	W9NVZ	318/334	W8KBT	316/333	K1YZZ	313/316
W9HG	322/351	DL1JN	320/340	W3VWV	319/345	YV5AB	318/340	W9KFC	316/341	K2KER	313/317
W9NDA	322/350	DL1JW	320/336	W3GAU	319/346	YV5ANF	318/320	W9TKO	316/330	K4ICK	313/329
W96W	322/347	DL1KB	320/343	W4ALI	319/346	ZL3IS	318/335	W9GKL	316/334	H4D	313/320
W9DU	322/348	HLZL	320/336	W4MCM	319/334	4K4JU	318/337	DL1BK	315/333	K4M2U	313/318
DL2BW	321/342	IT1TAJ	320/340	W4ML	319/343	JU7ZJ	317/322	H1K3G	315/319	K6AHV	313/322
DL3RK	321/342	J4LRK	320/332	W4NJE	319/326	DL0KQ	317/322	H6KDB	315/333	K6PHD	313/318
DL6FN	321/340	K6RO	320/334	W4OCW	319/340	J4JDM	317/336	J44BJD	315/320	VE3CFG	313/321
DL7AA	321/347	K8LSG	320/334	W56C	319/332	K2DCA	317/338	K20EA	315/335	W1QJR	313/328
DL90X	321/336	K9KYF	320/332	W5GO	319/336	K2PXX	317/326	K4YYL	315/326	W2FXN	313/321
G2BOZ	321/343	K9LUT	320/331	W6CHV	319/341	K2TQC	317/328	K6W	315/326	W2QK	313/320
G5VT	321/345	HL4DMG	320/340	W6LL	319/326	K2ZYX	317/328	K6QH	315/319	W2VCW	313/319
K2H1	321/342	OH2NB	320/345	W6FZJ	319/328	K6LVL	317/323	K7ADL	315/324	W2ZGJ	313/332
E2LWR	321/338	W1H7	320/342	W6HCO	319/336	K6WR	317/327	K8YDZ	315/320	WA2ELS	313/321
K6AN	321/346	W2BMK	320/336	W6ID	319/342	K8OHG	317/326	K9WTS	315/321	W3CJR	313/334
K6FC	321/339	W2BOK	320/341	W6KTE	319/324	K9RGM	317/321	L6SAQ	315/335	W3HTE	313/323
K6LGC	321/337	W2EXA	320/337	W6REH	319/329	K9PKR	317/331	OH5UQ	315/321	W4BR	313/326
K7GCM	321/335	W2EZY	320/337	W6RKP	319/337	OH2BH	317/323	PY2BKQ	315/320	W4RLS	313/321
K8LKB	321/336	W2GKZ	320/326	W6LN	319/343	OH4DM	317/340	VF5RU	315/332	W5HJA	313/328
LU6DJX	321/349	W2GM	320/339	WA6GLD	319/324	VF3WA	317/322	W2EKH	315/325	W5M8B	313/321
E9GJX	321/345	W2SAW	320/341	W7CMM	319/333	W1DQJ	317/326	W2DT	315/319	W5MMD	313/326
W1AX	321/348	W2SDC	320/341	W7IG	319/331	W1GYF	317/336	W2I	315/338	W5NUT	313/330
W1AZY	321/339	W2WMG	320/335	W7OF	319/340	W2AVJ	317/340	WA2DJJ	315/328	W6CAL	313/338
W1BAN	321/338	W2YY	320/332	W8CUI	319/330	W2BQM	317/334	W8RCS	315/320	W6TUF	313/317
W1BH	321/349	WA2RAU	320/325	W8JNJ	319/348	W2NO	317/325	W4IDR	315/335	W6ZJV	313/321
W1CKA	321/335	W4GGS	320/343	W8MB	319/337	W2PV	317/323	W4IM	315/341	W7OK	313/331
W1CLX	321/348	W4GRN	320/336	W8ONA	319/339	WA2HOK	317/333	W5OIGS	315/335	W9AMU	313/333
W1GKK	321/350	W4JMA	320/346	W8UAS	319/344	W4MR	317/340	W6CJL	315/321	W9GB	313/328
W1NU	321/340	W4MMW	320/338	W9HJZ	319/343	W5EGK	317/339	W6FRS	315/325	W9BK	313/327
W2BXA	321/349	W4BJ	320/336	W9RKP	319/340	W5GJ	317/328	W6HVN	315/321	W9DMX	313/325
W2CP	321/331	W5KTW	320/327	W9KE	319/340	W5KHU	317/338	W6OMF	315/332	W9NLY	313/333
W2LVU	321/346	W5OLG	320/345	W9LWG	319/334	W5FLZ	317/334	W7QPK	315/324	Y1AAB	313/327
W2TP	321/344	W6NSO	320/331	CEJAG	318/346	W5UKK	317/335	W8LY	315/333	Y8IO	313/333
WA2LZS	321/341	W6ZM	320/334	CR6BK	318/339	W5WZQ	317/335	W9MQK	315/331	YV58NW	313/314

Radiotelephone

W2HTI	322/341	W2BXA	321/347	K9LUI	320/331	W8HT	320/341	G3FKM	319/337	W1QNK	319/339
W6AM	322/349	W2RGV	321/349	I12HP	320/346	W9NDA	320/344	G5VY	319/343	W2ZY	319/342
W66VM	322/347	W2JF	321/331	W1BAN	320/336	W9N7M	320/328	G13VI	319/336	WA2ZS	319/330
W8BE	322/347	W9ILW	321/331	W2YY	320/336	W9CM	320/341	K1HXG	319/330	W3NKM	319/339
W8CZ	322/349	W9BW	321/340	WA2RAU	320/325	4X4DK	320/342	K6LGI	319/332	W4PDL	319/333
DL90H	321/336	G8KS	320/338	W6ZM	320/329	DL2YJ	319/338	K8RFG	319/332	W4QCW	319/336
W1JG	321/340	K9KYF	320/332	W7PHO	320/342	DL6FN	319/335	HL4DMG	319/339	W5GQ	319/332

W6REH	319/325	W4OM	318/338	4K4JU	317/332	W4SKO	315/332	W2LV	314/330	W2FXH	313/321
W8MPW	319/332	W6EL	318/324	HB9J	316/340	W5LZW	315/326	WA2HOK	314/320	W2GLF	313/330
W9LNM	319/334	WA8AJ	318/323	K2BZT	316/330	W8PQA	315/333	W4EEL	314/335	W2JT	313/331
W9GAA	319/326	YV5AB	318/340	K4HEF	316/329	W5SZ	315/318	W5KBU	314/334	WB2HXD	313/318
Z15CF	319/338	DL1IN	317/336	K5JEA	316/331	W7QPK	315/323	W6KTE	314/319	W4ANE	313/332
5Z4ERR	319/345	K4TTL	317/330	K6WR	316/322	W8EVZ	315/321	W7CMO	314/321	W4UWC	313/321
G6TA	318/336	K6YRA	317/322	W1DGI	316/325	W9SFR	315/326	W9JT	314/318	W6LUF	313/316
IIAMU	318/341	K9ECE	317/329	W2PV	316/322	YV5AIP	315/328	YV5AHR	314/321	W6WX	313/318
K2YLM	318/322	ON4DH	317/337	W3RIS	316/345	ZL1HY	315/342	YV5BPI	314/321	W6YMV	313/322
ON4DM	318/341	W4NJE	317/323	W8QJR	316/337	DI2BW	314/328	ZS6LW	314/330	W7AHS	313/332
PA4HBO	318/338	W5JWM	317/332	W9KNX	316/338	IK8DB	314/323	CR6BX	313/330	W8JIN	313/332
PY2CK	318/345	WASEFL	317/322	IN7ZG	315/320	OE1ME	314/331	JA1BK	313/323	W8UAS	313/335
PY2PA	318/323	W6BAF	317/331	G3DO	315/340	FY3PC	314/317	K2RKC	313/320	W9HH	313/329
YK5MS	318/341	W6NJU	317/329	W1CLX	315/333	SM5BCO	314/327	R9ACL	313/320	W9CKL	313/330
W2OKM	318/338	W6RKP	317/330	W2FGD	315/320	VE3QA	314/334	SM5CZY	313/320	W9MLY	313/329
W27TV	318/322	W9JWQ	317/324	W2WMG	315/323	VE5RU	314/330	VF3MJ	313/317	XE1AE	313/327
W3DJZ	318/326	W9WHM	317/338	W3KT	315/338	W2GQN	314/319	W2BQM	313/329	YV5HNW	313/314
W3WGH	318/331	YV5ANF	317/319								

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings - June 1-30, 1972

New Members

K6GUY	243	VE2GS	145	DL7QH	107	VK9BA	103	DK5ZO	101	K4OI	100	WB2AWL	100
G3JAG	235	W9EBY	138	WASSVH	107	VE6LB	103	W1RML	101	K4QR	100	W3YJG	100
WA3GJZ	215	WB2ALO	120	DK3GL	106	WB2CBO	103	W1FVX	101	K9DDA	100	WA3MTT	100
JA2PH	203	DL2UR	115	DM3VUH	106	W3EKKZ	103	WB4UKA	101	K3MSY/KG6	100	WB41H	100
K8CSG	202	W9EZO	115	K9LJZ	106	WA7REH	103	WA6HCL	101	VE3FBW	100	WA51YB	100
W5PD	180	HB9ASK	113	K9QAC	105	WA9WSD	104	W8ZPJ	101	VE4QP	100	WA5YFL	100
WA3MBQ	162	KG4AL	113	WA1PD	105	KJ3VS	102	ZL4OL/A	101	WA1GXC	100	W6EOL	100
WB5RFZ	162	W9EXD/4	112	WA5ZVE	105	OE6MKG	102	E3ZEM	100	WA1JZC	100	W7BL	100
KZ5KN	159	IIFY	111	DL3LT	104	WA2NGB	102	K2QWH	100	W2GRR	100	WA9YNE	100
W2GOF	149	W6KYA	110	G3KNB	104	WB2VPR	102	R4CFY	100	WA2FBV	100	YU3WO	100
PY2FCF	145	DL7NJ	107	OK3TBY	104	VP2MU	101						

IIKMG	308	WA3MBQ	162	ZP5NH	134	HB9ASK	112	II MSO	109	K6COC	105	VF1ATO	101
PY1CAD	243	PY44KL	160	JICZ	124	WA1JWQ	112	K9IUC	109	W4OZF	105	VE2GS	101
K6GUY	239	W5NQN	156	ZL1DO	117	II FY	111	YV3UF	109	ZP5TU	104	W2CCK	101
IIZU	191	W5PD	155	SM6DSS	116	II SLA	110	KG4AL	107	W2GOF	103	WA9MHH	101
W1LYN	182	K4CFB	150	DL8ZY	114	W6GIL	110	W6LU1	106	W9PHZ	103	WA5YB	100
JA2PH	178					II BA	109					W8NPF	100

Endorsements

In the endorsement listings shown, totals from 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 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.

JA1AG	330	W1AA	300	DL1YA	270	W2HRK	240	W2UJ	200	W1RYB	160	WA3NAV	140
OZ3Y	325	W2BXC	300	K3PNI	270	W2LHJ	240	W3CDG	200	WA2DHF	160	WB4PNG	140
SM7ANB	325	WA2HSX	300	SM6AFH	270	W3BRO	240	W3YHR	200	W4ZVX	160	WA9DJO	140
W1RLQ	325	W4ID	300	WA2HN	270	W4VJH	240	W4YKA	200	W9YVA/4	160	WA9TVM	140
OH2LA	320	W4REZ	300	WB2BBW	270	W6M1	240	W4WRY	200	WB4LXF	160	WA9TL1	140
VE4OX	320	VE3DCP/W9	300	JA1HHM	260	WA6FM	240	WB4SJO	200	WB4S1J	160	JA1QJ	140
W6UQQ	320	PY1WT	290	K6OIO	260	W8DA	240	WA6GGR	200	WA6GGR	160	K2GBC	120
VE6TP	315	W6MSW	290	VE4XJ	260	PY1FH	240	W7SE	200	W9JVF	160	K3NFT	120
K4ZCP	310	SM5WJ	290	W8SEN	260	SP3DD1	220	W9BMD	200	WA9YZN	160	K4EPJ	120
SM6CKS	310	W4ZSH	290	W1JFL	260	VE3BXV	220	W9KHC	200	W9KHC	160	K9GSG	120
W5LZT	310	WA4LXX	290	W1D8R	260	VE5SNW	220	DI4UF	180	YV5CKR	160	K9MGL	120
W9HPS	310	W5MCO	290	WA1ABW	260	W2S1M	220	DL7HI	180	DK2LM	140	KK6AY	120
K11HX	305	WA6GFE	290	WA4ZYQ	260	W3ES	220	DL9YD	180	ISPD	140	VE7BAF	120
WB2VAE	305	W1HGA	280	W5ZWX	260	W41BP	220	HB9ADU	180	JA1FNZ	140	WA1NKV	120
WB2YQH	305	W4JD	280	WA9UCE	260	W7PIZ	220	WB4PUD	180	K4EN	140	W2USJ	120
W3BWZ	305	WA2HIN	280	W9AO	260	WA8TDY	220	W7FT	180	K9EHP	140	WA2JRD	120
W4NO	305	W6GC	280	W2BXY	250	DK3SD	200	WA9EQG	180	KH6CCL	140	WB4PB	120
WA5JH	305	WA6PNB	280	WA3ATX	250	JA9GRF	200	DI4ET	160	ON4FP	140	W9LJL	120
W8DCH	305	WB9QV	280	WA9ZCP	250	KP4DKY	200	DL1RB	160	WQ2AF	140	WA9VGS	120
WA9IVL	305	W8QXQ	280	K3SEW	240	OE3HOW	200	K35XQ	160	W1SPK	140	W9HHH	120
K8RWL	300	W8SRK	280	K6QZ	240	OK1KTL	200	K9BWQ	160	WB2AQC	140		

F3DJ	320	W1BHI	305	OA4HS	280	K2KGB	260	WA2CGD	220	WA2MBE	180	DL9KR	140
W2NUT	320	W6PTS	305	W1HGA	280	K4VKK	260	WA2HIN	220	SM1AWD	180	G3YJI	140
DL7AA	315	W9QLD	305	W1HJB	280	W2GT	260	W6TTS	220	W9KAA	180	K9EHP	140
JA3UI	315	W9NVZ	305	W3COR	280	WB8XF	260	CB6EQ	200	W9YZO	180	KH6CCL	140
K4YYL	315	DL1JW	300	W5PPW	280	K6QJO	250	CPIFE	200	YV4WT	180	WB2RLX/VE1	140
K5AWR	315	DL7FN	300	W6ZC	280	W1BAB	250	DK3SD	200	HP1H	160		
K8IKR	315	JA2JW	300	VF3DCP/W9	280	W6CUF	240	K1RAW	200	K7DVK	160	W5SSMM	130
VE2WY	315	K3GKU	300	W9DH	280	W2SSC	240	K8CSG	200	K7GFX	160	VE7AGT	120
W9QGT	315	W1AA	300	JA1AG	270	W9LAA	240	VE3BIF	200	K9BWQ	160	KX6GK	120
II1LZ	310	WA2HSX	300	SM5WJ	270	WA9ZCP	240	VP2SNK	200	PY2CPK	160	WA2JRD	120
W5LZT	310	W4QAW	300	VE6FP	270	F6AOI	220	W1EP	200	WA3HBU	160	WA41PM	120
W9CPM	310	WA6MWG	300	W2ESC	270	JA6BSM	220	WA2DXJ	200	WB4S1J	160	WB4PXW	120
G3DML	305	W8GKM	300	W4REZ	270	K4LSP	220	W3YHR	200	W61TD	160	W5HFA	120
JA4BJO	305	W9KRO	300	W7FRM	270	K6RXXZ	220	W4WRY	200	W9KHC	160	WB5CBJ	120
OZ3Y	305	OE7UD	290	WA9IVL	270	K7SJE	220	WB7WA	200	DJ4FF	140	W7SF	120
VK4QM	305			CK7IK	260			DL6TZ	180			WA9DJO	120

DXCC NOTES

Announcement is hereby made of two actions being taken which concern the ARRL Countries List and DXCC credits.

1) Effective as of October 1, 1972, the *Maria Theresa* listing which has appeared on the ARRL Countries List is removed and all DXCC credits which have been given for that listing will be annulled. Information which has been gathered leaves no question but that no island, reef, or shoal exists in the area between 36 degrees 50 minutes South to 37 degrees 15 minutes South and 150 degrees 45 minutes West to 151 degrees 37 minutes West, the area in which *Maria Theresa* was alleged to be located. Official government charts of numerous soundings made in this area show no depths of less than 2850 fathoms.

2) Effective as of October 1, 1972, the listing which appears on the ARRL Countries List of *Minerva Reefs* will become a deleted country and only contacts made prior to July 15, 1972, will be creditable towards the *Minerva Reefs* listing. The Kingdom of Tonga has annexed *Minerva Reefs*. Because *Minerva Reefs* is less than 500 miles from Tonga, it no longer meets any of the points of the criteria for separate status on the ARRL Countries List.

The removal from the ARRL Countries List of the *Maria Theresa* listing and annulment of all previous DXCC credits for *Maria Theresa*, and the deletion of *Minerva Reefs* is in accord with recommendations which have been made by the ARRL DX Advisory Committee.

where in this column, every month. The "when" is something else. Since the station has regular commitments, bulletin transmissions in some cases will have to be "sandwiched" in between them. In other cases, when or if the emergency situation appears to be serious enough, other regular commitments may be temporarily shelved. In either case, however, the special emergency bulletins should be transmitted at the same times before and after the hour, so that Joe Amateur knows precisely when to look for them, or *continuously* if the emergency is that serious. It seldom will be, however, so a definite order of transmissions is called for.

The matter has been studied within the department, and a definite schedule has been arrived at. In the event of an emergency situation serious enough to merit a special bulletin (with or without an FCC proclamation), WIAW will transmit the special bulletin (only) by phone on the hour, by RTTY fifteen minutes after the hour and by cw on the half hour. Of course the regular bulletin transmission schedule will be observed. If the emergency rates top precedence, the bulletin will be transmitted on the above schedule even when this will pre-empt the code practice. However, ordinarily the code practice will be sent on schedule, since most emergencies are pretty localized in nature.

Special emergency bulletin transmissions will be originated when, in the judgment of the ARRL President, General Manager and/or Communications Manager (whoever is available or jointly, depending on circumstances) such a bulletin is needed or justified.

Remember, *in general*, listen on the hour for phone, fifteen minutes after the hour for RTTY, on the half hour for cw. Make it a practice to check the WIAW frequencies during these times in emergency situation.

Operating News

(Continued from page 103)

advanced class segments) was dictated by the prevalence of FD activity elsewhere on the bands, but this in itself was not intended to restrict the license grade of operators to be used.

The point is that although WIAW transmitted these bulletins several times a day on all bands by all modes, many amateurs did not hear it and chances are that some of the FD participants were not even aware that an emergency condition existed. The reason? Perhaps because the bulletins were transmitted at random during the course of WIAW operation, rather than on a regular as well as frequent schedule. The reasoning is that if there is an understanding as to when and where such transmissions will take place, average Joe Amateur, wondering if an emergency condition exists (perhaps because he heard something on TV or radio or even on the hambands), will know precisely when and where to look for more and authentic info.

The "where" is easy - the regular WIAW bulletin frequencies. You'll find them listed else-

Field Day film. WA2MYK is attempting to put together a Field Day film, under ARRL sponsorship, somewhat on the order of "Field Day at DK" which many clubs have hooked from our film library. She had intended attending a local F-D and getting some footage, and did indeed do this, but weather conditions weren't the best for shooting movies, as those in the area can testify, and the "rushes," although for the most part usable, aren't exactly ideal.

If your FD group or club took some movies, perhaps you could be persuaded to let us have a look at them for possible use in this production. This is strictly a low-budget affair, Super-8 sound, so what we need is Super-8 footage only (regular 8-mm won't do), the original copy. We have to use the original, so cannot return it (but can make a duplicate to return to you). In other words, your footage will be practically a donation; however, anything not used will be returned.

WA2MYK would like an opportunity to view as much Super-8 footage as possible, in order to give "CQ Field Day" a cosmopolitan appearance. If you have some that looks like a good prospect for a typical FD film, send it to ARRL headquarters for screening. It will be appreciated. - WINJAM.

Operating Events

de W1YL

SEPTEMBER

1-15 **WX2MAP operation**, p. 106 August.

7 **W6OWP Qualifying Run** (W6ZRJ, alternate) 10-35 wpm at 0400 GMT on 3590/7129 kHz. This is 2100 PDST the night of September 6. Underline correct minute of highest speed copied, certify copy made without aid and send to ARRL for grading.

8-21 **Malta National Day Award** activity period any mode or mixed. Applicants should send in a separate list for each band showing date, time in GMT, station worked, RST's and serial number starting with 001. A certified copy of the applicant's log signed by an official of his club/society or by any other two amateurs must be forwarded with 10 IRCs or 2 dollars, U.S. The name, call and QTH of the applicant must be shown on each piece of paper. Special certificates. Apply to the Awards Mgr., Mr. Lawrence Smith, 9H1BB, 'Doreen' Francis Buhagiar St., Birkirkara, Malta. Decisions of the committee are final.

9-10 **VHF QSO Party**, p. 68 August.

10 **FMT**, p. 106 August.

13 **WIWAQ Qualifying Run** 10-35 wpm at 0130 GMT on 1.805 3.580 7.080 14.080 21.080 28.080 50.080 and 145.588 MHz. This is 2130 EDST the night of September 12. Underline one minute of top speed copied, state no aids used (typewriters OK), sign and mail to ARRL with your full name, call (if any) and complete mailing address.

16-18 **Pennsylvania QSO Party**. 15th annual, starts at 2300 GMT Sat. September 16 and runs until 0200 GMT Mon., Sept. 18. Pa. stations count 3 points per out-of-state QSO, one point per Pa. QSO, multiplied by the number of ARRL sections and countries worked. Out-of-state stations count one point per QSO, multiplied by the number of Pa. counties worked. The same station may be worked on different bands/modes. Logs must show date/time in GMT, QSO no., stations, RS(T), counties (for non-Pa. stations), ARRL sections for Pa. stations, band/mode. Exchange QSO no., RS(T) and county (Pa.) or section/country if non-Pa. Activity will be found around 72.5 kHz up from the low end of each cw band and 20 kHz down from the top end of each phone band. Check phone bands on the even GMT hours. Appropriate certificates for single-operator stations. Any station qualifying for the Pa. Counties Award will be issued it free of charge, minimum qualification 30 separate counties. Multitop, a separate category. Nittany ARC members ineligible for awards. Mailing deadline Oct. 16. Send to NARC, P. O. Box 60, State College, PA 16801. **Washington State QSO Party**, 7th annual, sponsored by the Boeing Employees' AR Soc. (K7NWS), the final weekend of Wash. State AR Week, starts at 2000Z Sept. 16 and ends 0200Z Sept. 18, open to all. Stations may be worked each band/mode for contact points and more than once if they are additional multipliers. Wash. stations score 1 point for each QSO (including contacts with other Wash. stations). All others score 2 points for each contact with a Wash. station. Wash. stations multiply QSO points by the total of different states, VE provinces and other foreign countries worked. Others use Wash. counties for multiplier (maximum of 39). Exchange QSO no., RS(T) and county (for Wash.) or state/province/country. Appropriate awards. Suggested freqs.: cw, 3560 7060 14060 21060 28060; phone, 3935 7260 14280 21380 28660; novice, 3735 7175 21204. Logs must show dates, times(Z), stations, exchanges, bands/modes and claimed score. Include a check sheet if more than 50 QSOs. Each entry must contain the usual statement. No logs returned. Results will be mailed to all entrants; postmark log no later than Oct. 16 and send to BEARS Contest Committee, Willis D. Propst K7RSB, 18415 38th Ave. South, Seattle, WA 98188.

20-22 **YLRL Howdy Days**, p. 100 Aug.

23-25 **VE/W Contest**, p. 69 Aug.

26 **WIWAQ Morning Qualifying Run**. 1300 GMT (this is 9 am EDST). Same frequencies and details as under the Sept. 13 listing.

OCTOBER

4 **W6OWP Qualifying Run**.

7-8 **California QSO Party**, sponsored by the North Hills RC K6IS, 7th annual event running the full 48-hour GMT period, all the same station may be worked once per band/mode. Send QSO no., RS(T) and QTH (county for Calif. stations and ARRL section or country for others). Calif. stations may work each other. Contacts between stations outside Calif. are not valid. Each contact is worth 1 point, except those with Novices, worth 5 points. Multiply QSO points by total Calif. counties worked or total ARRL sections (including those in Calif.) and DX countries worked. Frequencies: cw, 3560 7060 14060 21060 28060; sb, 3880 3980 7280 14280 21280 21380 28580; novice, 3735 7175 21110. All logs must show dates, times, band, modes, exchanges. Each band

and mode must have a separate page, and contain your call on each sheet. Logs cannot be returned. Include a summary with each entry. List counties, ARRL sections and countries worked (for Calif. stations). Show breakdown of QSOs per band and scoring on this page. Include your name, call and address in block letters. Appropriate awards. Entries must be postmarked no later than Nov. 4. Send to John Minke W6KYA, 6230 Rio Bonito Dr., Carmichael, Calif. 95608. Include a no. 10 s.a.s.e. for results. Good quality photos are appreciated along with your comments. **VK/ZL/Oceania DX Contest** phone, from 1000Z Oct. 7 to 1000Z Oct. 8. Non-VK/ZLs count 2 points for each QSO on a specific band with VK/ZL, 1 point for Oceania stations other than VK/ZL. Oceania stations count 2 points for QSOs with VK/ZL, 1 point for QSOs with the rest of the world. Final score is derived by multiplying total QSO points by the sum of VK/ZL call areas worked on all bands. Serial numbers are RS(T) plus QSO no., starting with 001. Logs must show date/time(Z), calls, bands, serial numbers. Underline each new VK/ZL call area contacted and use separate logs for each band. The summary sheet must show your call, name, address (print clearly), details of gear and for each band, the QSO points for that band plus the VK/ZL call areas worked. All-band score will be total QSO points multiplied by the sum of VK/ZL call areas on all bands. Include the usual declaration. Special certificates. Logs must reach the NZART before Jan. 25, 1973. Send to the NZART Contest Mgr. ZL2GX, 152 Lytton Road, Gisborne, N.Z. **Massachusetts QSO Party**, 8th annual, sponsored by the M.I.T. Radio Soc. W1MX, from 2300 Oct. 6 - 0500 Oct. 7, 1900 Oct. 7 - 0700 Oct. 8, 1100-1700 Oct. 8, 2200 Oct. 8 - 0400 Oct. 9. A station may be worked once per band, cw/phone are separate bands. No crossband, no contacts through repeaters. Mass. stations may work each other. Outside stations work Mass. only. Exchange QSO no., RS(T), country (Mass.) or state/VE province/country for others. Count 1 point per exchange. Outside stations multiply QSO points by the no. of different counties worked (max. 14). Mass. stations use Mass. counties plus states (not including Mass.) and VE provinces. DX may be worked for QSO points but not for multipliers. Stations using 6 and above exclusively may add multipliers worked on each band. Logs containing more than 50 QSOs must be accompanied by a check sheet for each band worked listing alphabetically the calls of the stations worked (ARRL Op. Aid 6, or equivalent). Suggested freqs.: cw 55 kHz up from lower band edge, phone 15 kHz up from the lower edge of the General class phone bands, Novices lower third of each Novice segment, vhf all bands, all modes. Try phone on the even GMT hours. Appropriate awards. Logs must be postmarked no later than Nov. 10. Mail to M.I.T. Radio Soc., W1MX, Box 558, 3 Ames St., Cambridge, MA 02139. Please include an s.a.s.e. for late January mailing of results/awards. **R5GB 21-28 MHz phone contest**, 0700 GMT Oct. 7 to 1900 GMT Oct. 8. Non-British Isles station score 5 points for each complete QSO with a British Isles station. In addition, a bonus of 50 points may be claimed for the first contact with each prefix, i.e. G2, G3, GM4, etc. GB stations do not count for bonus points. A check list showing the bonus points claimed should be included. Send entries to arrive no later than Dec. 11 to the R5GB HF Contest Committee, c/o R. J. Polley, G3YPC, 81 Beech Rd., Horsham, Sussex RH12 4NW, England. Appropriate certificates.

12 **WIWAQ Qualifying Run**.

14-15 **CD Party phone**. **CARTG RTTY SS**, this issue. **VK/ZL Contest**. cw; same rules as the Oct 7 listing, the time the full 24-hour GMT period starting at 1000 GMT Oct. 14

18-19 **YL/AP cw**.

21-22 **CD Party cw**. **CQ-WE Contest**, h.f. portion, limited to Bell System employees. For full details see your local coordinator. **R5GB 7 MHz Contest**, cw, from 1800Z Oct. 21, running a full 24 hours. Serials must be used starting with 001. Overseas contacts may claim a bonus of 50 points for the first contact with each British Isles country-numerical prefix, i.e. G2, G3, GM4, etc. Contacts with GB stations will not score bonus points. Entries must be posted to arrive no later than Dec. 22, and sent to: J. Bazley G3HCT, Brooklands, Ullenhall, Solihull, Warwickshire, England. Appropriate awards. **Boy Scout Jamboree-on-the-Air**.

28-29 **CQ World Wide DX Contest**, phone.

NOVEMBER

1-2	YL/AP, phone.	11	FMT
2	W6OWP Qualifying Run.	11-12	SS, phone.
4-5	R5GB 7 MHz Contest phone, Maine QSO Party.	18-19	SS, cw.
10	WIWAQ Qualifying Run.	25-26	CW WW DX Contest, cw.
10-11	Trillium Contest.		

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, Roger E. Cole, W3DKX — SEC: WA3DUM, RM: W3EFB, PAM: WA3GSM, WA3QID has sole possession of the rig while in op. WA3QUU is touring Europe as member of the String Bass section of the American Youth Symphony Orchestra. The Del. Traffic Net operates Mon. through Fri. at 6:30 local time on 3905 kHz on an experimental basis. QNI and QTC has been good but more Kent Co. stations are needed. WA3IID makes 2-meter am nets with a Seneca. Most Del. clubs were active on Field Day. W3ZNF reports 14 members of the Mavericks increased contacts by 60% over the best previous year and charter member Ray Dennis traveled 700 miles to join the gang. K3KAJ is now settled at his new Laurel QTH while WA3FRV/4 is looking for 20-meter contacts from 6491 SW 43rd St., Miami, Fla. 33155. PSHR: WA3GSM 46, WA3DUM 35. Traffic: WA3GSM 104, WA3DUM 42, W3DKX 38, W3EFB 25, K3KAJ 25.

EASTERN PENNSYLVANIA — SCM, George S. Van Dyke, Jr., W3HK — SEC: W3FBF, RMs: W3EML, K3BR, K3MVO, WA3AFI, K3PIE, W3CDB, PAMs: K3BHU, WA3PLP. OBS reports were received from WA3QOZ, K3WRV, WA3AFI, WA3LWR, W3CBH. OVS reports from W3CL, WA3BJQ, W3ZRR, OO reports from K3OIO, W3BFF, W3FTG, W3KEK, K3RDT, W3CL, K3WRV, W3ID. BPLs: WA3OGM, WA3HGX, WA3QOZ, WA3ATQ, K3NYX, W3ZRO, WA3CFU/3, K3WRV, W3EML, PSHR: K3BR, K3OIO, WA3QOZ.

Net	kHz	Operates	QNI	QTC	RMPAM
PTTN	3610	6:30 P Dy	182	86	WA3AFI
EPA	3610	7:00 P Dy	298	256	K3BR

FD messages were received from K3SSC/3, K3MTK/3 and W3AJ/3. Many clubs gave up FD for work in the flood which is very commendable. Reports of nets and various groups that did an FB job during the flood will be covered in QST by Hq. My only complaint was that there were so many hams willing to help but they were totally ignorant of circuit discipline and net procedure and message handling. New officers of Mt. Airy VHF ARC are K3BPP, pres.; W3POD, vice-pres.; WA3BIV, treas. secy.; W3SAO, corr. secy.; K3GAS, treas.; WA3NCK, K1SFF/3, K3ZSG, dir. Traffic totals really show the activity caused by Agnes! W3CUL says situation normal Rapid City followed by Agnes! WA3EEC/3 manned CD Hq. for Lackawanna Co. W3EML reports a real hectic month for TCY. FPAEP&TN had a Jamaican station report into their traffic net, K3WEU/6Y5U! WA3QOZ reports the early morning CW net is really picking up and handling a lot of traffic. W3ZRO says these emergencies should be spaced far apart, rough week end! K3NYX, AI's jr. op. did a fine job too. WA3MQP has a keyer, now it has him. WA3DE makes a good comment, is cw going out of the picture during emergencies? Even when conditions were so poor that relays did not work, no one resorted to cw. WA3CKA used the first week of his vacation for flood work. W3AXA bought a bug now his rig needs debugging, any connection? WA3EFC graduated from Lafayette with honors, congrats! W3OY will be QRT for a while. WA3MWT busy on intruder watch. Agnes should be another fine chapter in the record of ham radio. Well done! New officers for the Tamaqua Area Sideband Amateur Radio Assn. are K3HXS, pres.; K3KNL, vice-pres.; W3ZRO, secy.; W3CMA, treas; Traffic: W3VR 1428, WA3HGX 1202, W3EML 580, WA3OGM 577, WA3QOZ 474, K3BR 348, W3ZRO 321, WA3CFU/3 298, W3NNL 250, WA3KWU 241, K3NYX 232, K3WRV 231, K3OIO 177, WA3ATO 175, WA3MQP 143, WA3QQM 101, W3ADE 96, W3NM 88, WA3CKA 62, WA3AFI 52, K3MNT 49, K3SWZ 42, WA3PLP 41, W3KEK 40, W3AXA 38, W3HK 36, WA3QHN 36, W3VAP 35, WA3PHQ 33, K3MVO 30, W3VA 26, W3OY 23, WA3KKM 21, WA3LWR 19, W3CL 16, W3BNR 15, W3CBH 12, W3BUR 8,

WA3QLG 8, K3KNL 7, K3UKO 6, W3LC 4, WN3RKH 4, K3HXS 3, WA3BJQ 2, W3GKM 2, W3EU 1, WA3MWT 1.

MARYLAND-DISTRICT OF COLUMBIA — SCM, Karl R. Medrow, W3FA — SEC: K3LFD, RM: W3EZT, PAM: W3FCS. The big traffic men for June are WN3RCI, W3TN, WN3OYP and WN3RIY all on originations and deliveries. Early reports of the Agnes emergency show MEPTN with 56 hours of operation, 270 check-ins and 131 messages. MDD handled long haul in regular session. In regular sessions MDD held 60 sessions, 543 check-ins and 320 messages. MDCTN met 14 times QNI average of 15.3 and 40 messages. W3CIX reports 40 two-meter amateurs participated in the emergency through the WA3DZD repeater. WA3LQV is a new ORS, OPS; WA3IYS and WA3PJS become OOs. WA3JRDU was pleased with the CD party results. WA3QIA is a new member of ARRL. WA3EOP suffered an electrical typewriter breakdown. WA3PJG spends a month in Ill. at Northwestern. W3EKZ reports the QCWA of Baltimore had a delightful time at the NSS transmitter site. W3FCS operated E22FM while in Ireland with the XYL. W3FZV touts CD and FD. WA3IIV says his NCS stints are too many. Singing the praises of new beams and a quad are WA3MSW, WA3OHF and WA3LFU. WN3OYP is out of competition until he gets his General. W3PT is active with AMSAT nets and on 2 meters. W3QU reports a busy month on vhf and with heavy flood traffic. K3NCM was flooded out for two days. WN3RIY likes DX and traffic. W3BHE enjoyed his first FD since the thirties. W3OKN supervises 150,000 workers — he is a registered bee keeper. W3TN goes south, W3QU goes north for vacations. W3CDO enjoyed the YLRL Convention and received a new 24-hour clock. WN1QJW/3 is at the NNMC and misses New England. W3EOV likes the dry west and didn't get rich prospecting. Welcome back to WA3PAA. W3RUN passed his 1st class cw and 1st lone and has the rest of the BARC doing the same or upgrading to Advanced Class. They have 10 new Novices and a class of 25 new aspirants including an entire family of five. WA3IVA is prexy and W4HYV is program chm. The Md. Mobileers had a fabulous hamfest and a well organized FD. The Goddard ARC played host at the old WVV site for a joint operation. Traffic: (June) WN3RCI 268, W3TN 249, WN3OYP 204, WN3RIY 204, WA3IYS 184, W3OKN 173, W3QU 161, W3FA 126, WA3PJG 92, WA3LFU 88, W3EZT 81, WA3IIV 57, WA3MSW 50, W3GZK 47, WA3OHF 28, W3GRM 22, W3FCS 16, W3FZV 14, WA3FHK 13, K3NCM 13, W3CIX 7, WA3RDU 7, W3EOV 6. (May) K3TNM 38, WA3MSW 34, K3QDC 8.

SOUTHERN NEW JERSEY — SCM, Charles E. Travers, W2YPZ — SEC: W2LVW, PAM: WB2FE, RM: W2JI.

Net	Freq.	Time(EM)	Ses.	QNI	Tyc.	Mgr.
NJPON	3930	6	4	76	19	WB2FE

With Field Day a part of history, we can now look forward to the usual summer activities. Recent endorsement of a very active station is WB2VEJ. W2KGM also is a recent renewal. W2ORS continues to do well as an OO. K2ARY continues to transmit bulletins. WA2SEA reports a new Novice Net which meets Mon. at 8:30 P.M. on 21325 MHz, as a part of the AREC program of the GCR. The hurricane season is here and up to their customary tricks of being most unpredictable. As a result of the recent storm great effort is being put forth by various CD areas to collect pertinent information so that more and new criteria may be set to more successfully combat the onslaught. Much commendation is due all those who contributed so well to the work accomplished in the recent hurricane. Care should be exercised in keeping equipment in operating condition at all times. Preparedness is still a tremendous defense for these unreasonable "visitors." Traffic: WB2UYB 376, W2ZO 244, WB2VEJ 229, WA2CZA 92, WB2FE 23, W2JI 22, W2YPZ 11, W2ORS 7, W2KGM 6, WA2KWB 6, WA2NZJ 4, W2ZI 3.

WESTERN NEW YORK — SCM, Richard M. Pitzeruse, K2KTK Asst. SCM: Rudy M. Ehrhardt, W2PVI, SEC: W2CFP, Well, we went and did it! We went and had a real live emergency which just happened to coincide with Field Day, the traditional ham radio emergency preparedness drill. It would be impossible for me at this time to list all the calls of the fellows who did such a tremendous communications job so far fear of sighting someone, I won't list any as yet. Please advise me of your emergency operations as soon as possible. I think that even though there were some flaws, amateur radio again did an outstanding job when no other means were



Plug yourself into a bargain

You don't plug the Yaesu FTdx 570 into a power supply, you plug it into the wall. The 570 is ready-to-go, with 560 watts of PEP SSB and 500 watts of CW power built-in.

In a rig selling for \$549.95.

And power isn't the only reason why the FTdx is the world's best transceiver value. For a nickel less than \$550 you get a whole lot more. Like a built-in noise blanker. VOX. Calibrators. A built-in speaker and cooling fan. WWV channel. And 80 to 10 meter coverage on transmit and receive.

You get a rock-stable VFO, and a receiver so sensitive it hears things



clearly other rigs don't hear at all. Plus a lot of other features detailed in our brochure. Features that would cost you a fortune if you could find them all in any other rig.

For a little more than the \$549.95 price tag, you can order the 570 with a CW filter.

Send us the coupon and we'll send you a brochure on the FTdx 570.

Include a check for \$549.95 and we'll send you the real thing. Do that, and you'll be plugged in to amateur radio operation at its finest.

SPECTRONICS WEST

Dept. Q, 1491 E. 28th, Signal Hill, Ca. 90806 / (213) 426-2593

SPECTRONICS EAST

Dept. Q, Box 1457, Stow, Ohio 44224 / (216) 923-4567

Please send detailed information on all Yaesu products.

Enclosed find \$ _____

Please send model(s) _____

Name _____

Address _____

City _____ State _____ Zip _____

All prices F.O.B. Signal Hill, Ca. 0-1

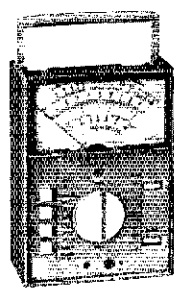
Master Charge and BankAmericard accepted.

The peanut whistle heard 'round the world...



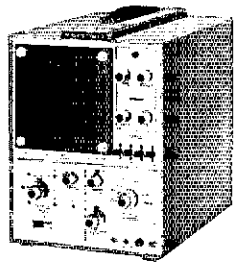
and Heathkit instruments that

The New Heathkit FET VOM... 79.95*. This is the tool hams have been waiting for. A portable lab-grade FETVOM combining accuracy, versatility, convenience and ruggedness—in an easy-to-build dollar-saving kit! Our new IM-104 has low-drift 1% precision metal film and wirewound resistors for exceptional stability. Dual FET meter amplifier circuitry for 10 megohm input impedance and instant operation. And there are 53 ranges on four scales. Nine DCV ACV ranges from 0.1V to 1000V. Six current ranges cover 0.01mA to 1000mA, DC & AC. Seven resistance ranges from 1 ohm to 100 megohms, conventional or low voltage modes. Decibel ranges from -40 dB to +62 dB. DC null scale with better than 1 mV resolution. The 4½" ruggedized, taut-band meter is diode protected, built to take plenty of abuse. Built-in circuitry shows battery condition at the flip of the range selector.



Kit IM-104, 4 lbs. 79.95*

The Heathkit 10 MHz Triggered Scope... 229.95*. Maximum flexibility in a general purpose scope, at a price to fit any budget...the new Heathkit IO-103 is a ham's dream come true! Big 6x10 cm screen with lighted graticule for easy, accurate measurements. DC-10 MHz ± 3 dB response with less than 50 ns rise time on vertical channel. Horizontal expansion gives x2 magnification $\pm 5\%$ for a 50 ns/cm sweep rate. Triggered sweep, too, with selection of either normal or automatic modes. Other features are switch controlled AC-DC coupling; provision for external triggering signals and horizontal deflection signal; front-mounted connectors for vertical inputs and 1V peak-to-peak signal for checking calibration; easy-access cabinet with removable side panels for service or demonstration purposes; 120/240 VAC operation. Put this budget-minder in your shack now.



Kit IO-103, 37 lbs. 229.95*

The latest QSL count is 27 countries, 40 states, all continents! That's what the Hams at Heath have scored field testing the new HW-7 CW QRP Transceiver. And the new contacts are coming in every day. The HW-7 is flea-power operation at its finest. With three-band CW coverage, running a tidy 3 watts on 40, 2.5 watts on 20 and 2 watts on 15 meters. That's a bare minimum, but the HW-7 gives you more than a sporting chance. It has both built-in VFO and crystal transmit capability. Sensitive Synchrodyne Detector receiver circuitry for a readable signal with a 1 μ V input or less.

Operation is nice and neat too. Band selection is at the push of a button, and the 6-1 vernier drive gives you "backlashless" VFO tuning. The pushbutton crystal transmit provision makes the HW-7 perfect gear for novice or QRP roundtable use. Built-in sidetone and relative power meter are other top quality features.

You can carry your HW-7 peanut whistle anywhere. As you see it at left it's ready to run on any 12 VDC supply. For a fixed flea-power station there is an optional

low voltage power supply that plugs into your 120 VAC line.

You can build this rugged little transceiver in an easy two evenings — building-in the dollar savings as you go. One-circuit-board design and the check-by-step assembly manual help you get it together without a hitch.

The Heathkit HW-7 — for novice or veteran QRP amateurs operating in the field or fixed. It's the ultimate Mini-Rig. From the folks who brought you the Maxi.

Kit HW-7, 6 lbs. 69.95*

Kit HWA-7-1, 12 VDC power supply, 4 lbs. 14.95*

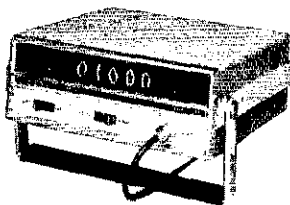
HW-7 SPECIFICATIONS — TRANSMITTER: RF Power Input: 3 watts on 40 meters, 2.5 watts on 20 meters, 2 watts on 15 meters. Frequency Control: 40 meter crystal, or built-in VFO on 40 meters, 20 meter crystal or built-in VFO on 20 meters, 15 meter crystal, or built-in VFO on 15 meters. Output Impedance: 50 Ω unbalanced. Sidetone: Built-in. Spurious and Harmonic Levels: At least 25 dB down. RECEIVER: Sensitivity: Less than 1 microvolt provides a readable signal. Selectivity: 2 kHz at 6 dB down. Types of Reception: CW or SSB. Audio Output Impedance: 1000 Ω nominal. Receiver frequency response is ± 3 dB at 200 Hz to 2500 Hz. GENERAL: Frequency Coverage: 40 meters, 7.0 to 7.2 MHz, 20 meters, 14.0 to 14.2 MHz, 15 meters, 21.0 to 21.3 MHz. Frequency Stability: Less than 100 Hz drift after 10 minutes warm-up. Power Required: 13 volts DC, 35 mA receive and 450 mA transmit. Dimensions: 4 $\frac{1}{4}$ " H x 9 $\frac{1}{4}$ " W x 8 $\frac{1}{2}$ " D, including knobs and feet.

keep the ham world working

The Heathkit
100 MHz Counter ...
269.95*

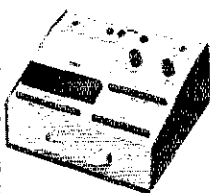
Accepts input levels from less than 50 mV to over 200V, depending on frequency, without damaging the instrument; full 5-digit readout can be expanded to 8-digit capability with range selector and overrange circuitry; decimal point automatically positioned with range selection; MHz, kHz, overrange and gating conditions indicated by illuminated legends on front panel; one megohm input impedance & low input capacitance minimize possibility of circuit loading; all solid-state circuitry with cold cathode readout tubes for instant operation; count storage circuitry gives non-blinking or count-up readout, changing only with count; stable time-base crystal has better than ± 3 ppm from 17° to 32° C. dual primary, 3-wire line cord & regulated supply for stable operation over long periods.

Kit IB-1101, 8 lbs. 269.95*



The New Heathkit FET
Tester... 49.95*. The new

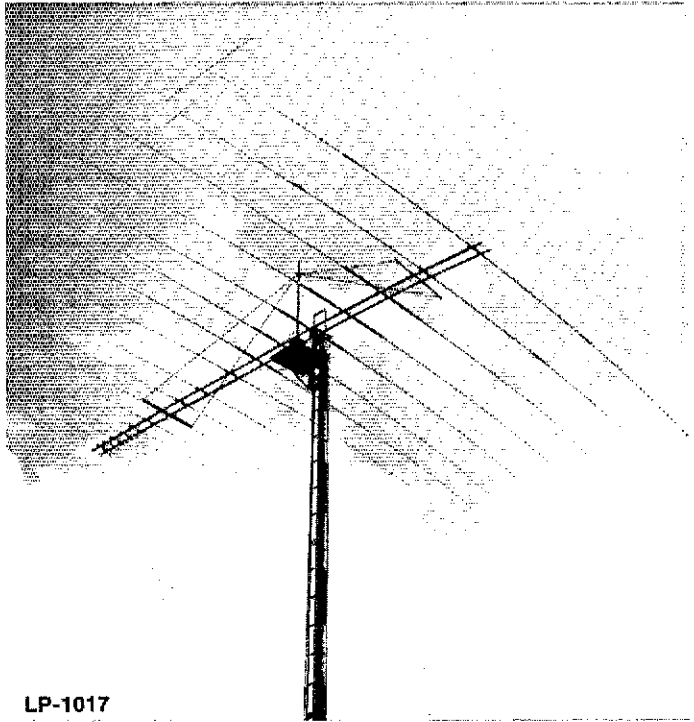
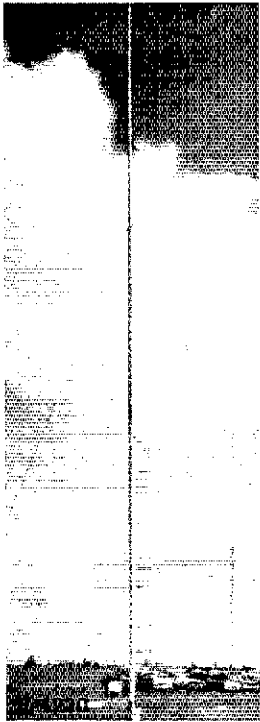
Heathkit IT-121 checks transistors in or out of circuit. Five current ranges measure leakage as low as 1 μ A and collector currents as high as 1 A. Gain (DC Beta), transconductance (GM), and leakage values read directly on large meter face. Has color-coded pushbutton range selection, battery testing circuit (batteries not included), handy 3' leads.



Kit IT-121, 6 lbs. 49.95*

HEATHKIT Schlumberger	
HEATH COMPANY, Dept. 9-9 Benton Harbor, Michigan 49022	
<input type="checkbox"/> Please send FREE Heathkit Catalog.	
<input type="checkbox"/> Enclosed is \$ _____, plus shipping.	
Please send model(s) _____	
Name _____	
Address _____	
City _____ State _____ Zip _____	
Prices & specifications subject to change without notice.	
*Mail order prices; F.O.B. factory. AM-273R	

Hy-Gain Commercial duty HF antenna systems don't compromise HF efficiency



LP-1017

New from Hy-Gain...replacements for the old, inefficient whip and tuner combinations. Now get maximum performance from two new high efficiency antenna systems that operate *without* tuners or other external matching devices. Specifically designed for commercial duty HF communications circuits. Connect your transmitter, receiver or transceiver...and communicate with nearly 90% efficiency.

Check Hy-Gain features...and low prices.

Model V-4220 Vertical Omnidirectional
4 through 30 MHz (or 2 through 30 MHz)

- Tunes any frequency 4 through 30 MHz (or 2 through 30 MHz)
- No tuner required—50 ohm input
- VSWR 1.5 to 1 maximum
- True $\frac{1}{4}$ wave monopole radiation patterns at all frequencies
- Available in fixed station and shipboard models
- Installs with 2 men in a matter of hours

Model LP-1017 Log Periodic 6.2/30 MHz

- Only 36' x 40', 500 lbs.
- Covers 6.2 through 30 MHz continuous
- Operates in all high seas HF frequencies 6.2 and above
- VSWR max 2.5 to 1, (2.0 to 1 over 90% bandwidth)
- 10–12 dbi gain
- The smallest, lightest LP ever built
- Fixed azimuth or rotatable
- Available as complete system with tower and rotator, or mount on your existing support structure

Price \$1,400 U.S.

Write for complete details on these and other communications antenna systems available from 2 through 1000 MHz.

HY-GAIN ELECTRONICS CORPORATION

P.O. Box 5407-HI Lincoln, Nebraska 68505, U.S.A. • Telephone 402—434-9151 Telex 48-6424

(International agents and distributors write Export Dept.)

available. I am going to prepare a second WNY Bulletin for distribution to the entire section concerning our emergency readiness and if you have inputs for this please advise. WB2YEM has been appointed to the board of RAWNY. WA2JFQ has a new Drake TR-22. WB2NSU has a new homemade triband quad. W2PFFK is interested in starting a Western New York net on 40 meters ssb. He hopes to have his HT-46, Gonset Linear, HQ-110, HQ-180 and MP-33 back on the air by now. SFC W2CFP was guest speaker at the Herkimer County CD meeting. Yours truly had a most enjoyable time at the Rome Family Day. The hospitality and dinner provided by that group is fantastic! BPLs: W2OE, WB2NRK and K2KTK. For yours truly it is his first in 16 years of handling traffic. The Syracuse University Amateur Radio Club elected WA2BPH, pres.; WA2IUH, veep; WB2RBG, treas.; WA3OIS, secy. WA2CDV is busily readying a homebrew 8 digit counter. WB2KZM now is WB2KZM/KA6 on Okinawa. Before that he spent a few months at Keesler AFB and K5TYP where he earned two BPL awards. Also, WA2JWV writes that he now is WA6SFP and is looking for old friends on 15 meters. Traffic with the * indicating PSRR: (June) K2KTK 428*, W2OE 408*, W2MTA 391*, W2RUU 345*, W2FPR 340*, WA2ICU 260*, WB2NRK 202*, K2JBX 144, WA2JEQ 139, W2HYM 134, K2BWK 92, W2BU 86* W2RQF 83, W2EEX 82*, W2FEB 78, W2MSM 53, WA2SIR 47, WB2LQP 43, WA2AYC 38, K2OFV 29, W2PNW 28, WA2MPC 23, WB2VND 19, WA2AIV 16, WB2FAW 14, K2IMI 10, K2DNN 9, W2EAF 9, W2PVI 7, WA2OMN 6, WA1JKJ/2 3. (May) WB2LQP 16.

WESTERN PENNSYLVANIA - SCM, Robert F. Gawryla, W3NEM - SEC: W3KPI, PAM: K3ZNP, RM: W3LOS, W3KUN, WA3IPU. WPA CW Net meets daily on 3585 kHz at 7:00 P.M. KSSN meets Mon, through Fri, at 6:30 P.M. on 3585 kHz. It is with deep regret that we announce the Silent Key of K3HAO. Many stations and groups were active during the June flooding. The mail reveals that emergency programs are now being revised and updated. Thanks and gratitude to the many who helped out. W3HLM is a new Advanced Class and WA3PIB a new General Class licensee. The newly formed Bradford High School ARC reports new Novices WN3s TFA, TFW, TGF, TBF and RVI. WN3RVJ has since upgraded to General Class. Congrats men. WN3SPQ has 35/21 stations on 40 meters for WAS. Two Rivers ARC held their 8th annual hamfest July 16. WA3QJT is operating from Keesler AFB at K5TYP on 14.3 and 21.4 MHz evenings. A new ARRL affiliate the Crawford Amateur Radio Society (CARS) of Meadville, Pa. reports K3HFW, pres.; WA3PKC, vice-pres.; WN3RFF, secy.-treas.; K3YAK, WA3MPV, dir. The Nittany ARC gave up Field Day this year to provide communications for three communities during the June flood. NARC also enjoyed the company of W8OUU, SEC Ohio, for 5 weeks. Penn State Univ. ARC ex-WA3HCG is now K3CR. PSUARC will sponsor an Amateur Radio Week Oct. 23-29 to celebrate 60 years of licensed operation. PSRR for June: WA3NAZ 72, W3LOS 39, W3NEM 39, W3YA 36. WPA had 30 sessions in June with 355 QNI and 196 messages handled. Traffic: W3YA 182, W3NEM 158, WA3QOR 147, W3KUN 116, W3LOS 95, K3EXE 90, K3SMB 77, WA3NAZ 71, W3ZUH 60, W3MJ 50, W3ATQ 36, K3ZNP 26, K3HCT 24, WA3PXA 23, WA3IYA 16, K3TNH 7, W3LOD 3, K3SJN 3, WA3JIM 2, W3IDO 1.

CENTRAL DIVISION

ILLINOIS - SCM, Edmond A. Metzger, W9PRN SFC: W9RYU, PAMs: WA9CCP and WA9PDI (vhf), RM: WA9ZUE, Cook County EC: W9HPG.

Net	Freq.	GMT/Days	Tye.
IEN	3940	1400 Su	
ILN	3690	0300/2330 Dy	104
NCPN	3915	1300/1800 M-S	69
III PON	3915	2245 M-F	689
III PON	3915	1430	
III PON	145.5	0200 MWF	15
III PON	50.28	0200 M	

WN9JVR and WN9KRG are new Novices in Clinton. WB9JNT is a new station on the air operating on two meters. The Bel-Rock 1972 Hamfest was held at the Boone County Fairgrounds in Belvidere with an FB crowd. New officers of the Chicago Suburban Radio Assn. (CSRA) are W9KRR, W9EOK, WA9FWY, WA9ZWY and W9LCA. WN9HEG now is WB9HEG. The Ill. section amateurs were very active and handled many emergency messages during the days following the Rapid City Flood and Hurricane Agnes. K9DTB is now manager of Global Research (a ham supply store) in Lombard. K9CPR is the owner. WB9HYK and WB9IFE are new Generals and WN9JRE is a new Novice in the Evergreen Park area. K6GPR/9 now is W9MPD. W9PQN is now working and living in Tokyo, Japan and on the air as JA1YSH. Hopes to meet some of his old Ill. Valley Radio Assn. gang on 15 and 20 meters from 1200 to 1400Z daily.

When you want
an authoritative,
up to date,
complete,
reference
It's the **QTH**
and
you know it

The U.S. and DX Editions lists licensed radio amateurs throughout the world plus many other valuable features including maps, charts & tables all designed to make your operating more efficient and more fun.

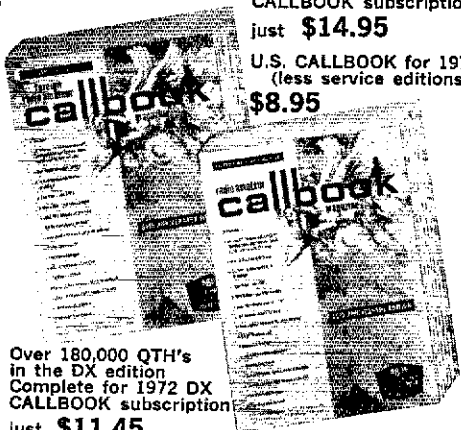
PLUS

New this year!

A special subscription service of one basic CALLBOOK plus three service editions, one issued every three months to keep you completely up-to-date for less than half the cost of purchasing four complete CALLBOOKS as before. You save money — you stay better informed.

Over 285,000 QTH's in the U.S. edition
Complete for 1972 U.S. CALLBOOK subscription
just \$14.95

U.S. CALLBOOK for 1972
(less service editions)
\$8.95



Over 180,000 QTH's in the DX edition
Complete for 1972 DX CALLBOOK subscription
just \$11.45

DX CALLBOOK for 1972
(less service editions)
\$6.95

See your favorite dealer or send today to

(Mail orders add 25¢ per CALLBOOK for postage and handling)

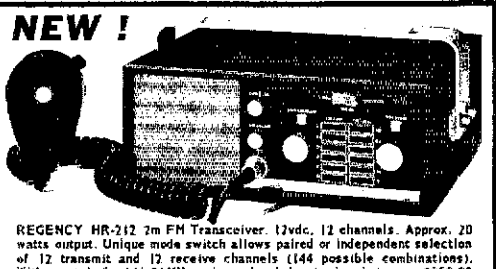
WRITE FOR FREE BROCHURE RADIO AMATEUR **callbook** INC. Dept. A 925 Sherwood Drive Lake Bluff, Ill. 60044

AMATEUR ELECTRONIC SUPPLY RECONDITIONED HAM EQUIPMENT

★ 10 Day Free Trial (Lose only Shipping Charges) ★ 30 Day Guarantee ★ Full Credit Within 6 Months on Higher

Priced New Equipment ★ EZ Terms—Convenient REVOLVING CHARGE Payment Plan ★ Order Direct from this Ad!

AMECO CB-4 (14-18) \$ 19 CN-50 (14-18) 29 CN-50 (30.5-34.5) 29 CN-144 (30.5-34.5) 29 PS-1 AC supply 9 CSB Selector box 6 TA-62 VHF Xmt 89 621 VFO 39	PMR-8 Receiver 79 PSR-612 DC supply 19 GLOBE/GALAXY/WRL A-1 Linear Xmt \$ 49 H-100 Receiver 89 SB-175 SSB Xmt 59 VX-1 VOX 15 Galaxy V Xmt 139 Galaxy V Mk II 359 GT-550 Xcvt 329 AC-35 AC supply 65 DC-35 DC supply 65 AC-400 AC supply 79 G-500 DC supply 75 VX-35 VOX 15 SC-35 Speaker 15 DAC-35 Dlx console 69 VX-15C VOX 15 F-3 300cy. filter 24 2000 Linear/supply 275 Economy DC supply 19 MA-61 AC supply 15 SC-300 splr console 19 SC-550 splr console 15 AC-210 AC supply 25 CAL-25 calibrator 19 GONSET Comm I 2m \$ 75 Comm 1 6m 59 Comm II 6m 79 Comm III 6m 89 Comm IV 2m 109 Comm V 2m 169 Comm VI 6m 149 1kw, 2, 6m VFO 6m Linear II 169 6-50 Xcvt 169 90A 1/2 AC supply 39 Thin Pak 19 G-76 DC supply 49 GSB-100 Xmt 169 CSB 201 Linear 199 GC-105 2m Xcvt 129 972A 180w Comtron 189 2m Amplifier	HQ-1110 Receiver 119 HQ-1100 Receiver 129 HQ-110AC Rec. 169 HQ-145C Receiver 149 HQ-170C Receiver 169 HQ-170A Receiver 209 HQ-170AC Receiver 219 HQ-170A/VHF 259 HQ-170AC/VHF 269 HQ-170AC with noise 299 Immunity 299 HQ-180C Receiver 239 HQ-180AC Rec. 339 HQ-215 Receiver 249 5200 Speaker 15 HEATH GR-54 Receiver \$ 59 GR-78 Receiver 99 HR-10B Receiver 69 HR-20 Receiver 69 SB-300 Receiver 219 SB-301 Receiver 229 XG-54 6m conv. 25 SBA-300A 2m conv. 19 SBA-300-3 6m conv. 19 HS-24 Speaker 9 QF-1 Q-multiplier 9 HD-11 Q-multiplier 15 UX-60 Transmitter 59 DX-60B Transmitter 69 100-100 Transmitter 89 75-10 Transmitter 99 SB-10 SSB adaptor 75 HK-10 Transmitter 189 HA-10 Linear 175 HX-20 Transmitter 125 HX-30 6m Xmt 149 HA-20 6m Linear 89 HW-12 75m Xcvt 85 HW-12A 75m Xcvt 95 HW-22 40w Xcvt 85 HW-70 70m Xcvt 85 HW-37A 20m Xcvt 95 HW-100 Xcvt 249 SB-400 Transmitter 245 SB-401 Transmitter 249 SB-220 Transmitter 349 SB-620 Sca analyzer 119 SB-630 cool./monitor 79 HW-30 2m AM Xcvt 169 HW-30 (Two'er) 39 VX-1 (Seners) 169 HP-10 DC supply 24 HP-13 DC supply 49 HP-20 AC supply 24 HQ-20 Calibrator 12 HRA-10-1 Calibrator 8 HM-10 GDO 24 GD-125 Q-multiplier 15 SG-310 SWL Rec. 229 SB-308 Receiver 299 IS-42 Lab Gen. 49 HWA-173 FM xmt 15 5 adaptor 75	KNIGHT R-100 Receiver \$ 59 T-60 Transmitter 34 LAFAYETTE HE-45A 6m AM Xcvt 575 390 Statline Xmt 59 HE-30 Receiver 49 SMLEY SM-1 Receiver \$ 99 NATIONAL NC-66 Receiver \$ 39 NC-98 Receiver 89 NC-109 Receiver 99 NC-155 Receiver 119 NC-300 Receiver 125 NC-303 Receiver 199 HQ-50T1 Receiver 125 HRO-60 Receiver 199 HRO-50T5 Speaker 25 NCX-5 Xcvt 329 NCX-5 Mk II Xcvt 379 NCXA AC Supply 75 VX-501 Remote VFO 25 NLM-2000 Linear 375 P & H LA-400C Linear \$ 69 POLYTRONICS PC-2 2m Xcvt \$139 PC-62 6-2m Xcvt 225 RME 4300 Receiver \$ 89 4350A Receiver 109 6900 Receiver 179 VHF-126 Converter 85 REALISTIC AR-150A Receiver \$ 89 REGENCY HR-2 2m FM Xcvt \$169 AR-2 2m Amplifier 89 SBE SB-33 Xcvt \$189 SBI-1A Linear 139 SBI-14 Xcvt 269 SINGER FR-1 Panadaptor \$ 89 SWAN TCW control unit \$ 69 2708 Xcvt 329 400 Xcvt and 420 VFO 169 406 VFO 59 410 VFO 59 410C VFO 95 508 VFO 95 350 Xcvt (early) 249 350 Xcvt (late) 349 500C Xcvt 369	(17XC AC supply 80 230XC AC supply 90 14C DC module 49 14X DC module 45 117K Basic AC sup. 65 117B AC supply 65 210 AM Xcvt 349 210 VFO 35 Mark-6b Linear 449 TV-2 2m Xverter 189 TEMPO DC-70e DC supply \$ 75 TEN-TEC Argonaut Xcvt \$199 210 12vdc supply 19 PNSA Xcvt 49 RX-10 Receiver 45 TRD TR-310 Receiver \$129 UTICA 650 6m Xcvt/VFO \$ 59 650A 6m Xcvt/VFO 79 VARITRONICS FA-50A 2m amp. \$ 89 IC-2F 2m Xcvt 199 HF-2 Handl. Iaitke 159 PDM-25A Xcvt 129
B & W 5100B Xmt 5119 6100 SSB Xmt 269 515B SSB adaptor 169 CENTRAL ELECT. Q1-1 Anti-trip \$ 6 DC-45B VFO/10M Model B Slicer 34 CLEGG? SQUIRES-SANDERS 27'er 2m AM Xcvt \$159 21'er 6m AM Xcvt 149 99'er 6m Xcvt 39 Thor 6 (RF only) 85 417 AC sup./mod. 55 418 DC sup./mod. 59 Zeus VHF amp. 289 Interceptor Receiver 229 Interceptor B Rec. 289 Allbander HF Tuner 75 22'er Mk II 2m AM 259 COLLINS 75A-2 Receiver \$199 75A-4 (ser. #2084) 395 75A-4 (ser. #2345) 395 75B-1 Receiver 175 75B-3 Receiver 449 75B-3A Receiver 495 75B-3B Receiver 549 R-390 Receiver 995 325-1 Transmitter 349 325-3 Transmitter 595 625-1 VHF cons. 295 312B-3 PFO cons. 115 516F-1 AC supply 115 MM-1 mobile mkr 15 R. L. DRAKE 24 Receiver \$159 2AQ 3sp./Q-mult. 25 2AC Calibrator 9 2B Receiver 189 2CQ 189 2CQ 3sp./Q-mult. 29 2NB Noise Blanka 15 MS-4 Speaker 15 SC-4 6m converter 49 CP-1 Supply 12 SCC-1 VHF calib. 19 DC-4 DC supply 95 RV-4 Remote VFO 69 T-4X Transmitter 299 ZNT Transmitter 109 L-4B Linear 595 MN-4 Notcher 59 TC-4 6m Xmt/conv. 179 FF-1 xtal cont.adapt. 24 5-NB Blanka 49 M1-7 2m FM Xcvt 225 DYCOM SDCC Amplifier \$ 49 10-D Amplifier 139 EICO 730 Modulator \$ 39 753 SSB Xcvt 129 154 At supply 49 752 DC supply 49 717 Keyer 49 ELMAC AF-67 Transmitter \$ 49	reg. NOW Regency Monitor Receivers reg. NOW H-40 30S-50MC 12v Rec. \$150 \$ 49 H-160 152-174MC 12v Rec. 150 49 DR-200 Hi/Low Rec. 110v 209 149 DRS-1A Spkr. for above 16 4 AR-116 Aircraft Receiver 99 89 SBE reg. NOW SB2-VOK Accessory unit \$ 38 \$ 23 SB2-MB Mobile Mg. Bracket 12 7 SB2-MIC Mike dynamic 16 12 SB3-DCP Mob.sup./SB2-LA 249 149 H-72 cable for SB3-DCP 4 6 SONAR reg. NOW 25-50Mc Tunable FM Receivers FR-10D (110 & 12v) \$114 \$ 59 FR-10DX plus 1 xtal ch. 134 69 350-175Mc Tractable FM Receivers FR-102 (110v) \$ 89 \$ 69 FR-102D (110 & 12v) 114 89 SWAN reg. NOW TV-2 2m Transmitter 3295 \$275 410C VFO 120 95 32B Adaptor 32 25 VARITRONICS reg. NOW PDM-2 and BP-1 \$262 \$159 FM-201 Mobile Amp. 150 59 FM-202B Base Amp./Supply 235 89 FA-50A 2m Amp. 12v 129 99 PDM-25 (mod. for MARS) 310 189			
B Y I (mfg. by Halstrom) LK-2000HD table-top Rx section PS-3000 supply CLEGG 27'er FM series 75 E TO PA-71V Linear (Demo) EICO 751 AC Supply Kit \$ 79 \$ 49 751 AC Supply Wired 109 79 752 DC Supply Kit 79 49 752 DC Supply Wired 109 69 GALAXY PA-210 2m FM Amplifier \$149 \$ 49 AC-210 AC supply/booster 49 39 MMB-210 mg. bracket 6 5 SC-350 Speaker console 29 22 G-35A DC supply 99 79 GONSET reg. NOW GSB-201 Mk IV Linear 1525 \$189 902A DC sup. for 900A 2m 62 45 HY-GAIN reg. NOW 203BA 3 el. 20m Beam (shipped in error to a customer) \$16 99 HB252 stacked 2m halos 219 19 51252 2 el., 2m J-pole 33 19 LAFAYETTE HA-260 2m Amplifier 12v \$ 99 \$ 49 RAYTRACK reg. NOW UX-2000L 80-10m Linear \$699 \$599	reg. NOW \$916 \$732 \$384 \$284 \$1775 \$1595 \$ 79 \$ 49 109 79 79 49 109 69 \$149 \$ 49 49 39 6 5 29 22 99 79 625 \$189 152 45 reg. NOW \$16 99 219 19 33 19 \$ 99 \$ 49 reg. NOW \$699 \$599			
HUNTER Z1 Station Control \$ 79 1CB FDAM-3 6m Xcvt \$ 89 JOHNSON Navigator 89 Ranger I 89 Ranger II 139 Valiant II 189 55B Adaptor 175 Pacemaker 149 Invader 2000 495 Courier Linear 139 6N2 VHF Xmt 89 6N2 VFO 29 KIDDE Douglas-Randall Scribner \$ 49	reg. NOW \$329 00 319 00 349 00 119 00 39 95 4 95 4 95 6 50 2 95 2 95 7 95			



NEW!
REGENCY HR-212 2m FM Transceiver. 12vdc. 12 channels. Approx. 20 watts output. Unique mode switch allows paired or independent selection of 12 transmit and 12 receive channels (144 possible combinations). With crystals for 146.94 MHz, mic. and mobile mtg. bracket. . . . \$259.00
OTHER REGENCY 75 FM PRODUCTS
HR-2A 4 channels. Approximately 15 watts out. 12vdc. . . . \$229.00
HR-2MS 6ch xmit, 8ch Rec. w/ scanner feature 12vdc. . . . 319.00
HR-25 same as above, but for 117vac. . . . 349.00
AR-2 50 watt, 12vdc, Mobile Amplifier. . . . 119.00
P-107 13.6vdc 3 amp. regulated supply. . . . 39.95
Receive crystals for HR-2A, MS, S, HR-212. . . . 4.95
Transmit crystals for HR-2A, MS, S, HR-212. . . . 6.50
MA-10 12vdc cond with cigarette lighter plug. . . . 2.95
MA-3 4" Remote Speaker, in metal cabinet w/mg. bracket. . . . 7.95

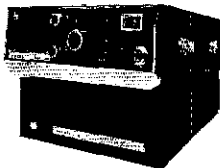
AMATEUR ELECTRONIC SUPPLY
4828 West Fond du Lac Ave. Milwaukee, Wis. 53216
Phone (414) 442-4200

HOURS: Mon & Fri 9-9; Tues, Wed & Thurs 9-5:30; Sat 9-3
CLEVELAND Area Hams may wish to visit our Branch store located at 17929 Euclid Avenue, Cleveland, Ohio, Ph. 486-7330, Pete Smith, Mgr. All Mail Orders and Inquiries should be sent to our Milwaukee store.

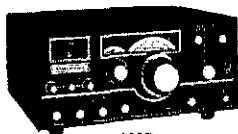
AMATEUR ELECTRONIC SUPPLY

is the Best Place to purchase your new
SWAN gear for the following reasons

SWAN 270B 80-10m 110vac Xcvr....	\$419.00
270B with SS-16B filter.....	489.00
14A 12vdc Converter for 270B.....	39.00
SWAN 500CX 80-10m Transceiver....	489.00
500CX with SS-16B installed.....	549.00
SWAN 250C 6m Transceiver.....	429.00
NS-1 6m Noise Silencer.....	35.00
TV-2C (specify 14 or 50 Mc if).....	329.00
CYGNET 1200X Linear.....	239.00
Mark II 80-10m Linear.....	599.00
Mark 6B 6m Linear.....	599.00
117XC AC Supply w/spkr. in cabinet	99.00
14-117 12v DC Supply w/Cable.....	129.00
510X MARS Oscillator - less crystals	49.00
50B Full-Coverage VFO.....	139.00
210 6 Meter VFO.....	99.00
YX-2 Plug-in YOX.....	35.00
FP-1 Phone Patch.....	44.00
14C 12v DC Module/cable ONLY.....	65.00
230XC 230v AC Supply, spkr., cabinet	105.00
MTK Mobile Mounting Kit.....	9.00
SS-16B Custom Crystal Lattice Filter	75.00
160X 160 Meter 400w Transceiver....	429.00*
160VFO VFO for above.....	95.00
600T Transmitter 80-10m, 600w.....	535.00*
600R Receiver.....	395.00*
600R CUSTOM Receiver (with I.F., Noise	
Blanker and I.C. Audio filter-inst.)	495.00*



FM-1210A



600R

- **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!
- **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**
- **LARGE COMPLETE STOCK** means Fast Deliveries. United Parcel Service available to most parts of the country. - UPS Blue label (AIR) to the West Coast.
- **LOW LOW 1% Monthly Service Charge (ONLY 12% per annum)** on GECC Revolving Charge Plan. Only 10% Down Plus LOW Monthly Payments - For Example: \$10 a month finances up to \$300, \$20 up to \$610. Write for complete information

* Add \$60.00 for SS-16B factory installed

600Hz CW Filter for 600R.....	\$ 22.00
AM Filter for 600R.....	89.00
600S Speaker for 600R.....	18.00
600SP Deluxe Speaker (w/ph. patch)...	59.00
330 External Tuner for 600T, 600R....	129.00
NB-500 I.F. Noise Blanker Kit.....	89.00
ICAF I.C. Audio Notcher-Peaker kit....	59.00
SWAN 444 Desk Mike.....	25.00
SWAN 404 Hand Mike.....	18.00
FM-2X 2m FM Transceiver.....	259.00
FM-1210A 2m FM Transceiver.....	329.00
VHF-150 150w 2m Amplifier.....	279.00
Crystals for FM-2X and 1210A...each	5.00
MO-4 2m 5/8 wave Mobile Antenna....	16.95

-SWAN TRIBAND BEAMS (10-15-20m)-

TB-2 2 el., 5 db, 6 1/2' boom.....	\$ 79.00
TB-3 3 el., 7.5 db, 14' boom.....	94.00
TB-3H 3 el., 8 db, 16' boom.....	109.00
TB-4H 4 el., 9 db, 24' boom.....	129.00

MB-40H 2 el., 40m Beam..... 145.00

80-40m Trap Dipole..... 24.95

1040v 10-40m Vertical Antenna..... 59.00

75m Add-on Kit..... 29.00

- SWAN MOBILE ANTENNAS -

Model 45 (manual switching) covers 10, 15, 20, 40 and 75 Meters..... \$ 79.00

Model 55B (remote control)..... 129.00

Kwik-on connector..... 6.00

BMT Bumper Mount..... 24.00

- MODEL 35 (SINGLE BAND) -

Top Section, 6 ft. whip.....	\$ 12.00
15m Coil.....	22.00
22.00 40m Coil.....	26.00
20m Coil.....	24.00
75m Coil.....	28.00
40 Meter Coil.....	26.00
75 Meter Coil.....	28.00
18 inch Base Section.....	8.50
36 inch Base Section.....	9.00
48 inch Base Section.....	9.50

SWAN ELECTRONICS
305 Airport Road Oceanside, CA 92054

Revolving Credit Account Nr. 7388

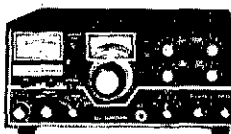
Issued To: Joe Ham

Address: 599 QSO Lane, Anywhere, USA

Coil: W9XYZ

Joe Ham
Signature

Now you can use your
SWAN CREDIT CARD
at
AMATEUR ELECTRONIC SUPPLY
to purchase any new Swan equipment



500CX

OTHER E-Z WAYS TO PURCHASE

1. CASH
2. C.O.D. (20% DEPOSIT)
3. MASTER CHARGE
4. BANK AMERICARD
5. AMERICAN EXPRESS
6. GECC REVOLVING CHARGE



Order Today
Direct from this Ad



Ray Sorenson, K9KHW
Mgr. Mail Order Sales

To: **AMATEUR ELECTRONIC SUPPLY**
4828 W. Fond du Lac Ave, Milwaukee, Wis. 53216

I am interested in the following new equipment:

I have the following to trade: (what's your deal?)

Ship me:

I Enclose \$ _____ I will pay balance (if any):

COD Swan Credit Card GECC Revolving Charge Plan

Master Charge* BankAmericard American Express

Account Number: _____

Expiration DATE _____ *Master Charge Interbank number _____ (4 digits)

Name: _____

Address: _____

City & State: _____

Send used gear list

AMATEUR ELECTRONIC SUPPLY

4828 West Fond du Lac Ave. Milwaukee, Wis. 53216

Phone (414) 442-4200

HOURS: Mon & Fri 9-9; Tues, Wed & Thurs 9-5:30; Sat 9-3

CLEVELAND Area Hams may wish to visit our Branch store located at:

17929 Euclid Ave., Cleveland, Ohio, Ph. 486-7330, Pete Smith, Mgr.

ALL Mail Orders and Inquiries should be sent to our Milwaukee store.

UNIVERSAL Aluminum Towers are GREAT!

* Strong * Lightweight * Easy to assemble * Rust-Free (less maintenance) * Self-Supporting
 Models are available from 30-90 feet with a choice of wind loads to meet your specific needs.
 Write us for literature. Shown here is a Model 18-50 (18 sq. ft. wind load - 50 ft. high) installed
 at Ted Willett's house (W9NHE), our Print Shop Manager. **AMATEUR ELECTRONIC SUPPLY**
 can recommend the proper **UNIVERSAL TOWER** to fit your particular needs.

AMATEUR ELECTRONIC SUPPLY
 4828 West Fond du Lac Ave. Milwaukee, Wis. 53216
 Phone (414) 442-4200

The Breakfast Club's Annual Hamfest was held with many eyeball QSOs being held by those attending. ARRL pres. W2TUK, was guest at the Expo '72 which was held at the Lake County Fairgrounds. Robert Everett, legal counsel of the FCC was also a guest. Your SCM is bringing up his files on appointments. A notice is being sent to those whose endorsements have expired. Please cooperate and forward your certificates if they are in arrears. Traffic: (June) WA9VGV 398, W9NXG 247, WA9ZLN 150, W9JXV 107, WA9ZUE 101, W9FLF 55, W9LDC 52, WA9OBR/M 42, W9KR 27, WB9FHI 22, W9TAL 20, W9FHJ 19, W9FL 16, W9PRN 16, WA9NZF 13, W9II 10, WB9ELP 10, WA9LHU 8, WB9EDP 6. (May) W9JXV 69.

INDIANA - SCM, William C. Johnson, W9BUQ - SEC: W9FC. RMs: WB9ANT, WB9EA, W9FC, W9HRY. PAMs: K9CRS, WA9OHX, (vhf) W9HWR, W9PMT.

Net	Freq.	Time(Z)/Days	Tfc.	Mgr.
IT6EN	3910	1330-2300 Dy 2130 M-S	518	WA9OHX
QIN	3656	0000-0300 Dy	178	WB9ANT
IPON	3910	1245 Su 1830 S-S	29	WB9AHJ
IPONVHF	50.7	0100 SuMW 0200 Dy	36	WA9ULH
IPONCW	3740	0000 Dy	78	WB9AHJ
Hooster VHF			7	W9PMT

With deep regret I report WA9OTI as a Silent Key. Indiana Radio Club Council appreciates the work our SEC has done in selecting the Field Day Award winner for Ind. Officers of the Clinton County VHF AREC are WA9YZE, pres.; WB9FJO, vice-pres.; WA9JLF, secy-treas. Lake County ARC: WB9AUJ, pres.; WB9ANT, vice-pres.; W9SIHH, secy.; WA9AJT, treas.; WA9SSV, editor. W9MGC now is W9KT. W9UUU is on the air from the Red Cross Bldg. in Terre Haute. W9SOH, Greenocastle wishes to contact some of the old timers. WB9IWIY is a new Tech, WA9ULH upgraded to Advance. W9JBO is again active with a new 40-ft. tower, ham M and CJ-33 trihandler. Field Day reports were about the same as last year. Gibson County AREC is very active. I need more activity in the vhf portion of AREC. Activity on 220 is picking up. I was on about 34 hours during the Rapid City Flood. W9URO reports that Bill Medley, Major in the Salvation Army and formerly W9GEL of Princeton has passed away. WB9BAP and WB9BAQ are very active in the Teenage Net. WB9AHJ is the new mgr. for IPON. Check in to a traffic net; get the training needed for any emergencies which require communication. Amateur radio exists because of the service it renders. BPL for June K9FFY, Tippecanoe Amateur Radio Assn. AREC Net traffic 6. Gibson County AREC Net traffic 8. Traffic: (June) K9LFF 271, WA9WJA 210, WB9GVT 165, W9FWH 151, WA9OHX 146, WB9AHJ 126, W9BUQ 80, WB9LAY 80, W9PMT 80, W9QLW 80, W9HRY 71, W9KWB 48, WA9TJS 39, W9JBQ 37, K9FZX 35, K9RWQ 34, WB9FBR 33, WA9OAD 24, K9C6Y 23, W99FJO 19, K9YBM 18, WA9ULH 15, W9UEM 14, W9DZC 13, W9JOY 13, W9HWR 11, WA9BVL 10, K9DIY 10, W9RTH 10, WB9BAP 9, WB9BAQ 9, K9RPZ 8, K9ILK 7, W9KT 7, WA9WNH 7, WB9FOI 6, W9BDP 4. (May) W9FC 3.

WISCONSIN SCM, Joseph A. Taylor, W9OMT - SEC: W9NGT. PAMs: K9FHI, WA9OAY, WA9OKP, WA9PKM. RMs: W9UCR, K9KSA. W9BN QNI 996, QTC 323; WIN QNI 218, QTC 147; BEN QNI 715, QTC 386; BWN QNI 470, QTC 215; SW2RN QNI 92, QTC 5; WI-PON QNI 516, QTC 107; Wis-RACES QNI 51. Wis-OCWA QNI 70; WCW QNI 30, QTC 1. Net statistics will be listed as above every other month, for times and frequencies of nets consult alternate issues of QST. The WCW under the guidance of WA9ZAZ invites your participation on 3662 nightly at 10 P.M. local time. This net is in the process of coordinating activities with the WIN to expedite traffic into and out of the state. The WI-PON also has cw net on 3697 kHz Wed. at 2330Z. We are fortunate to have the W9 representative of the DXCC Advisory Committee in our section. He is W9NN and he welcomes your comments both pro and con on DXCC matters. Severe thunderstorm watches on June 12 and 19 activated 19 hours of operation with 31 stations relaying storm observations to Milwaukee WSO. Memorial Day "Bring 'Em Back Alive" had a total of 50 stations operating for 19 hours. Rapid City traffic was widespread with W9MMP, K9FAM on 40 and W9ENJ acting as coordinator. FCs don't forget your monthly reports to W9NGT. The WNA picnic was a big success with close to 100 registrations. Ssb shaded cw in the ball game 18 to 17. Field Day conditions were excellent this year, your SCM received 11 messages of participation. Hats off to W9DXV and the boys from Neenah-Menasha area who assisted the FAA with communications during a recent plane crash over Lake Winnebago. They worked several days on the recovery program and received the praise of many government officials. W9ONI working portable from Minnesung Sun. during the summer. Congrats to K9GDF who

WHICH ANTENNA WINS THE CONTEST ?

In open competition against thousands of commercial and home-brew antennas, WA1JFG won the New England championship with a Gotham beam, by a margin of 5,982 points! WB2JAM won the sectional award for the Sweepstake contest in 1969 and 1970 with a Gotham 4-element 15-meter beam! Hundreds of unsolicited testimonials from grateful hams are our proof that Gotham antennas give you the best design, and the best materials. Forget our low prices — rely on the results of open, competitive contests. Ask yourself: Why do Gotham antennas win?

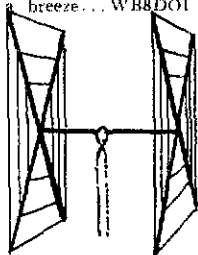
In QST since '53 without missing an issue!

QUADS

Totally satisfied with quad. Worked DK4VJ, SM7DLH, XE1AB, DM4SEE, FL8SR, F6AUM, HK7YB in few hours. Instructions a breeze... WB8DOI

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 3/8" 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. \$37.00

10-15 CUBICAL QUAD. 32.00

15-20 CUBICAL QUAD. 34.00

TWENTY METER CUBICAL QUAD 27.00

FIFTEEN METER CUBICAL QUAD 26.00

TEN METER CUBICAL QUAD. 25.00

(all use single coax feedline)

BEAMS

"Just a note to let you know that as a Novice, your 3-EI. 15 Beam got me R1 Section Winner and New England Division Leader in Novice Round-up. See June (QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"

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 EI 20. \$21	4 EI 10. \$20
3 EI 20. 27*	7 EI 10. 34*
4 EI 20. 34*	4 EI 6. 20
2 EI 15. 17	8 EI 6. 30*
3 EI 15. 21	12 EI 2. 27*
4 EI 15. 27*	*20-ft. boom
5 EI 15. 30*	

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, W20DH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

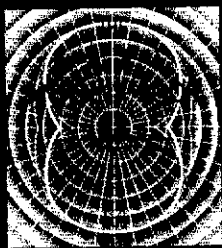
FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4-AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

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 money order only (bank, store, or United States) in full.

We ship immediately by REA Express, charges collect. DEALERS WRITE!

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139



PUBLISHED BY THE
AMERICAN RADIO RELAY LEAGUE \$2.50

What Antenna's Best for YOU?

Dipole, long wire, vertical,
beam quad?

Is space a problem?

The twelfth edition of the Antenna Book is jam-packed with ideas for antennas of all types, for all bands.

More Quad information than ever before. A whole chapter on the construction of wire antennas, with ideas you may not have considered.

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

graduated from UW-Stevens Point with B.S. in Physics. Traffic: WA9GJU 453, W9ESJ 326, WA9ZAZ 284, WA9SLU 164, W9MSG 136, W9UCR 116, K9FHI 68, WB9ABF 47, K9JFS 34, WB9EJA 30, WB9BRF 28, WA9IVH 26, W9NRP 24, W9CBE 21, K9CPM 21, WA9OAY 21, K9KSA 14, WA9LRW 9, WB9GUG 5.

DAKOTA DIVISION

MINNESOTA - SCM, John H. Halstead, KØMVF - SEC: KØLAV. RMs: WØZHN and WAØYAH. PAMs: KØFLT and WAØHRM. WBØCAP has a new quad antenna. John reports improved DX contacts. Activity was high in the section on Field Day. One of the unusual sites was from a caboose on a remote siding reported by the Northliners, the Burlington Northern Amateur Radio Club. The Rapid City disaster brought a terrific response from Minn. amateurs as would be expected. WØJIE reported the activity of WBØBQG, the 3M Amateur Radio Club station. WAØDCJ, WNØGOY, WAØQPO, WØJIE, WØVUZ, WØCYH, WAØBIX, KØRAB and WØRDQ were among the personnel manning the station on a 24 hour basis during the emergency. About 150 Health and Welfare messages were originated with a traffic total of 384 reported for the month. This report is one of many that could be written by amateurs in this section. Traffic: WAØVAS 1097, WØZHN 390, WBØBQG 384, WAØYVT 199, KØZRD 116, WBØCNM 104, WAØONE 79, WAØVYB 77, WAØTFC 74, KØZBI 67, KØMVF 63, WAØNLT 62, WBØDZA 60, WØWFA 56, WBØDVP 49, WAØIAW 49, KØICG 47, KØPTZ 45, KØFLT 32, WAØSGJ 30, WAØHRM 26, WAØVHX 18, WAØYGE 17, KØSXQ 10, WØUMX 9, WAØDCJ 7, WBØAYE 5, WAØIPR 5, WØOBB 5, WBØCAP 4, WAØPRS 3, WAØYAH 3, WNØGKH 2.

NORTH DAKOTA - SCM, Harold L. Sheets, WØDM - SEC: WAØAYL. OBS: WBØATB. OO: WØBF. RM: WAØMLE. The Grafton fellows invited the Grand Forks fellows to a meeting and WAØAYL, WBØBUF, WBØFDT and WØDM attended. 2 meters was the main subject of conversation. Some of the Fox Club went up to the Grafton FD. WØDM and XYL attended the Three Rivers Radio Club FD at old Ft. Abercrombie. 40 people attended the picnic on Sun. KØFRP got leave from the Navy to help the gang run up a score on 20 and 15. WBØANH also came down and helped operate. FD messages were received from Bismarck, Ft. Abercrombie, GFAB at Turtle River Park and Grafton. WNØHMS is a new Novice at the GFAB. WAØFLO lost his activity report. K7DGV is vacationing from MontL and active on 2 meters. WØGGQI is with the Tel. company in Northwood. WAØAYL attended the Republican Convention in Bismarck and then on to the Peace Garden Hamfest. Ex-WØPHH of long ago, now W6HWN and W6HWQ are back in ND for vacation and the Peace Garden Hamfest. WAØMLE still working TEN and CAN with a good traffic total. WNØHIN a new Novice in Grand Forks has an HW-16.

Net	kHz	CDST/Days	Sess.	QNT	QTC	Mgr.
RACES	3996.5	1830 M-F	22	487	32	WBØATTJ
PUN	3996.5	0900 Su	12	221	1	WAØSJB
		1830 S-S				

Traffic: WAØMLE 110, WAØSUF 84, WØDM 15, WAØPT 7, WØMXF 4.

SOUTH DAKOTA - SCM, Ed Gray, WAØCPX - SEC: WAØOVR. RM: WAØTNM. PAM: WAØYAK. Your SCM would like to express his thanks from all the amateurs in Rapid City who participated in the flood communications to all the other amateurs in South Dakota as well as the other states who spent so many hours on the 80-, 40- and 20-meter frequencies handling messages or just waiting and monitoring for something that they could handle. Two meters played a very important part in the communications. On the evening of June 8 some very unusual conditions were noted on two meters. WAØCPX using WØKXZ's TR-22 on top of the water tower at White, S.D. worked three stations through the Kingman Ariz. Repeater. WAØYAK of Colome recently received his Private Pilot License. The Sioux Falls ARC has a new club rig and was very active in FD. Some of the other groups were Aberdeen and Huron that participated in FD. Again, a special thanks to all who handled messages, served as net control, and in so many ways helped with the flood emergency.

DELTA DIVISION

ARKANSAS - SCM, Jimmie N. Lowrey, WASVWH - SEC: WBSCCL. RM: WASTLS. WASZKE now operates a new Palomar Engineers squeeze keyer. KSVRC also has a new keyer, a Heathkit. K6KCB/5 has some phased half wave verticals on 40 meters nearing completion. W5KL's big final is on the blink, hopes to have it back on the air soon, in the mean time he has been doing a lot of 2-meter fm work. WA5WVK has two Regency HR-24 and also a new

Does a 5 watt transceiver at \$288 make sense?



You be the judge.

It opens a whole new world of excitement and fun in Amateur Radio. We think you will find QRP a welcome change from high power in these days of push-button operation.

Five watts is about 2½ "S"-units below 150 watts for identical conditions. When skip is favorable and QRM light you almost forget you are using low power.

The diminutive size (1/5 cubic foot) makes it ideal for operation in a motel, camp or trailer, or mobile in your car, boat or plane. Power it with any 12 volt battery or optional AC pack. Operate on SSB or CW on any ham band from 3.5 to 30 MHz.

The Argonaut will be a faithful companion for many years to come. This \$288 may be your best investment in Ham Radio in a long time—perhaps ever!

TEN-TEC products are sold by selected dealers. If one is in your trading area, by all means patronize him. It will help you and Amateur Radio. However, if it is more convenient, send your order directly to us. Include \$2.00 for shipping. (Tennessee residents include 5% sales tax). Write for catalog.

Argonaut	\$288.00
AC Power Supply	24.95
Microphone	17.00
KR 5 Electronic Keyer	34.95

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862

FREE

LAFAYETTE 1973 CATALOG 730



Ready
Now!

The World's Largest Consumer Electronics Catalog

Everything In Electronics For The Ham, CBer, Experimenter

- Ham Receivers, Transmitters, Transceivers • CB Transceivers and Walkie-Talkies • Tools and Test Equipment
- Police & Fire Monitor Receivers • Antennas and Accessories • Semiconductors, Books, Parts • Photography Equipment • Public Address Systems • Plus The Latest In Lafayette 4-Channel Stereo and Hi-Fi Components
- And Thousands of Additional Items!

Your Complete Electronics Buying Guide

Send
Today!

Lafayette Radio Electronics
P.O. Box 10, Dept. 34092
Syosset, L.I., N.Y. 11791

Send FREE 1973 Catalog 34092

NAME _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

TH6-DXX. K5YCM also has a new TH6-DXX to go on his new 80-ft. tower. WSSOQ and WBSBPU are working on RTTY stations.

Net	GMT/Day	Freq.	Mgr.
OZK	0000 Dy	3790	WASTLS
Ark Phone	1100 M-S	3937	WAVFV
Ark Teenage	2000 SS	3975	WASZKE
Ark P.O.	2130 M-F	3925	W5OEO
Ozark	2230 M-S	3995	WASZKE
Razorback	2330 Dy	3995	
DX Info	2345 M	3995	WASWYW
CAREN	0100 Th	146.34/94	W5RXU

Repeaters: WASSNO Fayetteville, 52.550/53.020, 146.16/76
WASYUT Fort Smith, 146.34/94; WBSFKF Forrest City, 146.16/76; WSDI Little Rock, 146.34/94; W5RHL Jonesboro, 146.34/94. Traffic: WASZKE 268, K6KCB/5 179, WBSFDP 36.

LOUISIANA - SCM, John R. Rivoire, K5AGI - Asst. SCM: Louis Muhleisen, Jr., W5SAEH, SEC: WASOLU, RM: WASVQE, SEC W5OB and PAM W5NNY have retired from their respective jobs. My special thanks to them for their past efforts in conjunction with ARRL activities and their continued support of the League. New appointments have been made as indicated. The job of PAM is still open. Thanks for the hospitality extended to Mary and I on our Field Day tour of New Orleans, Metairie, Houma and Baton Rouge; also recent club visits to CLARC, LARC, ARCSWL, BRARC, DDXA, WARC, OARC, JARC. WARC has joined the growing family of the RAT newspaper. JARC and GNOARC have joined forces to form a Novice Crystal Bank. Dig in your old junk box and ship them your old novice crystals. W5VUY is looking for interested experimenters to run 435 MHz TV skeds. BRARC is planning an exhibit on amateur radio for the Baton Rouge State Fair. WARC celebrated its 20th anniversary with two charter members still in the area - W5VUH and W5OB. LARC graduated 4 new Novices. W5SKW recently gave a presentation on amateur radio to the Kiwanis Club of West Calcasieu in Sulphur. W5TVH now is operating motorcycle mobile. Congrats to WASQQH in Shreveport for his jump from General to Extra. W5QMT is the proud owner of a new SB36. W5A7M is the new treas. of DDXA. ARCSWL is planning an auction. Governor Edwards recently declared Amateur Radio Week for the state. On hand for the occasion were K5GLA, K5SVD and W5CUQ. During a recent visit to a NOVHFC meeting the club voted to become an ARRL affiliate. Traffic: WASVQE 127, W5GHP 87, W5TFS 57, W5NNY 15, W5E5D 2.

MISSISSIPPI - SCM, Walker J. Coffey, W5NCB - SEC: W51JWD. Miss. Coast ARC is going strong on another Novice class, thanks to W5FDG, W5SAHL, etc. Congrats to W55DCY, now General. Miss. hams really want to town in FD. Great work fellows. New Net Mgr. for CGCHN is W5ZQP; for MSBN W5UJH. Thanks to W5LZB and W5WTW for FB job as outgoing Net Mgrs. W50GV/5 doing great job with new MSPON. W5SBM had heart surgery and is recovering FB. The FCC computer assigned WNSHHH to a West Point ham - try that on your radio cw. MTN QNI 121, QTC 74; MNN QNI 33, QTC 18; CGCHN QNI 1644, QTC 120; MSPON QNI 183, QTC 28; MSBN QNI 1104, QTC 158. Welcome to new hams WNSs GZS, HAF, HAP, HAS, HAZ, HFA, HFB, HFC, HFN, HGG, GTD, GIK, GVO, GVR, GVS, GWG, GWT, GXI, GXP, GXQ, GXR, GXS, GXT, GXU, GXV and GYP. To boost traffic handling we soon will have available the nearest toll free QTH and alphabetical and numerical index of all telephone exchanges in Miss. When did you have a QSO with a Novice? Traffic: W5YZW 154, W5EDT 104, W5NCB 101, W5SDEK 73, W5WZ 41, W5SEIN 36, W50GVO/5 30, KRYUW/5 29, W5AMZ 27, K5YTA 21, W55BUL 17, W55BKM 10, W5ASKEY 10, W55BW 7.

TENNESSEE - SCM, O.D. Keaton, WA4GLS - SEC: WB4ANX. PAMS: W4PFP, K4MOI, WA4EWW, RM: W4ZJY.

Net	Freq.	Time(Z)/Days	Ses.	QNI	QTC	Mgr.
TPN	3980	1145 M-F	30	1419	38	W4PFP
		1300 S-Su				
FTPN	3980	1040 M-F	22	504	15	WA4EWW
TN	3635	0000 Dy	30	267	169	W4ZJY
KVHFN	50.7	0100 T	4	22		WB4MPJ
MTTMN	28.8	0100 T-F	9	76		W4PSN
FTTMN	28.7	0100 W-F				WA4QXC
IHARCN	7288	0030 W-F				WB4QNK
FTVHFN	50.4	0000 TTh&S				WB4IOB
EIVHFN	145.2	0000 W&F				WB4IOB
TSSBN	3980	1130 M-S				K4MOI
TNN	3720	1100 Dy	29	124	42	WB4USC
TPON	3980	1130 Su	4	121	7	WB4BHZ
TWNN	7170	2000 Su				WB4YCV

The TN Honor Roll: W4ZJY 48, WB4YCV 35, K4CNY 34, WB4USG 30. Remember the Memphis Hamfest on the 17th. The Music City Hamfest was a great success at the new location, winner

HAVE A BIGGER VOICE IN THE WORLD

MAGNUM SIX R F SPEECH PROCESSOR

Price for HEATH
& COLLINS rigs
\$129.95*
Postpaid U.S.



- TRUE RF SPEECH CLIPPING
- NATURAL SOUNDING SPEECH AFTER PROCESSING
- 4 TIMES THE SSB POWER ON ALL BANDS ($\geq 6\text{db}$)
- EXTERNAL CONTROLS - PERMITS ADJUSTMENT TO YOUR RIG

● ATTENTION DRAKE & YAESU OWNERS!

Magnum Six units for your equipment will be available for delivery as follows;

- T4X/T4XB One side only (upper or lower).. **\$139.95***
15 Sept. Selectable sideband **\$149.95***
- TR3/TR4 One sideband **\$139.95***
15 Oct. Selectable sideband..... **\$149.95***
- YAESU FT101 - 1 Nov. **\$139.95***
- YAESU FT200, 400, 560, & 570 **\$139.95***
(DATES TO BE ANNOUNCED)

* (Add 5% Tax in Washington)

● SWAN & Others coming soon.

Send for FREE Brochure
Communication Technology Group
31218 Pacific Highway South
Federal Way, Washington 98002



A Division of Bitcil Systems Inc.

get a fair deal at

TRIGGER Electronics

where the HAM IS KING



free

TRIGGER CATALOG

TO HELP YOU SHOP BY MAIL

Everything for the Ham!

Send for this reliable buying guide to carefully selected Amateur gear. You'll find it easy to shop at TRIGGER by mail. We make fast shipment from complete stocks of all the leading brand equipment—generally the same day your order comes in.

CHECK COUPON FOR YOUR FREE CATALOG

BEST TRADES IN HAMDOM

Trade high with TRIGGER. You'll find we allow you more for your present gear. Write for quick quote.

Instant Cash for Your Used Gear

Describe fully what you have: Make, model, modifications, accurate description of condition:

GET A GOOD DEAL FROM TRIGGER

SHOP EASILY AT OUR STORE

ON THE WEST EDGE OF CHICAGO

ALL PHONES: 312/771-8616

FREE Catalog

TRIGGER Electronics, Dept. 115T
7361 North Ave., River Forest, Ill. 60305

Send FREE TRIGGER Catalog

Name
PLEASE PRINT

Address

City

State

Zip

of the first prize was WB4IJM. The Tenn. Council of RCs will reinstate the net on Sept. 6, at 8:00 P.M. CDT. It is time for those who want 1973 auto license tags to make application to: Motor Vehicle Division, Dept. of Revenue, Andrew Jackson State Office Bldg., Nashville, 37219. Traffic: WB4YCV 252, W4ZJY 122, K4CNY 117, WB4USG 80, WA4GLS 42, WB4LHD 36, WB4DUJ 19, WN4VZC 19, W4PPF 17, WB4NTR 16, WB4FEC 14, WB4ANX 7, WB4DYJ 7, WB4EKI 7, WA4CGK 3, WN4WHF 3.

GREAT LAKES DIVISION

KENTUCKY - SCM, Ted H. Huddle, W4CID - New appointments: WA4WWT, WB4NHO and K4FXN as ORS; K4UDZ as EC-4; W4OTP as PAM-FCATN. Endorsed: W4NBZ as ORS.

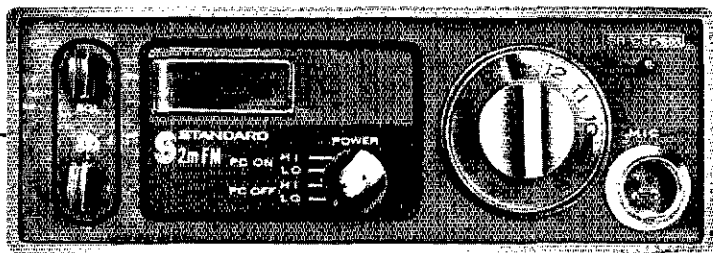
Net	QNI	QTC	Freq.	Time-Z	Mgr.
KKN	350	31	3960	10.30	W4BEJ
MKPN	468	39	3960	12.30	WB4AUN
KYN	1013	174	3960	2.300	K4MAN
KYN	224	272	3600	0000/0200	W4BAZ
KNTN	225	101	3725	0100	E4UNW
KPON	65	32	3945	1730 S	WA4AVV

WB4VLH is working all kinds of FB DX on 6 meters. W4OTP has volunteered to manage FCATN and becomes vhf PAM (No. 2) for Ky. W4BAZ is adding to KYN ranks with many new ORS appointments but is still looking for activity in those sparse areas. K4LOL has a new 2-meter mobile. Your SCM had the pleasure to observe and participate a little in the Owensboro Regatta activity in early June. They were commended as being the best organized communications group on the racing circuit. WB4AUN, WA4AVV, W4CID, W4OXM, WN4WCM and W4BNP attended the Huntington, W.Va. Hamfest. The license plate poop should be in your hands by the time you read this so get those applications in for yours! Traffic: WA4WWT 277, W4BAZ 231, WN4WCM 135, W4CID 96, W4OXM 68, WA4AVV 55, K4UNW 54, K4MAN 52, WB4EOR 41, WB4AUN 38, K4FXN 30, WB4ENH 21, WB4PVC 17, W4CDA 13, WA4FAE 13, WB4NHO 11, K4LOL 7, WN4YAF 7, WA4AGH 6, WA4HLW 6, WB4ILF 6, K4TXJ 6, W4BTA 5, K4FPW 5, WA4MXD 4, K4AVX 3, WB4GCV 3, W4IQZ 3, K4HOE 2.

MICHIGAN - SCM, Ivory J. Olinghouse, W8ZBT - Asst. SCM: B. Peter Tremf, W8KBZ. SEC: W8MPD. RMs: W8JYA, W8WVL, W8RTN, K8KMQ, W8GLC. PAMs: K8MIK, K8PVC, W8KTB. VHF PAMs: K8AEM, W8WVV.

Net	Freq.	Time/Days	QNI	QTC	Sess.	Mgr.
QMN	3663	2300 Dy	550	335	59	W8JYA
WSSB	3935	0000 Dy	873	108	30	K8PVC
BR/MEN	5930	2230 S-F	640	91	26	W8KTB
UPEN	3920	2230 Dy	342	39	30	K8MIK
GLETN	3932	0130 Dy	584	70	28	W9KHK
PON	3955	1600 Dy	694	416	30	K8LNE
PON/CW	3645	2400 M-S	156	27	27	VE3DPO
MI6M	50.7	0000 M-S	220	29	19	W8VXE

W8CVO reports SW Mich. 2-meter net with 56 QNI and 4 sessions. K8ZWR reports 56 QNI and 4 sessions for the SW Mich. WX Net. New appointee: W8BIM as OBS. Blossomland ARA is forming an Emergency Corps. Hazel Park ARC again will conduct classes in code and theory at the Hoover School. New in Plymouth is W8MNU, W8JYO, W8BHD and W8BTJ are now General Class licensees. W8BHQ is now Advanced Class and ORP on cw with 2 watts. The VHF Conference will be held at WMU on Oct. 21. Calhoun ARC and ARS of Calhoun Co. have joined other hams to form Southern Mich. AKS, P.O. Box 934, Battle Creek, Mi. 49016. Officers are W8MFL, pres.; W8BULG, vice-pres.; K8TWX, treas.; W8VWG/8, rec. secy.; W8VXE, corr. secy. Hazel Park ARC officers for '72 and '73 are W8WZU, pres.; W8WVE, vice-pres.; W8BDUK, treas.; W8JYX, secy. W8VXM can now see after eye surgery and is back on the Wolverine Net as NCS. W8FZL was unlucky in a storm; lightning took his Swan 350 off the air. He now is looking over the SB-102. GCRG Ham of the Month goes to W8VGG for his assistance in organizing the March of Dimes Walk-a-Thon communications. CMARC came up with a breakdown of their membership - Extra 6%, Advanced 28%, General 24%, Tech. 24%, Novice 9%, SWL 8%. K8ETU is vacationing in Europe. Congrats to W8SZY and his new XYL, W8VVO is custodian of the new Novice crystal bank, W8EUN and XYL WN8MYV will spend July and Aug. in UA1, UA3, U18, UG6, UF-6 and UB5-Lands. From all reports Field Day was a big success and fun was had by all participants. WN8MBM is starting a Novice Regional net, look for him on 7.189 or 7.191 at 0030 GMT if you are interested. I wish to thank all my friends for the fine cards sent me at the hospital. Traffic: (June) W8ENW 429, W8IBX 299, W8JAD 257, W8TZZ 159, K8LNE 150, W8GLC 136, K8DYI 130, W8WZF 121, W8BFG 88, W8BAXI 74, W8BPPY 66, W8BIM 65, W8BYB 56, W8IZ 54, W8PTM 50, W8NOH 46, W8ZBT 46, W8DTJ 43,



MAXIMIZE YOUR AMATEUR RADIO

What new 2M FM gives me most for my money, performance vs. price? The answer's as clear as the superb reception you'll get on the new Standard 826MA, 10 watt, 2 meter FM transceiver. You'll find such outstanding features as 12 channels — with the four most popular ones included — and a RF output meter with selection of 10 watts or 0.8 watt for battery conservation. And of course, our "Astropoint" system

MONEY. that assures: top selectivity, great sensitivity, and rejection of unwanted signals on today's active 2M band. **Helical Resonators** & FET front end provide the performance needed for tomorrows crowded channels. Provision for **tone coded squelch** to activate modern repeaters. A radio that won't become obsolete. Occupies less than 200 cu. in. Weighs less than 5 lbs. It has all the same "Astropoints" as entire Amateur line.

NEW 22 CHANNEL BASE STATION SRC-14U

Ultimate in a 2M FM Transceiver features:

- 22 channels
- AC & DC supplies Built In
- 10W (1, 3 & 10 selectable)
- Receiver offset tuning
- VOX
- Three Front Panel Meters
- Plus many more exciting features.



For detailed information on these; the complete Standard line and the name of your nearest dealer write:



Standard
Communications Corp.

213 / 775-6284 • 639 North Marine Avenue, Wilmington, California 90744

WB8BJP 42, WB8DJS 42, K8JED 41, K8PVC 41, W8MO 35, W8KTN 31, W8EU 30, WA8VXE 30, WB8EFU 28, WR1YA 28, WA8KHB 28, W8NJM 25, WA8R-XR 24, K8MJK 24, WB8BJJ 22, WA8OJI 21, K8WRJ 19, W8IUC 18, K8TTY 15, W8Q 12, W8FX 12, WA8WVV 12, W8NDI 11, W8DCN 10, K8GOU 10, WB8DKQ 9, WB8HQS 8, K8GXV 7, K8JHA 7, K8HGA 6, W8HKL 6, W8ISC 6, WA8ONZ 6, WA8WLE 6, W8WVL 6, WB8RANR 5, WB8EZ 5, WA8PDN 5, WA8FLK 4, W8VXM 3, WB8BFK 2, WA8CUP 2, WB8EUN 2, WA8ZDE 2. (May) WA8ZAV 43, WA8VXE 20, W8NDI 10.

OHIO - SCM, William E. Clausen, W8MI - Asst. SCM; Kenneth L. Simpson, WA8ETX. SEC: W8OUU. RM: WA8WAK. PAM: K8UBK. VHF: PAM: WA8ADU.

Net	QNT	QTC	Sess.	Freq.	Time(Z)	Mgr.
OSSBN	2821	324	82	3972.5	1430/2245	K8URK
BN	548	390	60	3577	2300/0200	WA8WAK
O6MtrN	521	53	60	50.61	2300	WA8ADU
				50.16	0100	
OSN	204	75	30	3577	2225	WA8WAK
BN RTTY	146	639	28	3605	2200	W8SZU

The Ohio Novice Traffic Net meets on 3720, Sun., Tue. and Thur. at 2145Z. BPLs for June went to WA8ETX, WA8VYO, WA8MCR, WA8VKF, K8NQW, K8ONA, W8QCU, WB8HUP and WA8QFK. New appointees are WB8EEZ, OPS and ORS; W8IGW, EC for Jackson, Meigs and Gallia Counties. New officers of the Indian Hills RC are WA8USP, pres.; K8STK, vice-pres.; WA8AAV, secy.-treas. Findlay RC's Hamfest is Sept. 10 at Riverside Park and Greater Cincinnati ARA's Stag Hamfest is Sept. 24 at Stricker's Grover. The Champaign-Logan County ARC sponsors an award for working Ohio's highest point during contests; details from W8HFK. OVSs WA8KPN, WB8BOK and K8TUT report exceptional openings on six during June. OO W8ZCQ feels that improper use of speech processing equipment is the major cause of poor signals. Cincinnati has a new novice crystal bank; contact W8NKLO to give or take. The Parma RC News bulletin reports the club operated a display station at the Parmentown Mall. W8DFL operated portable while on a European tour. EC W8FRD was named ham radio chmn. of the Franklin Co. Red Cross. WB8IRB won the hidden transmitter hunt and WB8ESB was judged best mobile at the AREC-sponsored Cincinnati Area Ham Picnic. W8CEM spoke on SSTV to the Westpark Radiops. OO K1DIK/8 is the new editor of Columbus

ARA's Carascope. WB8AYC received WAC, WB8CLF joined AMSAT and W8QXQ completed 5BWAS. W8DYF reports setting up flood emergency stations at Steubenville Red Cross and at Empire during FD week end. WA8COA's Ham Call reports that Cincinnati Area Red Cross honored W8YGH for 25 years of service, W8OUU 15 years and K8PMW 10 years. Public service activities included the Miami Valley FM Assn., national power boat races; the Apricot Net, Flag Day Parade; Lima RC, AREC and CD, international inland boat races at Grand Lake. Don't forget the autumn meeting of the Ohio Council of ARCs on Oct. 14 - your club should be represented. We need ECs for the following counties; Athens, Coshocton, Hancock, Hocking, Knox, Morgan, Muskingum, Perry, Seneca, Vinton and Washington. Contact your SIC or SCM if you are willing to perform this vital service and organize AREC in your county. Traffic: (June) WA8ETX 1216, WA8VYO 1044, WA8MCR 551, WA8VKF 506, WA8UPI 374, W8SUS 342, K8NQW 304, WA8WAK 282, K8ONA 245, WA8HGH 243, W8PMJ 243, W8QCU 237, WA8YLW 221, W8CUT 218, W8MI 198, WB8HUP 194, WA8WPO 192, WA8QFK 171, W8VIT 159, WB8JEL 142, WA2ASM/8 139, W8QZK 127, W8MOK 119, WB8KVU 118, W8GVX 107, W3:AF/B 103, WB8CWD 97, K8MLO 92, WA8DWL 88, K8LTG 82, W8JD 80, WB8KJF 79, WA8VWH 75, W8DDG 67, WB8FXD 67, WB8EFZ 57, WA8NOQ 56, WA8YTB 55, W8OE 52, K8DHJ 50, WA8SFD 50, W8LT 48, WB8CSH 43, W8GOE 43, WB8AYC 40, WA8FCQ 40, WB8JKA 39, W8GRY 38, WA8ADU 37, WB8FNC 36, K8DHD 35, W8BHL 34, WB8IGW 34, WA8YJQ 34, WB8FCT 33, W8UPD 32, W8VND 29, W8BICQ 28, WB8MKZ 27, WA8ETW 25, W8WEG 24, WA8FSX 23, W8NAL 20, W8ARW 19, W8GRG 19, WA8MHO 18, K8BYR 17, WB8DQV 16, WA8KPN 16, WA8BXC 14, W8HNT 13, WA8GZE 12, K8JID 12, K8OYR 11, WB8FWF 10, W8MCC 8, WA8LAM 7, WB8CLF 6, W8LZF 5, K8CKY 4, W8ETU 4, K8ZYX 3, W8BKEO 2, W8QXQ 2. (May) WA8VYO 280.

HUDSON DIVISION

EASTERN NEW YORK - SCM, Graham G. Berry, K2SIN - Asst. SCM/PAM; Kenneth M. Kroth, W2VJB. SEC: W2URP. RM: WA2VYS. Nets: 1SS daily 2300Z, 10 wpm on 3.590. NYS: Daily at 0001Z and 0300Z on 3.675 MHz. NYSPT&EN daily at 2200Z on 3.925 MHz. NYRTTY daily at 2330Z on 3.613 MHz. All appointees note 9th Pp on p 4 of "Operating" manual; after 3 months without

Regency 2 Meter FM - American made at import prices

NEW

Instant access to 144 frequency pairings with 20 watts out on the new HR-212 twelve channel 2 Meter FM Transceiver by Regency

Specifications

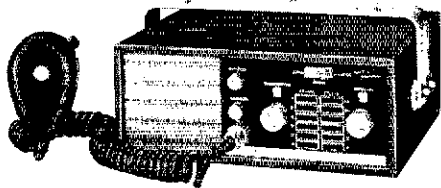
Power Output: 20 watts (nom.) at 13.8 V DC

Frequency Range: 144-148 MHz

Channels: 12; crystal controlled

Sensitivity: 0.4 uv, 20 DB quieting

Spurious Rejection: 60 DB



Model HR-212

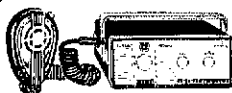
\$259 Amateur Net

Includes microphone, mounting bracket and factory installed transmit and receive crystals for 146.94 MHz.

for all your 2 Meter FM needs



Model HR-2MS 8 channel Transceiver™ with signal search reception and 15 watts minimum output. \$319.00 Amateur Net



Model HR-2A 6 channel transmit, 12 receive 2 Meter FM Transceiver with 15 watts minimum output. \$229.00 Amateur Net



Model AR-2 Amplifier boosts 2 Meter FM output power 300%. \$119.00 Amateur Net



Electronics, Inc.

7900 Pendleton Pike • Indianapolis, Indiana 46226

Regency 2 Meter FM - American made at import prices

A New Star In The Sky

The System I Yagi Antenna gives full coverage of 20, 15, and 10 meters.

- Multi-band performance over complete 20, 15, and 10 meter bands.
- Phone and CW coverage of all bands without adjustments.
- Constant high gain and low VSWR across each band.
- Single coaxial feedline.
- Maximum legal power rating.
- High-quality, low loss traps.
- Ruggedly constructed for severe weather conditions.
- Easy installation with all necessary hardware.

All of these features and performance in a single antenna at only \$439.95 comes to you from Weinschel Engineering—a worldwide leader in the design and manufacturer of precision microwave components and instruments for over 20 years. It is our expertise in the microwave field that led to the development of the System I "No Compromise" Yagi Antenna.



WEINSCHTEL ENGINEERING

Gaithersburg, Maryland 20760 • Tel: (301) 948-3434 • TWX: 710-828-9705

Tomorrow's Antenna Technology Today

Gentleman: _____ (Send to: Dept. A)

Please ship one System I antenna (freight collect). Enclosed is a check for \$439.95. Ship via _____

Please send detailed literature on System I.

Name _____

Address _____

City _____

State _____ Zip _____

a report SCM can terminate your appointment, likewise for lapse of ARRL membership — and will Renewal as LC to W2HO. New ORS to WA2CNE. Club news scarce for June. Some Field Day cancellations because of emergency in SNY and Penna. Flood areas. At Westchester ARA long-time member and Hudson Dir. K2SJO for June meeting. Schenectady ARA held annual Ladies Night with 5H3MB as speaker, installed WB2YLB, pres.; WB2IIC, vice-pres.; WB2VPE, secy.; WA2BLC, treas. WA2WFI, WB2OCZ, WA1JKJ/2 and WA2JIN, dir. Club's Broughton Award for '72 to K2DLD. Congrats. Overlook Mt. ARC due to give Novice tests to Camp Woodcliff students. All clubs remember the HARC Biennial Convention in Oct. at Tarrytown. Banquet reservations to Englewood ARC % WA2CCF in N.J. or via your club rep to HARC (you have one don't you?) Seating limited, so act now. Re Flood: Too many ENY stations active to list them all, but a particular bow to WB2ZSB, W2APF, WA1AFP for Elmira Net Control help; and to the K2AVP "gang" and all others who went into the stricken area to help out. The Elmira H&W net handled 500+ check-ins, over 3K inquiries during one week after the flood — thanks to everyone who helped make it possible. WA2HGB now PhD and joining Air Force at Wright-Patt Field in Ohio. WA2ULU on verge of 2-meter FM and going "DX" for summer with QRP CW rig. WA2CNE at Camp station in Mass. for summer. WB2CFE in the cw nets. W2DPV, K2JOB spearheaded control operation for another City parade in New Rochelle — this time of antique cars. K2BK now has 5BWAS and 5BDXCC. Red Cross liaisons during emergency for area were WA2JWL, WA2WGS, WB2ZSB, WB2VJB, WA2EAH, W2URP and others. Thanks for FB job to one and all. With new club season starting, check your mail list to make sure paper or bulletin gets to SCM for column inclusion. Traffic: K2SUN 313, W2URP 166, WA2VYT 70, WA2WGS 57, K2UYK 46, WA2JLU 40, W2GPH 31, WA2HGB 23, WB2AEQ 8, WA2EAH 4.

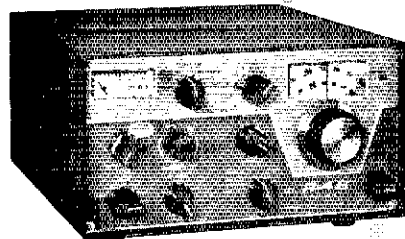
NEW YORK CITY AND LONG ISLAND — SCM, Fred J. Brunjes, K2DGI — SEC: K2HTX, RM: WA2UWA, HF: PAM; WA2UWA, VHF: PAM; WB2RQF. The following are major ARRL Nets: Join in!

Bronx	28.64 MHz	50.35 MHz	146.17 MHz
Brooklyn	28.64 MHz	50.35 MHz	146.26 MHz
Richmond			146.88 fm
New York	29.50 MHz	50.48 MHz	
Queens	29.50 MHz	50.20 MHz	145.62 MHz

Nassau	28.72 MHz		146.10 MHz
Suffolk	28.73 MHz	50.46 MHz	145.59 MHz
			147.21 fm

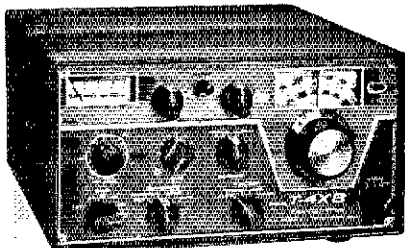
Note: Nets usually open 2000 local, Mon. Hope everyone had an enjoyable summer and are all rested up for a fresh new season of amateur radio! In the Hudson Division, preparation is drawing to a close on one of the best Conventions ever held in the Hudson Division and the New York area. The Convention Committee suggests you order your tickets now if you have not yet done so, particularly for the Banquet, tickets are going fast. Contact: Convention, 303 Tenefly Rd., Englewood, N.J. 07631. Don't forget to attend, and tell your friends about it! If you miss this one, don't complain you didn't know about it ahead of time; Oct. 21 and 22 at Hilton Inn, Tarrytown, N.Y. My thanks to those who were able to venture to Pa. over the July 4 week end to help provide communications in the distribution of food and clothes in the flood disaster areas of Pa. I would also like to thank those individuals that handled traffic for that disaster, and those who had the sense to stay clear of those frequencies that were used for the emergency nets during the Field Day week end. Many thought that Field Day should have been cancelled because of the flood disaster in the Mid-Northeast. Local authorities had been contacted and indicated all was in hand, and with the proper use of the short range frequencies (80, 40 and 2 meters) covering a 300 mile radius from the disaster area; there was no need to cancel the activity for the rest of the country. Remember, if you need immediate help, you go to your neighbor, not to a friend or relative 3000 miles away via 15 or 20 meters! Congratulations to WA2GMD who recently upgraded to Extra Class. WB2DZL is out sporting an FTDX 560 with a vertical on 20 and 40 meters. W2FVS is back on the air from a new apartment, running a new CX7A and 2-meter fm. WA2GTK had been vacationing in XE-Land during the summer. And another traveler, WB2FJX has spent the month of Aug. traveling through Europe visiting amateurs there. WA2QJU and new wife have moved across the river to Elizabeth, N.J. Congratulations! A little smoke is in the making at the shack of WA2MDX; a new 4-1000A sstb amplifier is under construction! Well it appears the fm repeater situation has finally been straightened out in our area. WA1KKG is permanently off the air because of loss of the tower lease in Trumble, Conn. This also helped to complete the frequency change of a few repeaters in the area that had been held "out of standard spacing" due to the odd input of "KGK." The up-to-date list of the

DRAKE 4 LINE — Superior performance



Versatility ...
Accuracy ...
Dependability

Use VFO of either
R-4B or T-4XB for
transceiving or
separately.



R-4B RECEIVER

- Linear permeability tuned VFO with 1 kc dial divisions. VFO and crystal frequencies pre-mixed for all-band stability
- Covers ham bands 80, 40, 20, 15 meters completely and 28.5 to 29.0 Mc of 10 meters with crystals furnished
- Any ten 500 kc ranges between 1.5 and 30 Mc can be covered with accessory crystals for 160 meters, MARS, etc. (5.0-6.0 Mc not recommended)
- Four bandwidths of selectivity, 0.4 kc, 1.2 kc, 2.4 kc and 4.8 kc
- Passband tuning gives sideband selection, without retuning
- Noise blarker that works on CW, SSB, and AM is built-in
- Notch filter and 25 Kc crystal calibrator are built-in
- Product detector for SSB/CW, diode detector for AM
- Crystal Lattice Filter gives superior cross modulation and overload characteristics
- Solid State Permeability Tuned VFO • 10 tubes, 10 transistors, 17 diodes and 2 integrated circuits
- AVC for SSB or high-speed break-in CW
- Excellent Overload and Cross Modulation characteristics
- Dimensions: 5½"H, 10¼"W, 12¼"D. Wt.: 16 lbs.

\$475 00

T-4XB TRANSMITTER

- Covers ham bands 80, 40, 20, 15 meters completely and 28.5 to 29.0 Mc of 10 meters with crystals furnished; MARS and other frequencies with accessory crystals, except 2.3-3, 5-6, 10.5-12 Mc.
- Upper and Lower Sideband on all frequencies
- Automatic Transmit Receive Switching on CW (semi break-in)
- Controlled Carrier Modulation for AM is completely compatible with SSB linear amplifiers
- VOX or PTT on SSB and AM built-in
- Adjustable Pi-Network Output
- Two 8-pole Crystal-Lattice Filters for sideband selection, 2.4 kc bandwidth
- Transmitting AGC prevents flat topping
- Shaped Grid Block Keying with side tone output
- 200 Watts PEP input on SSB—200 watts input CW
- Meter indicates plate current and relative output
- Compact size; rugged construction
- Solid State Permeability Tuned VFO with 1 kc divisions
- Solid State HF Crystal Oscillator
- 11 Tubes, 3 Transistors and 12 diodes
- Dimensions: 5½"H, 10¼"W, 12¼"D. Wt.: 14 lbs.

\$495 00

R. L. DRAKE COMPANY • 540 RICHARD STREET • MIAMISBURG OHIO 45342

You get more for your money from NRI



SOLID STATE TRAINING—Learn-by-doing with NRI equipment. TV-Radio Servicing course includes 25" color TV, with handsome woodgrained cabinet at no extra cost, wide-band service type oscilloscope, color bar crosshatch generator, transistorized volt-Ohm meter, and solid-state radio kit. Other courses equally complete.

NRI Programmed Equipment Gives You Priceless Confidence, Makes Learning TV-Radio, Electronics Fast and Fascinating

NRI pioneered the idea of supplying home-study students with custom designed training kits to give practical on-the-job experience as you learn. Today, NRI's "3-Dimensional" training can't be equalled. You get more value—from the exclusive Achievement Kit sent the day you enroll, to "bite-size" texts and custom training equipment. Learning TV-Radio, Electronics or Communications at home is easy, exciting, the NRI simplified, dramatized way.

BE A SKILLED TECHNICIAN IN AMERICA'S FASTEST GROWING INDUSTRY

Regardless of your educational background, you can learn the Electronics field of your choice the practical NRI way. The NRI color catalog, sent to you free and without obligation, tells you how you can qualify quickly to be a part of the fast growing Electronic Age; about engineering jobs in business, industry, broadcasting, government, now offered to men without college degrees. It will open your eyes to the great number of success opportunities available right now in the high-pay world of TV-Radio Servicing, Broadcasting-Communications and Industrial-Military Electronics. With NRI technical training, you can take your choice of a wide variety of career openings or have a business of your own. And if you choose one of five NRI courses that include FCC License preparation, *you must earn your FCC License or NRI refunds your tuition!*

MAKE \$5 TO \$7 AN HOUR EXTRA IN SPARE TIME STARTING SOON

Tens of thousands of NRI graduates are proof it is practical to train at home in your spare time. Keep your present job while preparing for a better one, and earn \$5 to \$7 an hour extra in spare time while you train, fixing sets for friends and

neighbors. NRI shows you how. Equipment you build and keep becomes useful in your work.

STEP UP TO BETTER PAY, A BRIGHTER FUTURE

NRI can help you, but the decision to act must come from you. Decide now to move ahead... mail the coupon today for your FREE NRI color catalog. NRI Training, 3939 Wisconsin Ave., Washington, D.C. 20016. No obligation. **NO SALESMAN WILL CALL.**

APPROVED UNDER GI BILL

If you served since January 31, 1955, or are in service, check GI line on postage-free card or in coupon.



MAIL NOW for FREE CATALOG



NRI TRAINING
3939 Wisconsin Avenue, Washington, D.C. 20016

19-092

Rush me your new catalog. I have checked the field of most interest to me. **NO SALESMAN WILL CALL.**

- | | |
|--|---|
| <input type="checkbox"/> TV-Radio Servicing (with color) | <input type="checkbox"/> Computer Electronics |
| <input type="checkbox"/> Advanced Color TV | <input type="checkbox"/> Electronics Technology |
| <input type="checkbox"/> Complete Communications Electronics | <input type="checkbox"/> Electronics for Automation |
| <input type="checkbox"/> FCC License | <input type="checkbox"/> Basic Electronics |
| <input type="checkbox"/> Aircraft Communications | <input type="checkbox"/> Math for Electronics |
| <input type="checkbox"/> Mobile Communications | <input type="checkbox"/> Basic Data Processing and Computer Programming |
| <input type="checkbox"/> Marine Communications | <input type="checkbox"/> Automotive Mechanics |
| <input type="checkbox"/> Amateur Radio | <input type="checkbox"/> Appliance Servicing |
- CHECK HERE FOR FACTS ON GI BILL

Name _____ Age _____
(Please Print)

Address _____

City _____ State _____ Zip _____

ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL

more popular repeaters in the area is as follows: WA2PDI 25-85, WA2YQ 28-88, WA2UWC 34-94 N.J., WA2UWO 22-82 PL. N.J., W2OQI 22-82 PL East L.I., 58-82 PL West L.I., WA2UZF 16-76, WA2SUR 13-73, WA2KEC/2 40-995, WA2UWR 19-79 N.J. K2AVP 145.68 - 147.06. Suggest newcomers to fm listen on "channel" to operating technique for it is a little different than other modes of operation! Traffic: WB2LZN 283, W2EC 155, WB2WFJ 101, WB2OYV 72, WB2UFG 67, WA2GLP 46, WA2GTK 27, WA2HMM 15, WA2PLI 14, WA2FXP 11, WA2LJS 11, WB2CHY 10, WA2MDX 9, W2PF 8, WB2BY7 7, W2DBQ 7, W2FVS 5, WB2UOP 5, WB2DCS 2, W2GP 1.

NORTHERN NEW JERSEY - SCM, Louis J. Amoroso, W2ZZ - SEC; K2KDQ. RMs: WA2UOO and WA2BAN. PAMs: K2KDQ and WA2TAF.

Net	kHz	Time(PM)	Days	Sex	QNT	Tfc.	Mgr.
NJN	3695	7:00 Dy		30	379	191	WA2UOO
NJN	3695	10:00 Dy		30	118	55	WA2UOO
NJSN	3740	8:00 Su		4	7	5	WA2FVH
NJEPTN	3950	6:00 Dy		28	451	130	WA2TAF
PVTEN	145710	7:30 Dy					WA2JNQ
ECTN	145800	8:30 Dy					WB2ITW

endorsements: WA2CCF as EC for Englewood and vicinity. WB2YPO as OBS and WB2AEH as ORS. W2ZEP has been appointed asst. mgr. for NNJ and WA2VH asst. mgr. for NJEPTN. WN2GEZ is a new ham in Fords. WN2MIX is new in Linden and WN2CSX is new in Lodi. Welcome to ham radio and hope we have a QSO with all three. Ex-W8BFH and ex-W2EQU is back in again as K2GH. WB2LTW has moved to W6-Land. We wish him the best and also a big thank you for his work as mgr. of ECTN and EC of Jersey City. WA2KVU has retired from the Coast Guard and moving to Fla. W2CJC has been transferred to Ft. Lauderdale and WA2QKR has moved to Tenn. We will miss all of them. Received a letter from ex-W2LC who wrote that his new call now is W1SK. He also reported that WA2FRZ now is WA1QMZ and WB2DEG is WA1QMY. W2FJK reports his XYL passed the General and now is WB2ESG. W2TP went to UA1 and YU-Land on his vacation and W2WJO visited 8P8 on his. WA2SRQ has a new 14X and R4A. WB2AEH working on his R1TY gear. WB2COV and W2WOJ now using a new Swan 500. WB2KNS has a new TA-33 and a 2-meter beam mounted on his new 52-ft. tower. WA2FUI reports a class of over 40 attended his ham license course. WA2RYD now using a new

SB-102. WA2EGR reports he expects to operate portable while attending college in 4X4-Land. WB2KLD has a new Sidewinder. WA2UDT worked Fla. for No. 24 on 144 MHz. WA2FUI is the new trustee of K2MFF. W2ZZ had a roundtable QSO with W2CU, W3CU and W6CU. W2OFH installed a new 90-ft. Sky Needle for his 20-meter beam. WA2BAU installed 2-meter fm mobile rig in his car. W2QM is now mobile with the progress line. W2QD operated 4U1TU while in Europe. Field Day this year was a Murphy Special. We thank all who operated during the Flood Emergency and request that all such activity be reported to your SEC and ARRL Hq. Traffic: (June) WB2AEH 248, WB2DDO 232, WA2EPI 205, WB2RKK 187, WA2UOO 99, WB2NOM 92, WA2EUO 88, WB2IKL/2 69, WB2RYD 68, WA2SRO 63, W2ZEP 61, WA2FVH 58, WA2CCF 27, WA2CAK 23, W2CVV 23, WB2LTW 19, WA2MJG 19, WB2BCS 18, W2ZZ 17, W2CU 16, WB2KNS 15, WB2CJT 9, WA2FUI 7, W2WOJ 6, W2CJG 4, W2ABL 2, WA2BAU 2, WB2COV 2, W2JDA 2. (May) WA2UOO 207, WA2SRO 80, WA2VH 52, W2ODV 8, K2MFF 7, WA2FUI 5, W2ABL 3.

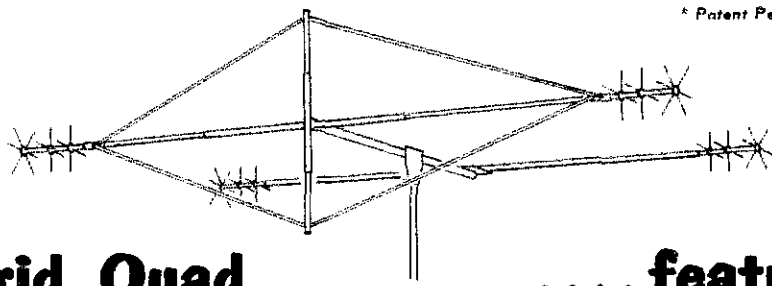
MIDWEST DIVISION

IOWA - SCM, Al Culbert, K0YYU - SEC: K0LYB. I am most grieved to report the passing of K0MHX, Iowa SCM 1968-70. K0LUW is a new OO appointee. All EC/RO's should have received their appointment endorsement stickers by now; any EC/RO who failed to receive one should contact myself or the SEC. I trust you have all fully recovered from any lingering Field Day maladies. Heard quite a few stations representing the section. Hats off to the operators at WA0CIC and W0WSV for their fine performance in handling the Rapid City traffic. We all shall share the bounty of the publicity which these fellows received from the news media. WA0AUX reports the formation of an Iowa Chapter of Handi-Hams, which has been so successful in Minn. - officers are WA0ATI, pres.; WA0AUX, vice-pres.; WA0MIZ, treas.; WA0VVR, secy.; WA0YFQ, rec. secy.; K0EVM, pub. rel.; W0ASM and K0SRR, equip. and tool smn.; WA0UVH, coord. K0JGH is the proud father of new daughter. K0AZJ issued new TLCN rosters with 43 calls and room for more. WA0KST who has been serving his apprenticeship at W0IO is moving to Sedalia, Mo. in Sept.

Iowa Phone (noon)	QNT 1437	QTC 162
Iowa Phone (eve)	QNI 819	QTC 81
TLCN	QNI 95	QTC 205

Hotter than a firecracker!

* Patent Pending



the Hybrid Quad

.... featuring

A BRAND NEW IDEA FOR SUPERIOR REFLECTOR OPERATION. A HIGH Q QUAD REFLECTOR ELEMENT USING MINI-PRODUCTS NEW MULTIBAND HIGH POT LOADING* PROPERLY PHASED WITH A LINEAR DRIVEN ELEMENT FOR MAXIMUM GAIN AND MAXIMUM FRONT TO BACK RATIO. HERE IN ONE SMALL PACKAGE IS PERFORMANCE NEVER BEFORE THOUGHT POSSIBLE WITH MINIATURE ANTENNAS.

- FOUR BANDS - 6, 10, 15, 20 METERS
- HIGHER GAIN
- HIGHER FRONT TO BACK
- MORE BANDWIDTH
- TURNING RADIUS - 74 INCHES
- LIGHTWEIGHT - 15 LBS.
- WIND SURVIVAL - 75 M.P.H.
- 50 OHM FEEDLINE
- 1200 WATTS P.E.P.
- PACKAGED FOR FPO SHIPMENT

model HQ-1 _____ \$7995 a.m. net

AVAILABLE AT LEADING DISTRIBUTORS

WRITE FOR ADDITIONAL DATE AND CATALOG TO:
MINI-PRODUCTS, INC., 1001 W 18th ST., ERIE, PA. 16502

Mini-Products, Inc.

The 2-Meter FM Rig The Experts Praise

GLADDING 25™



6 CHANNELS/2 METER/TRANSCEIVER/25 WATTS

Power is the keyword when discussing Gladding 25™, the two meter transceiver the experts recommend.

Gladding 25 is so similar to our marine gear (we're the leader in AM and FM marine communications) we are able to take advantage of the tremendous buying power and production efficiencies our huge volume gives us. The result is remarkably low priced. A Gladding 25™ has the power, price and the features amateurs want most, with unmatched quality.

- 25 Watts output • 0.3 micro volt uv sensitivity for 12 db SINAD • Dynamic microphone for unmatched audio • Six separately switchable transmit and receive channels • Crystal supplied for 146.94 simplex and repeater capability on 146.34/146.76 and 146.34/146.94 MHz • 12 volt mobile unit has matching accessory AC power supply • Vacuum tube driver and final for reliability and economy • 8 pole crystal lattice filter • Solid state receiver • Transistor sockets • Glass epoxy printed circuit boards • Quick disconnect power plugs • Mobile mounting brackets • One watt output capability for short range communications.

\$249⁹⁵

for mobile unit

\$299⁹⁵

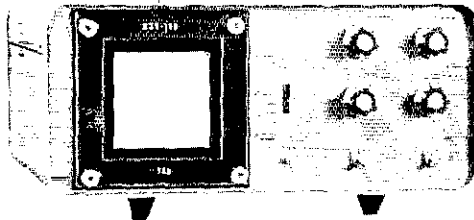
with accessory AC power supply

Write for complete information.

PEARCE-SIMPSON
DIVISION OF **GLADDING CORPORATION**
P.O. Box 800, Biscayne Annex, Miami, Florida 33152



MXV - 100



JOIN THE SSTV CROWD
GET THE FINEST FOR ONLY \$339.95 plus shipping
N.Y. REGISTERED AND LISTED

A UNIQUE MAGN. EYE SYNC INDICATOR SYSTEM ELIMINATES SYNC PROBLEMS. PROVIDES SIMPLE EAST TUNING.

DESIGN EXCELLENCE - 11 IC'S, 21 TRANSISTORS, AND 32 DIODES FOR TOP QUALITY PICTURES.

REVERSE BILLY - COMPLETE MODE SWITCHING FROM FRONT PANEL CONTROLS.

Send for free information

J&R ELECTRONICS

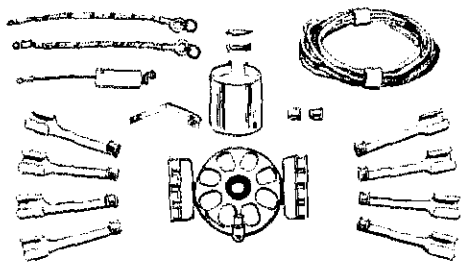
BOX 1646

Inst. manual \$1.00 w/color photo

Poughkeepsie, N.Y. (12601)

HALETT ELIMINOISE

Ignition Noise Suppression Kit



MODEL 80 - UNIVERSAL KIT FITS ALL 8 CYL. AMERICAN CARS

LIMITED

SPECIAL \$24.95

\$55.00 VALUE



Electronics Sales

• HAM • STEREO • C.R. •

23046 S. CRENSHAW BLVD.

TORRANCE, CALIF. 90505

PHONE (213) 634-4458

Traffic: WA0CIO 2966, W0LCX 826, K0DDA 389, W0WSV 262, K0LUZ 197, W0IQ 146, WA0AUX 110, K0AZI 110, W0MOO 105, WR0AAM 51, K0LKH 49, W0BW 48, WA0VZH 47, K0YVU 19, K0JGI 14, WA0ZVF 14, W0AVV 13, K0CNZ 12, K0OOD 11, WA0EFN 7.

KANSAS - SCM, Robert M. Summers, K0BXF - SEC: K0LPE. PAMS: K0JMF, W0B0CL. RM: K0MRI. VHF PAM: WA0TRO. Net reports for June: QKS - QNI 459, QTC 149. Ks Wx Net - QNI 573, QTC 223. Weather man of the Month (May) was W0B0CL. Ks 6C Net - QNI 21, QTC 2. Ks SSB Net - QNI 693, QTC 61. Ks Phone Net - QNI 64, QTC 8. HBN - Apr. QNI 531, QTC 59; May QNI 535, QTC 22. Mid State Mobile Monitor Service had a QNI of 1915 for June. Operation included 143 mobiles, 93 QTC and 125 phone calls or patches in 90 hours of operation. A lot of Kans. amateurs participated in the recent emergency operations of the S. Dak. Flood as well as the East Coast Hurricane. Zone 7 needs a volunteer for EC duties - W0GUR is asking for replacement. Our total AREC membership stands at 616. Hope all of you have an enjoyable vacation and then settle down for a long and good winter of hamming. For the most part Kans. has had a vacation from the tornado season this year. Get yourself and your fellow hams active in the AREC setup in your zone, let us be prepared if we do have to go into action for real in our own zone. Traffic: W0HL 256, W0INH 129, K0MRI 126, W0BGX 71, WA0TAS 71, W0CHJ 53, W0MA 47, WA0LLC 46, K0JMF 43, K0BXT 38, W0GCI 38, W0MCH 38, K0PSD 34, W0BHY 32, W0K0ZHO 29, W0BCZR 28, W0RBO 28, K0LPE 26, W0PB 23, WA0RYK 12, WA0OWH 11, W0BLI 10, W0BZI 8, WA0YMK 8, W0B0BC 7, WA0SWL 4, W0GOL 3, K0GCP 1, W0B0VC 27.

MISSOURI - SCM, Robert J. Pevlar, W0BV - SEC: W0ENW. New appointment: K0HNE as PAM. Appointments renewed: K0SGJ as OBS, OPS.

Net	Freq.	Time(Z)	Days	Sess.	QNI	QTC	Mgr.
MNN	7040	1800	Dy	30	59	19	W0GBJ
MON	3585	0000	Dy	30	123	85	K0AEM
MON2	3585	0245	Dy	29	89	29	K0AEM
MoNSR	3963	2300	M-S	26	891	44	K0HNE
MEIN	3963	1230	MWF	13	235	18	K0KUD
MoPON	3963	2200	M-S	26	573	27	WA0TAA
MSN	3703	2330	Fh	6	10	2	K0BIX
		0030	M				
WEN	7280	0030	T	4	11	3	K0BIX
PHD	5045	0030	T	4	63	13	WA0KUH

MNN suspended operation until Sept. 1. W0BV received Field Day messages from K0HIX/K0B0YC/0 W0DI/0 W0B0DQI/0 W0NL/0 W0F0I/0 and WA0SDC/0. Congratulations to: W0KCG, who passed Extra Class exam; W0ELJ, who passed General and Advanced; and to new Novices W0HHE, W0HHF, W0HHI, W0HHJ, W0HHO, W0HHS, W0HOU, W0HOV, W0HPE, W0HPF, W0HQH and W0HOX. WA0JOG was appointed to Board of Directors of American Red Cross for Stone County and a member of the Disaster Committee. W0BVF reports the formation of the QRP Club of Greater St. Louis; officers are WA0OCU, pres.; WA0ZRG, treas.; W0B0VF, secy.; W0POF, NCS; the club net meets at 0230Z on Mon. Traffic: (June) K0ONK 1560, K0AEM 355, K0BIX 156, W0BV 128, W0UD 65, K0PCK 21, W0GBJ 20, K0SGJ 17, WA0WOC 17, WA0KUH 9, W0FKY 7. (May) W0FKY 5.

NEBRASKA - SCM, V.A. Cashion, K0OAL - Asst. SCM: Velma Sayer, WA0GHZ. SEC: K0ODF.

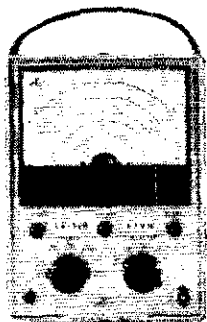
Net	Freq.	GMT/Day	QNI	QTC	Mgr.
NSN I	3982	0030 Dy	805	18	WA0LOY
NLB	3590	0215 Dy	93	22	W0TOD
NMN	3982	1330 Dy	1238	56	WA0JUF
WNN	3950	1300 M-S	500	28	W0NFK
AREC	3982	1330 Su	186	1	W0IRZ
CHN	3980	1730 Dy	1020	45	WA0GHZ
DEN	3980	2030 M-F	32	0	WA0AUX
NSN II	3982	2330 Dy	889	33	WA0LOY

Speedy recovery to W0ZYI, W0HYR is new ham at Imperial. Nebr. Novice Net reports 26 QNI for May. Congratulations to W0BADC on new harmonic. K0HKE 2-meter repeater 146.340-146.940 in Norfolk now in operation. WA0SCP recently nominated for membership in the Royal Order of Smoke Signal Senders. Well done to the Rapid City and surrounding amateurs for the efficient manner in handling numerous messages during the Rapid City flood. W0IRZ extended the Nebr. AREC Net during the disaster to provide an outlet for their traffic. The Sandhills ARC donated \$125 to the Rapid City Disaster Fund. Pine Ridge ARC had 45 amateurs and over 100 people attend their hamfest. Scottsbluff hams will provide communications for the Powder Puff Derby.

**We
uncomplicate
your
log time.**

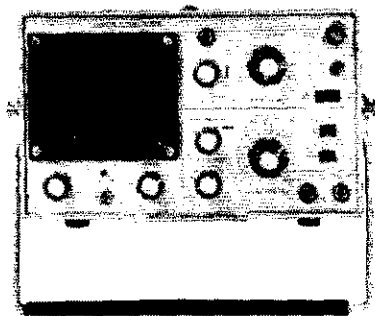
Leader

TEST INSTRUMENTS



**LV-76B
VACUUM TUBE VOLTMETER**

Unusually stable, highly sensitive, with 11MΩ impedance to minimize load effects. Performs all measurements with one probe. AC or DC may be changed by switching rather than lead changing. AC range to 4MHz. \$69.95



**LBO-301-3" PORTABLE
TRIGGERED SCOPE**

The only one with vert. and horiz. calibration! A solid state performer with DC to 7MHz bandwidth. Has 5X mag. and 0.2μsec. to 50ms/div (15 ranges) sweep time. With easy-to-use horiz. panel. An unmatched leader. \$374.95



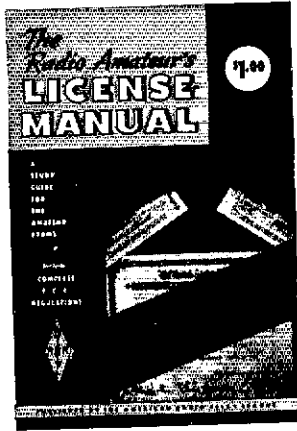
**LDM-810
GRID DIP METER**

Determine resonant frequency of LC networks with this versatile, AC operated meter. Has 6 coils covering 2-250MHz range; and modulation monitor earphone. Use to align receivers, adjust wave traps, find parasitic oscillations. \$54.95

The more you see... the more you believe... the more you save

Write for details. See your distributor.

Leader Instruments Corp. 37-27 Twenty-Seventh St. L.I.C., N.Y. 11101 (212) 729-7401



QUICK QUIZ:

IF I operate from a foreign country using my call sign as portable, do I have to notify the FCC?

I live in Florida; how much power can I run on 160 meters?

What do I have to know to pass the Extra class exam?

ANSWERS:

You'll find them all in the 67th Edition of the License Manual!

\$1.00

POSTPAID

The AMERICAN RADIO RELAY LEAGUE INC.
NEWINGTON, CONN. 06111

W0SWG spent the remaining portion of the summer in Lincoln. A good many of the clubs participated in FD. Traffic: (June) WA0SCP 98, W0CAU 86, W0L0D 75, W0HTA 48, W0H0P 25, W0T0D 24, W0M0W 22, K0FRU 19, WA0H0Q 12, WA0GHZ 10, K0AAL 10, W0FLO 9, W0DMY 8, WA0PCC 8, K0D0G 6, W0NIK 6, W0VYX 6, WA0LLI 5, K0HNT 4, WA0JKN 4, W0LWS 4, W0EWF 3, W0B0GAK 3, W0DJO 2, K0JFN 2, WA0LOY 2, WA0OQX 2, W0YFR 2, WA0JUF 1, W0LCE 1, K0SFA 1. (May) WA0BOK 16.

NEW ENGLAND DIVISION

CONNECTICUT - SCM, John McNassar, W1GVT - SEC: W1HHR. RM: K1EIR. PAM: K1YGS. VHF PAM: K1SXF.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900 Dy	60	558	290
		2200			
CPN	3965	1800 M-S	30	617	167
		1000 Su			
VHF 2	145.90	2200 M-S	22	105	40
VHF 6	50.6	2100 M-S	22	130	11

High QNI: CN - WA1GFH, W1CTI, K1EIR, W1KV and WA1GGN. CPN - W1BFY, W1GVT, WA1OPB, K1SXF and K1YGS. SEC W1HHR back on CPN and very active with AREC work. Now is the time to line him up for one of your coming meetings. Dir. W1OV would appreciate your club calendar of events when ready. Keep him informed of your activity. Hamden ARC held auction of WITNG estate. Past Granby HSRC officers: WN1QMJ, pres., WN1OML, vice-pres. ICRC repeater 28/88, WA1KHK officers: W1WHO, pres.; K1GZU, vice-pres.; WA1IHE, secy.; K1YGS, treas.; W1SL, tech. chmn. Thanks to all who do the work of keeping the many repeaters in the area on the air - if you use them, please support them - join at least one Repeater Club! W1WET and W1ENL active with cw classes and Novice exams. W1BBD vacationed in Maine. Congratulations to new Novices WN1QMJ, WN1OML, WN1QNH, WN1QNE and WN1OMI. Field Day provided activity for many clubs and individuals - thank s for the many FD messages and congratulations to those who observed "clear frequencies" and elbow room for emergency/disaster traffic. Monitor ECARS on 7255 when you can. Now is the time to plan winter activities. Don't overlook the many new and up-dated ARRL Handbooks and Manuals to put the answers at your fingertips! Traffic: WA1KVI 123, WA1GFH 96, K1SXF 83, WA1GGN 79, W1AW 67, W1MPW 64, W1KV 60, W1GVT 57, W1CTI 44, K1YGS 42, WA1NYU 39, WA1NES 35, WA1OPG 31, WA1QLS 27, WA1NLD 26, W1RML 25, WA1ENJ 20, W1QV 11, WA1OYS 9, WA1NCK 7, W1DGL/1 6, W1CUH 4, W1WEE 3.

EASTERN MASSACHUSETTS - SCM, Frank L. Baker, W1ALP - SEC W1AOG received reports from ECs: W1s LE, BAB, K1s TMP, NFW, DZG, ZUP, WA1DXL. I received many Field Day messages from clubs and groups. WN1QJW/3 now in the Navy in Bethesda, MD. W1ZSX had an eye operation. WA1QMY-QMZ are the sons of W1SR. W1KRM, ex-IRC-ex-1A1Z are Silent Keys. W1RTZ/1 in Norton is on 75. W1BVG joined repeater assn. W1NF keeps sked with W3OY. W1NCK is moving to Sun City, Calif. WA1PVL is ex-ICFM. W1UIR moving to Maine. W1IB on 2. WN1QKX is a YL in Methuen. W1AKC back from Fla. W1DMS home from hospital and on 2. WA1GZQ getting married and his YL studying for a Novice ticket. W1NRT is on 80-10 and in our FMN. WA1OWQ has a 75-A3 receiver. K1EPL handled some traffic for Hyaamis from the N.Y. flood area. W1EIJ worked VP5RS on 6. says he hears VE1ASB on 6. W1NF went to NYC for vacation. K1BUE/W1ZQM went to Europe for 3 weeks. WA1DFT has 500 counties on 6. WA1KZE and WA1NRV have worked 220 countries. WA1IFE worked WB4s on 6. W1WLZ and WA1MPZ showed pictures of members shacks at the Massanut ARA. W1KGU is on 2 fm in his truck, also W1ECK. K1DYA now in RI. New officers of Framingham RC: WA1NLG, pres.; WA1HHT, vice-pres.; WA1LKI, secy.; Fred Schweitzer, treas.; WA1GL, dir. WA1DMC has his MA in Economics from N.U. CD group have 2 drill periods a week. W1NJI passed the Bar exams and has mobile and renewed as ORS. OPS. Endorsements: K1HHN, WA1DMC as ECs; K1BJZ as OBS; WA1KZF as OPS, ORS; K1BUE as ORS; WA1KJF as OPS. Capeway RC met at W1GPL's QTH. WA1PJM has his General. K1HRV has an eleven-element beam. WA1OJM and EOT have new fm gear. W1GGS/4 mobile on 15 in 1fa. W1GDP has his Advance. WA1HHH is new pres. of Whitman RC. New calls: W1N1s QLW, QLT, QLM, QKX, QLD, QLC, QJL, QJK, QKG, QKIL, QKF, QJS, QJU, QIO, QKD, QKJ, QJW, QJT; WA1s OKK, OKC, QJZ, QKQ, QLO, QKP, QKU, QLJ, QLK, QLI, OMA. WA1MYK on a 6-week trip across USA and Canada. WA1LXU is on 220. W1OJM made BPL and on the Cape for the summer.

Net	Freq.	Time/Days	QNI	QTC	Mgr.
EMN	3660	1900/2200 Dy	378	223	W1QYY

NIXIE \$2.50

TUBE SALE

Burroughs B7971, 0-to-9, A-to-Z, 2 1/2" high characters, 170V.

ALLEN BRADLEY'S

'MICRO-POTS'

Type 4, 1 1/2" dia., 1 1/2" high, Mounts in 1/4" hole, with shaft, 100V, immersion-proof high line

2 for \$1

Ohms	2.5K	25K
75	5.0K	75.0K
100	7.5K	100.0K
500	10.0K	5 Meg
2.0K	20.0K	

We stock Locknut, Bushing & Screwdriver types at same low prices.

INTEGRATED CIRCUIT SOCKETS

Buy Any 3 - Take 10%	
14-Pin, dual in line	\$.45
18-Pin, dual in line	.50
TO-5, 8 or 10 pins	.20

Poly Paks Will Never Be Undersold!

Type	Sale
SN7400	\$.24
SN7401	.25
SN7402	.25
SN7403	.25
SN7404	.25
SN7405	.27
SN7406	.49
SN7407	.49
SN7408	.29
SN7409	.29
SN7410	.29
SN7411	.27
SN7412	.25
SN7413	.25
SN7416	.49
SN7417	.49
SN7420	.49
SN7421	.25
SN7422	.25
SN7426	.32
SN7430	.28
SN7437	.53
SN7438	.33
SN7440	.25
SN7441	.25
SN7442	1.21
SN7443	1.21
SN7444	1.21
SN7446	1.61
SN7448	1.17
SN7447	1.10
SN7448	1.37

* Factory Marked!
Factory Guaranteed!

NEW FOR 1973!

Never before offered at this price! You've seen them at \$175, \$140, etc. but now at a price calculator users can afford. **HIGH-DIGIT** fluorescent display has 10-digit capacity. Add! Subtract! Multiply! and Divide! in chain or mixed calculations. Includes **MINDS** sign showing negative credit balance, **OVERFLOW** indicator 0 to the right power, **CONSTANT** (K) MEMORY switch. Flipping decimal at 2, 3, 4, 5 decimal points as required. (CE) key clears calculator of last entry error. Automatic loading and trailing zero suppression. LSI (Large Scale Integration) equivalent to more than 8,000 discrete transistors. Calculation speed adds and subtracts 10,000ths of a second. Keyed **REED** SWITCH assembly for extensive trouble-free operation. Separate power switch. Removable 115 VAC line cord. Power 110-120 VAC 60-60 cycles. Wt. 3 lbs. Handsome black inlaid cabinet with silver trim, sizes 9 1/2" x 5 1/2" x 3 1/2". Complete with easy-to-understand booklet. **THE ONLY FACTORY GUARANTEED CALCULATOR BY A MAIL ORDER ADVERTISER. Gift Packed!**

SILICON TUBES

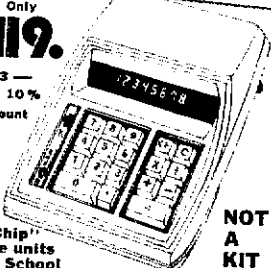
504	\$1.49
584	3.95
566	7.95

Uses single Texas Instrument "Chip" Features found in more expensive units For Home, Office, Shop, Student, School

The lowest price digital clock kit (with cabinet) as far as you can see in U.S.A. Scientific Devices' engineering dept. took extra pains in designing to give you the finest digital clock kit using the latest techniques in an easy-to-understand booklet. The cabinet-making section gives it the "interior decorating" touch as well. Walnut laminated inlaid front cabinet, with gold-line front. Tapered legs for easy viewing. Large G.E. 7-segment fluorescent "blue-green" poloroid tubes for the latest, easy-viewing. FEATURES: a display tubes, completely etched and thru plated circuit board, all IC's. Includes BCD outputs for use with timer options, may be wired for 12 or 24 hour display. Indicates HOURS, MINUTES, SECONDS. 115 VAC 60 cy. Gift packed, Wt. 3 lbs.

ELECTRONIC CALCULATOR COMPLETELY WIRED

Only \$119.
Buy 3 - Take 10% Discount



NOT A KIT

DIGITAL CLOCK KIT

By Scientific Devices



Only \$57. WITH CASE Buy 3 - Take 10% off * Smaller & more compact * 8" x 5 1/2" x 3" case

LOWEST PRICES ON TTL IC'S

Buy 3 - Take 10% Discount
No Gimmicks On Pricing, Deliveries, or Quality! We're "The Only IC Advertiser" with MONEY BACK GUARANTEE!

Buy 100 - Take 20%			
SN7450	.24	SN74107	.49
SN7451	.24	SN74121	.50
SN7453	.24	SN74122	.67
SN7454	.24	SN74123	1.06
SN7460	.24	SN74141	1.55
SN7470	.40	SN74145	1.33
SN7472	.36	SN74150	1.33
SN7473	.45	SN74151	1.33
SN7474	.45	SN74152	1.55
SN7475	.76	SN74154	2.30
SN7476	.49	SN74155	1.39
SN7480	.72	SN74157	1.39
SN7481	1.80	SN74158	1.48
SN7482	.99	SN74160	1.79
SN7483	1.85	SN74161	1.79
SN7486	.55	SN74162	1.79
SN7490	.76	SN74163	1.13
SN7491	1.35	SN74180	1.39
SN7492	.76	SN74182	1.13
SN7494	1.09	SN74181	1.87
SN7495	1.09	SN74182	1.13
SN7496	1.09	SN74183	1.87
SN74100	1.44	SN74192	1.87

LINEAR OP Amps

Type	Description	Price
531	Hi slew rate op-amp	3.58
532	Micro power 709	3.58
526	FET input op amp	4.50
540	709W 723 voltage reg.	2.04
550	Precision 723 voltage reg.	1.17
555	Timer 2, Seconds to 1 hour	1.25
560	Phase lock loops (A)	3.25
561	Phase lock loops (A)	3.25
562	Phase lock loops (A)	3.25
563	Phase lock loops (A)	3.25
564	Function generator (A)	3.25
566	Phase lock loops (A)	3.25
567	Tone decoder (A)	3.25
574	741 (mini DIP)	1.00
588	Four quadrant multiplier	3.10
702C	Hi-gain, DC amp, TO-8	1.00
703C	RF-IF, amp, 14 ckt, TO-5	2 for 1.00
708C	Operational amp (A)	.39
742C	Differential amp (A)	1.00
711C	Dual diff. comp (A)	.39
723C	Voltage regulator (A)	.39
741C	Frequency compensator 709	.95
747C	Dual 741C, TO-5	1.00
748C	Freq. adj. 741C (A)	.79
709-709	Dual 709C (DIP)	1.00
739-739	Dual stereo preamp	1.00
741-741	Dual 741C (mini DIP)	1.00
749-749	Dual channel amp	1.98

Buy Any 3 PAKS - Take 10% Discount

'HAM' UHF 400 MC HIGH POWER TRANSISTORS

Only \$3.95
3 for \$10.

By RCA or equal 2N3632, NPN, 28 watts, 3 amps. TO-60 case, with stud mtg. VCEV max 65.

ALPHA-NUMERIC 7-SEG. READOUTS 2.50

Fluorescent Blue-Green 0-9 numerals, decimals and letters.
MINI-7* 1.75 x 1.7" .360 x .570" 1.5V AC/DC 42 mls | Socket - 50c
SLIM-7* 1.6" x .375" .40 x .20" 1.5V AC/DC 42 mls | Socket - 50c

*Compatible to 7-segment driver IC's.

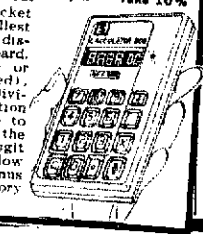
Dollar Stretchers

- 3 - "LEDS", visible, micro-miniature, axial leads \$1
- 2 - "LEDS", invisible, micro-miniature, TO-18 \$1
- 2 - "LEDS", visible, jumbo, TO-18 \$1
- 1 - "LED", invisible, parabolic reflector, RCA \$1
- 2 - PHOTO TRANSISTOR, with darlington amp after, lens \$1
- 4 - PHOTO CELLS, with darlington amp, 2N5777, GE \$1
- 5 - SOLAR CELLS, round, sun, rect., sun, rect., 2N5777 \$1
- 2 - SILICON SENSORS, TEXAS, RCA, Matsushita, visible \$1

8-DIGIT ELECTRONIC POCKET CALCULATOR

Completely wired, ready to use! Not a kit - hours saved! Most economical and advanced battery operated pocket calculator under \$100. Makes use of the smallest single chip LSI (Large Scale Integration), LED display technology and a unique snap-action keyboard. Recharged with the AC power charger after use or Performs Addition, Subtraction, Multiplication (included), Division, as well as true "credit" balance up to 10 digits. For added convenience in the right digit to decimal point is fixed to two places in the right digit beyond the eight digits and negative result (minus sign). Includes simplified instruction booklet. Factory guarantee. Gift packed. Size: 3 1/4" x 5 1/2" x 1 1/2".

99.95 LED Display



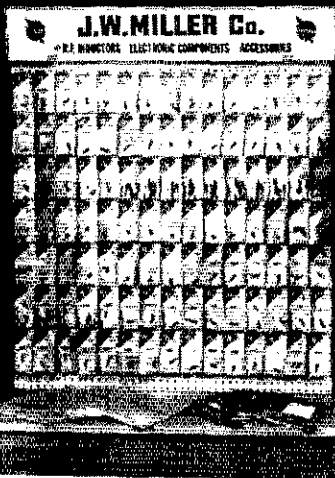
35 WATT AUDIO AMPLIFIER BASIC \$3.33

For Class AB use. Basic includes: Signetics 540 RD transistor high power driver TO-5 "IC", with a pair of complementary 45-watt plastic transistors, i.e. 2N659H npn and 2N6109 pnp. With schematics, printed circuit and parts board layouts.

Terms: add postage, cod's 25%. Retail: net 30. Phone Orders: Wakefield, Mass. (617) 245-3820. Retail: 211 Albion St., Wakefield, Mass. C.O.D.'S MAY BE PHONED IN.

POLY PAKS

P.O. BOX 942M LYNNFIELD, MASS. 01940



At Your Distributor Now*
Complete RF Inductor Coverage

*If your distributor's Miller Merchandiser hasn't arrived yet, ask him to expedite it with a call to (213) 537-5200.



Write for 80-page full line Catalog No. 72.

J.W. MILLER COMPANY

19070 Reyes Ave. ■ P.O. Box 5825 ■ Compton, Ca. 90224

FM2MN	145.8	1900 Dy	126	83	WA1QWO
NEEPEN	3945	0830 Su	84	5	K1EPL
6MCBN(May)	50.85	1930 M-F	31		K1GKE

W1AOG on a trip to New Brunswick. To the new hams listed above, let us hear from you on the report card sent to you. Watch the expiration date of your license fellows, five years goes fast. We hope WA1EYF will be back on the air soon. Traffic: (June) W1OJM 507, W1PEX 235, WA1QW0 97, W1EMG 67, WA1MYK 43, WA1MWN 39, WA1EYF 36, WA1NRT 30, W1AOG 20, W1UX 17, WA1IFE 11, K1UAF 11, W1MKN 3, K1JNO 4, W1PL 3. (May) WA1MWN 42, K1PRB 30.

MAINE - SCM, Peter E. Sterling, K1TEV - SEC: K1CLF. PAM: WA1PEN. RM: W1BJG. K1QMR, W1UE and K1VHH are all home from the hospital recovering nicely. W1DEO has been working DX with his new 5 QRP rig aboard his boat. WA4GRM is vacationing at Wiscasset for the summer. WA1PHE has been transferred to Ind. New officers for the Portland Amateur Wireless Assn. are WA1KVY, pres.; K1MTJ, vice-pres.; W1N1QH, secy.; W1BTR, treas.; K1GAX, chief op.; K1TEV, asst. op. New hams in Maine are W1N1QK, W1N1QV. Congratulations fellows, I am still looking for news; any little tidbits are welcome. The Loring Amateur Radio Club finally got their constitution approved and should be in high gear soon. They also have a repeater that will be going up soon. W1CTR received an OOTC certificate for placing first in Maine in the May 1972 QSO contest. K4EN, ex-K1ACT was in Maine for a short visit.

NEW HAMPSHIRE - SCM, Robert C. Mitchell, W1SWX - SEC: K1RSC. RM: W1UBG. Reports were received from WA1JSD, WA1LJP and W7TML/L1 for their Field Day activities. WA1MXT has new Swan 600T/600R combination. Welcome to new hams W1N1QL, W1N1QIS, W1N1QT, WA1QJE, W1N1QJN, WA1QKL and WA1QLY. Thanks to Eastern Mass. SCM WA1ALP for sending us the new ham listings. K2RZV is now WIATU, W1ALL now W1GMG and WA2QKV now WA1OUB. WA1GCE is active again on NHVT Net. RM W1UBG reports 98 check-ins and 122 traffic for this net. WA1FSZ has been working many other districts on 6 meters. This report originates from Indianapolis. Traffic: W1UBG 100, WA1MXT 44, WA1GCE 30, K1BCS 15, WA1PTF 10, WA1JSD 2, W1SWX 2.

RHODE ISLAND - SCM, John E. Johnson, K1AAV - SEC: W1YNE. RM: W1YKQ. PAM: W1TXL. VHF PAM: K1TPK. R1SPN reports 30 secQNI, 50 traffic. The radio clubs reported a very successful FD operation. The Providence R.C. reported to the SCM that they were in the Foster section of R.I. The Newport R.C. reported in the field at Newport, and the W1AQ Club was at North Central Airport. W1YNE has his new SB-200 in service and has a new HR-212 ready to go on the air. W1N1POJ is located in Warren and has been handling traffic on Novice Nets. Several of the R.I. hams were active in the recent flood emergency in Penna. and New York. Messages were sent asking locations of families and answers received by ham radio. Several clubs are active receiving new members for the fall season; why not visit some of the clubs and help them this coming year. Several will start Advance classes this fall and some will be having Novice classes. Traffic: W1YNE 247, W1N1POJ 85, K1QFD 19, WA1HBW 4.

VERMONT SCM, James H. Viele, W1BRG

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
V1PO	3909	2100 Su	72	11	W1BOB
Carrier	3945	1300 M-S	460	22	W1QWP
V1SR	3909	2200 M-S	362	56	K1YGI
Green Mt.	3932	2130 M-S	*		W1JLZ
NHVT	3685	2300 Dy	122	130	W1UBG

*No report. Welcome new amateur WA1QJY. Congrats to K1OXD on making PSHR and K1US for doctorate in E.E. New officers of Carrier Net: W1QWP, pres. and Net Mgr.; W1JLZ, vice-pres. and treas.; K1OGX, secy.; WA2FAN, asst. secy. Carrier Net trying out 3952 Mhz temporarily. Vt. nets get-together at Eureka Barn on June 11 had big turnout. K1NXC moved back to So. Burlington and out of military. K1RMI going for General class and DC bands. Traffic: K1BOB 81, WA2COO/1 122, K1OXD 78, K1YGI 31.

WESTERN MASSACHUSETTS - SCM, Perry C. Noble, W1BVR - SEC: WA1DNB. CW RM: W1DVV. UHF/VHF: PAM: W1KZS. The SEC reports that WMEN held 4 sessions with total QNI of 39. New members of AREC: W1YBT and W1N1QHR. WA1MFB and WA1LJP have been endorsed as ECs. The RM reports that WMN has QNI of 184 with a total of 20 stations and handled 111 messages. Top five in attendance were: W1BVR and W1TM tied for first place followed by W1DVV, WA1LNF and W1ZPB. The UHF/VHF PAM reports the BCAREC 2-meter net held 3 sessions with 8 to 12 QN

"CHOICE OF THE DX KINGS"



All models available "WIDE-SPACED"
2 ELEMENT—3 BAND KIT SPECIAL

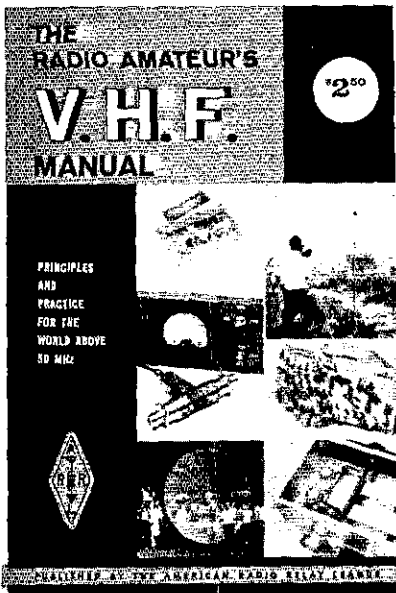
- 8 Fiberglass Arms—skyblue color
 - 2 End Spiders (1 pc. castings)
 - 1 Boom/Mast Coupler—h.d. aluminum
 - 16 Wraplock Spreader Arm Clamps
 - 1 CUBEX QUAD Instruction Manual
- ONLY **\$69.95**

2-3 or more element Quads available
 Write for FREE BROCHURE and Price List

CUBEX COMPANY

P.O. Box 732, Altadena, California 91001
 Phone: (213) 798-8106

YOU CAN'T SAY "QUAD" BETTER THAN "CUBEX"



SEEN THE NEW VHF MANUAL?

Ed Tilton, W1HDQ, has done a great job in revising this standard manual of vhf communication! The Nuvistor, which dominated the receiving chapter in the second edition, has made way for the MOSFET and the JFET. Transistors are also used in some of the QRP rigs, but you will still find the venerable 829B, 4CX250B and 2C39. Fm is covered extensively in the new *Third Edition*; three chapters cover everything from duplexers to tunable receivers. These changes and additions are only a small part of the new material in the latest edition of *The Radio Amateur's VHF Manual*. Pick up a copy today!

Available at your dealer's or post-paid from ARRL. \$2.50 in U.S.A. \$3.00 elsewhere.

The **AMERICAN RADIO
RELAY LEAGUE, INC.**

NEWINGTON, CONN., U.S.A. 06111

each session. K1VPS, WB2KHH and visitor KL7HFX, as a result of a call for aid from Wilkes-Barre, Pa., went there several days in order to help with 2-meter fm. FB. WIZPB worked 2M2AFZ and is active on RTTY as well as cw and ssb. FD operators in Windsor were WITM, W1WF, W1DKU, W1FLX, W1GTO, W1UUK and WA1MJ. Mount Wachusett had 8 operators during FD. Repeater K1FFK on Mt. Greylock is handling stations in Syracuse, Boston, the Cape, NYC area, Penna., as well as VT and NH. From the Mt. Tom Repeater Assn.: KGR repeater has added a private line encoder (PL) for the new remote control autolog system. New members are W1KK, W1EFW and K1WOM. NOBARC reports new members W1FBT, W1FBK, K2PCJ, WA2CSQ and WA1DSY. (Total membership now 81). Traffic: (June) WITM 71, W1BVR 65, W1DVV 58, W1ZPB 46, WA1LPJ 23, W1KZS 16, W1STR 8, WA1MJE 2. (May) W1KZS 3.

NORTHWESTERN DIVISION

ALASKA - SCM, Kenneth R. Klopff, KL7EVO - KL7HLM has been toting Argonaut on his fish and game biologizing this season and now and then has even been able to squeeze in some operating time. His XYL's dad, K4FW, helped to put up a beam and tower at his Anchorage QTH. KL7IS has real commercial power at his new QTH near Fairbanks and should be on the air now and then during lulls in building. WL7HFL has a Ten Tech which he operates from his building site near College on 3735 and is looking for contacts about 2100 local time. Danny Osborne, the mountain climber, has received a brand new Ten Tech in the mail and may yet learn the code and get his license. All things are possible. Sourdough Net 3915 0400Z week days. Code practice 3735 0500Z 1ThSat. Alaska-Pacific Net 14292 1700Z (or thereabouts) daily. Traffic: KL7HKH 2.

IDAHO - SCM, Donald A. Crisp, W7ZNN - W7GHT, WA7BDD, W7IUO and K7NHV are interested in organizing an Idaho section cw net. If you are interested in participating in such a net, contact one of the above or your SCM. Plans are being made for an Idaho QSO party later this year. K7NHV recently moved to Pocatello from Mich. and was given an ORS appointment. The Kootenai Club (Coeur d'Alene) operated Field Day stations from the top of Copper Mountain. Operators were K7UBC, WA7BDD, WN7PDV, WA7BTA and WA7OHJ. The club has plans to set up a station at the Kootenai County Fair. K7ZQG is moving from Montpelier to Idaho Falls.

W7IUO has prepared 8 different propagation predictions from Southeast Idaho. FARM Net reports 30 sessions, 568 check-ins, 97 traffic. Traffic: W7GHT 237, WA7BDD 58, W7ZNN 17.

MONTANA - SCM, Harry A. Roylance, W7RZY - Asst. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA7IZR. Had some good activity over Field Day. WA7IZR has his 2-meter mobile working and looking for contacts in the Livingston area. W7MBV and W7RZY worked on 2 from Emigrant to MBV's QTH, 6-meter fm has been real good this month. Mont. Traffic Net had 832 check-ins, 75 formal traffic with 22 sessions. W7EKB has been nominated for RN7 manager. WA7HAG is busy traveling in his camper and taking in hamfests and visiting hams. Yellowstone Radio Club has published a ham directory for the Billings area. One can be obtained from K7VCA. Evening of June 8 the 2-meter repeaters were jammed with skip from the S area. Several in the state worked the stations on 76 simplex. Several picnics were planned for this summer and hope to have seen you there. Traffic: WA7JQS 183, WA7IZR 42, WA7OBH 20, W7LBK 19.

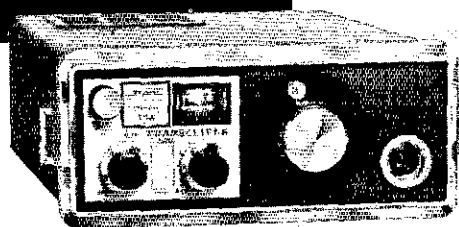
OREGON - SCM, Dale T. Justice, K7WWR - SEC: W7HLF. RM: K7GGQ. PAM: K7RQZ. WA7GTX reports the AREC Net had sessions 29, traffic 8, contacts 50, bulletins 13, check-ins 450, maximum number of counties 14. The Washington County AREC (WA7EUQ EC) put a float depicting early radio into the Hillsboro Happy Days Parade. The Rogue River Valley RC had a demonstration of SSTV by W7HLF. WA7SYY in La Grande has a new Triband beam and a 40-meter dipole above. WA7OYC is mobile with a Tempo 1. K7OHM recovered 10 db with new coax. The first edition of the HAGER BEAVER came out for RSN members. K7RQZ really did get her Extra ticket. Congratulations! Traffic: (June) K7RQZ 169, K7OUF 152, K7NTS 143, W7HLF 28, W7IWN 15, W7LT 5, W7MLJ 4, K7WWR 3, K7QFG 1. (May) K7RQZ 106. (Apr.) K7RQZ 125.

WASHINGTON - SCM, Arthur Henning, W7PI - SEC: W7UWT. RM: W7GYF. PAMs: W7GVC, W7MCW, VHF PAMs: K7BBO, K7LRD. New appointments: K7VNI as EC Whatcom County. WA7KNW as ORS. WA7LQO, K7VNI as OPSs. W7YGU as OBS. WA7LMO as OO. K7VNI as OVS. Regret to report that W7FXD and W7EOP became Silent Keys.

Net	Freq.	Time(Z)	QNI	QTC	Sess.	Mgr.
WSN	3590	0145	344	71	30	W7GYE

DRAKE TR-22

Versatility plus!... in a 2 Meter FM Transceiver



Over-the-shoulder, mobile, or at home

Completely transistorized, compact, portable. Capacity for 6 channels. Built-in telescoping antenna, and connector for external antenna. Use barefoot or with accessory amplifier. External 12 VDC or internal ni-cad batteries, built-in 120 VAC battery charger.

Complete with: Dynamic Mike, Q-T-S Carrying Case, 120 VAC and 12 VDC Cords, Speaker/Headphone Plug and 10 Ni-Cad Batteries.

\$199.95 Amateur Net

AA-22 Amplifier \$149.95
MMK-22 Mobile Mount \$9.95
BBLT-144D Hustler Ant. \$27.95

GENERAL: • Freq. coverage: 144-148 MHz • 6 channels, 3 supplied • Push-to-talk Xmit • DC Drain: Rcv, 45 mA; Xmit, 450 mA • Size: 5-3/8" x 2-5/16" x 7-1/8", 3-3/4 lbs.

RECEIVER: • Transistorized crystal-controlled superhet • 1st IF: 10.7 MHz, 2nd IF: 455 kHz • Ant. Input Imped: 50 ohms • Sensitivity: 1 µV or less/20 dB S+N/N • Audio Output: 0.7 W • Built-in speaker.

TRANSMITTER • RF Output over 1 W • Freq. Dev. adj. to 15 kHz max., factory set to 5 kHz.

R. L. DRAKE COMPANY



DRAKE

540 Richard St., Miamisburg, Ohio 45342
Phone: (513) 866-2421 • Telex: 288-017

THE BIG SIGNAL

"W2AU" BALUN \$12.95



IT'S WHAT'S INSIDE THAT COUNTS!

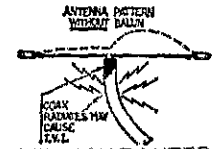
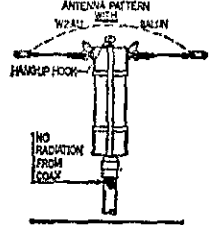
1. HANDLES FULL KW INPUT—THEN SOME. Broad-Banded 3 to 40 Mc.
2. HELPS TVI PROBLEMS By Reducing Coax Line Radiation
3. NOW ALL STAINLESS STEEL HARDWARE. SO239 Double Silver Plated
4. IMPROVES F/B RATIO By Reducing Coax Line Pick-Up
5. REPLACES CENTER INSULATOR. Withstands Antenna Pull of Over 600 Lbs.
6. BUILT-IN LIGHTNING ARRESTER. Protects Balun — Could Also Save Your Valuable Gear
7. BUILT-IN HANG-UP HOOK. Ideal For Inverted Vees, Multi-Band Antennas, Dipoles, Beam and Quads

NOW BEING USED EXTENSIVELY BY ALL BRANCHES OF THE U.S. ARMED FORCES, FAA, RCA, CIA, CANADIAN DEFENSE DEPT. PLUS THOUSANDS OF HAMS THE WORLD OVER

BIG SIGNALS DON'T JUST HAPPEN—GIVE YOUR ANTENNA A BREAK

Comes in 2 models. 1:1 matches 50 or 75 ohm unbalanced (coax line) to 50 or 75 ohm balanced load. 4:1 model matches 50 or 75 ohm unbalanced (coax line) to 200 or 300 ohm balanced load.

AVAILABLE AT ALL LEADING DEALERS. IF NOT, ORDER DIRECT



We'll GUARANTEE no other balun, at any price, has all these features.

UNADILLA RADIATION PRODUCTS

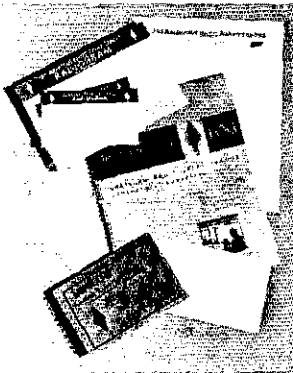
MFRS. OF BALUNS
Tel: 607-369-2985

RD 1

UNADILLA, N.Y. 13849

For

The Busy Operating Season Ahead . . .



Record keeping can often be tedious. But not with the *ARRL Log Book*. Fully ruled with legible headings it helps make compliance with FCC rules a pleasure. Per book . . . **75¢**

Mobile and portable operational needs are met by the pocket-size log book, the *Minitog*. Designed for utmost convenience and ease. . . . **50¢**

First impressions are important. Whether you handle ten or a hundred messages you want to present the addressee with a neat looking radiogram . . . and you can do this by using the *official radiogram form*. 70 blanks per pad. **35¢**

If you like to correspond with fellow hams you will find the *ARRL membership stationery* ideal. Adds that final touch to your letter. 100 sheets. . . . **\$1.75**

and they are available postpaid from . . .

The American Radio Relay League

NEWINGTON, CONN. 06111

2 meter FM starts with the



AVCOM FM-201 Transmitter Module

ONLY

\$4995

COMPLETE —
NOT A KIT!

90-Day Warranty!

- Repeater Entry . . . just add ant., mike, Xtal, 12-16 volts D.C.
- Transceiver . . . Half Cost! Add police band rec. Rig can cost under \$100.
- Walkie-Talkie Compactness . . . glass epoxy PC board only 3" x 3 1/2"!
- Power Input: 1 Watt D.C. to final.

ORDER
TODAY!

AVCOM, Inc.

P. O. Box 29153
Columbus, Ohio 43229

PL-100 CTCSS ENCODER \$24.95
LM-210 10-W POWER Amplifier Module \$29.95
TN-421 TONE BURST Module \$19.95
1 3/4" — 1 1/2" — 3/4"

NSN	3700	0200	272	112	30	WA7OCV
NTN	3970	1830	1065	118	30	K7VAS
NWSSB	3945	0130	858	44	30	K7KPC
AREC	3930	1700	Su	37	5	4 W7UWT

SEC W7UWT reports AREC members total 291 with 8 active local emergency nets. Snohomish AREC group participated in Rapid City disaster communications. Field Day week end showed tremendous activity with 15 groups reporting to SCM and 6 to SEC. WA7LQO is recuperating from FD workout. Wash. State Amateur Radio Week proclaimed by Gov. Evans for Sept. 10-17 with Washington State QSO party sponsored by Boeing on week end Sept. 16, 17. Puget Sound Council of Radio Clubs will issue certificates for contacts made with Wash. stations during the week. Walla Walla Hamfest is Sept. 23 and 24. Skagit Salmon Bar-B-Que is Sept. 9 at Oak Harbor City Park. Don't miss these events. K7CAL in May made a "first" by copying L.A. on 6-meter facsimile — a 2-way "A-4" QSO being planned. Mike and Key Club provided communications for Lake Sammamish Slough Water Ski Races. WA7KNW handled traffic in Omak and Rapid City Floods. W7BQ retiring after 10 years as RN7 Mgr. still is active and has erected new Triband beam. W7BUN's number one harmonic now WNT1VE. New General is WA7RWK. Traffic: (June) W7BA 1018, K7VAS 312, W7PI 163, W7KZ 125, W7BQ 116, WA7QY1 109, WA7OCV 76, K7OZA 65, W7AFS 46, K7OXL 45, W7JEY 42, W7MCW 40, W7GYF 39, W7AXT 37, W7IEU 34, W7BUN 32, WA7KNW 22, WA7HCL 20, W7OCV 14, WA7LMO 10, W7ZHZ 9, WA7EDQ 8, WA7GVB 6, WA7LQV 4, K7BBO 3, K7VNI 3. (May) W7JEY 42, W7OCV 9.

PACIFIC DIVISION

EAST BAY — SCM, Paul J. Parker, WB6DHH — WA6CXX is busily working on new cubical quad antenna, and is holding schedules with his Novice mother and brother. WA6IVB had very successful FD with WA6LKB, WA6FDP and WN6NXT participating signing WA6LKB/6. WB6VEW helped the Oakland Radio Club on 40 cw for Field Day. All amateurs are urged to have card on file at QSL Bureau. For address of nearest bureau check QST. W6ITD had fun with W6MAR operating Field Day this year. Congrats to WA6JUD for placing in the top ten on VHF SS. East Bay Radio Club had good time on Field Day. Listen for many new Novices in this section and try to give them a hand if possible. Traffic: WB6VEW 22, WA6IVB 1.

HAWAII — SCM, Lee R. Wical, KH6BZF — Asst. SEC: KH6BZF, RM: KH6AD. PAM; KH6GIN, VHF PAM: KH6GRU, QSL Mgr.: KH6DQ, SRC: KH6FOX. I regret to report the death of former district engineer-in-charge FCC and Honolulu amateur KH6SL. In order to observe and preserve the use of FM-VHF frequencies the below listing is presented.

- 146.04/64, Open, Possible Leeward rpt.
- 146.10/70, AFSS RTTY Rptr/KH6HOQ, Planned.
- 146.16/76, Manoa Rptr/ KH6FOX, Waialua Rptr/KH6EQL, Hilo Rptr/KH6EON, Regional rpt.
- 146.20/80, Tripler Hospital Rptr/KH6EOQ, Unique freqs incompatible with Nationwide Standard.
- 146.22/82, Only open on non-interference basis with KH6EOQ. However, if separated they could coexist. Nationwide-Standard
- 146.34/94, Mt. Haleakala, Maui-Rptr/KH6LQK Linked with Diamond Head Rptr.
- 146.40/40, Open.
- 146.43/43, Open
- 146.46/46, Honolulu DX Club, DX tip-off.
- 146.49/49, Open
- 146.52/52, Leeward Club/General Use Oahu.
- 146.55/55, Open
- 146.58/58, Open
- 449.3/444.3, Tripler Hospital/KH6EOQ, Forthcoming.

The above listing, except KH6EOQ rpt, conforms with the Tex: VHF-FM Society standard 2-meter plan as presented to the ARRL VHF Repeater Advisory Committee (VRAC). See pgs. 64-68 Ma '72 QST which is germane and especially welcomed. Noel Thomson is our regional VHF-FM section repeater coordinator. Phoi him at 946-9454, home or office 944-8790. The Emergency AR KH6GG, KH6GFG and company moved the 146.20/80 frequent out of Diamond Head to Tripler General Hospital. Thus a capable operation of Diamond Head 146.28/88 linked with M Haleakala's 146.34/94. Kudos guys. KH6GKD has a new Tri-tower. KH6GMP reports he replaced his '37 crank-up with a 60-SS Rohm tower. He also has a new Yaesu FL-2500. KH6HGV has new Yaesu FT-2F. KH6BYO is on with a new Collins S/LR KH6GLU reports some big DX plans brewing. KH6FSC is back for his tour in HI-9-Land. KH6HLK reports a new Hy-Gain 204-I antenna and a homebrew KW linear to go with that SB-102. KH6I has been quite active. He's applied for AREC. KH6BZF attempting 220 Tropo with the West Coast gang WB6NMT a company. Keep your reports coming. This is your column.

CRYSTAL BARGAINS

Depend on . . .

We supply crystals from 16 KHz to 100 MHz in many types of holders. Over 8 million crystals in stock. We manufacture crystals for almost all model SCANNERS, MONITORS, 2-WAY RADIO, REPEATERS, ETC. Inquire about special quantity prices. Order direct with check or money order.

For first class mail add 15¢ per crystal...for airmail add 20¢ ea.

JAN

DIVISION OF BOB
WHAN & SON
ELECTRONICS, INC.

2400 Crystal Dr.
Fort Myers
Florida 33901
(813) 936-2397

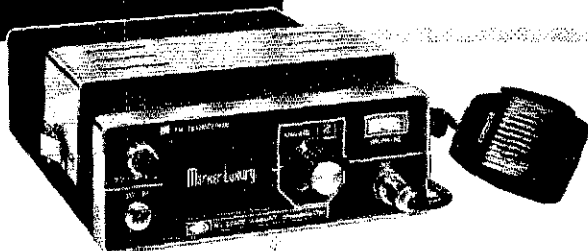
Send 10¢ for new catalog with oscillator circuits and lists of thousands of frequencies in stock.

SPECIALS! CRYSTALS FOR:

Frequency Standards	
100 KHz (HC13/U)	\$4.50
1000 KHz (HCB/U)	4.50
Almost All CB Sets, Trans. or Rec. (CB Synthesizer Crystal on request)	2.50
Any Amateur Band in FT-243 (Except 80 meters)	1.50
	4 for 5.00
80 Meter Range in FT-243	2.50
Color TV 3579.545 KHz (wire leads)	1.80
	4 for 5.00

DRAKE ML-2

EXCEPTIONAL QUALITY... VHF FM Transceiver



GENERAL • Freq. coverage: 144-148 MHz • 12 channels, 3 supplied • Push-to-talk Xmit • AC drain: Rcv, 6W; Xmit, 50 W • DC drain: Rcv, 0.5A; Xmit, 4A • Built-in Power Supply: AC, 117V 50-60 Hz; DC, 13.5V±10% • Size: 7-7/8" x 2-3/4" x 10-1/4", 8-1/4 lbs.

Including transceiver, 3 channels supplied, mobile mount, dynamic mike and built-in AC-DC power supply.

\$299.95 Amateur Net

Accessory BBLT-144D Antenna:
Hustler 3.4 dB gain \$27.95

TRANSMITTER: • Transistorized with 6360 output tube • RF Output: over 10 W • Freq. Dev: Adj. to 15 kHz max. • Freq. Stability: ±.001% or less • Output Imped: 50 ohms.

RECEIVER: • Completely transistorized, crystal-controlled superhet • Intermed. Freq: 1st 10.7 MHz, 2nd 455 kHz • Input Imped: 50 to 75 ohms • Sensitivity: 0.5µV or less/20 dB quieting; 1µV or less/30 dB S+N/N at 10 kHz dev., 1 kHz mod. • Audio Output, 0.5 W • Spurious Sens., > -60 dB.

R. L. DRAKE COMPANY



DRAKE

540 Richard St., Miamisburg, Ohio 45342
Phone: (513) 866-2421 • Telex: 288-017

the
Incomparable **CX7A**



CX7A-signal/one	\$2395.00
CX7S-speaker	\$39.95
CX7M-mike	\$89.50
400HZ CW filter	\$69.50
250HZ CW filter	\$160.00
1200HZ FSK filter	\$69.50

Exports our specialty

Every CX7A is "burnt-in" and cycled more than 96 hours—quality and reliability you demanded. Sensitivity, selectivity, power output, built-in features that are available in no other ham gear ever built. It's truly the "Cadillac of the Industry."



If you want to "move-up" to the **FINEST**, give **DON PAYNE, KA1D**, a phone call for personalized service, signal/one operating experience, a **BROCHURE**, and a **KING-SIZE** trade-in on any gear you have—one piece—or the whole station.

PAYNE RADIO

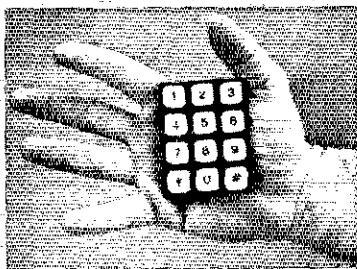
Six days
(615) 384-5573

Box 525
Springfield, Tenn.

Nites-Sundays
(615) 384-5643

TINY TONE PADS

with hybrid IC tone generator



(pad shown actual size)
 1/4" x 1/4" x 1/8"

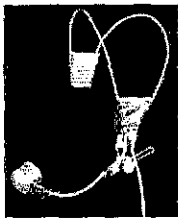
only **\$49.95**, 1/4-in. thick, complete ppd. Ready for 15-minute installation

send check or money order to:

TINY TONE PAD CO.

134 East Center St.
Manchester, CT 06040

PRACTICE DRIVING SAFETY & OPERATING EFFICIENCY WITH A PATENTED MAGNETIC SAFETY MIKE



\$29.95 NET AT YOUR DISTRIBUTOR

or P. P. From Factory. Ohio Residents Add Sales Tax.

Plasticized stainless steel headgear and aluminum construction. Wt. under 3 oz. Three-way adjustable mike support. Immune to heat, shock and vibration. Built for rough usage. "A natural for Mobile & SSB". -53 db to Hi-imp. Response 300 to 3,000 cps. w. matching unit installed inline. CM Net 29.95
 CMS same as above with inline slide switch for transmitter control Net 32.95
 With single attached earphone add \$10.00.

Write for literature.



MOBILIER'S

BX 715-722 MAIN, COSHOCTON, OHIO 43812

NEVADA - SCM, L.M. Norman, W7PBV - K7ZOK made his first WAS on 6 meters as W0FKY from Colo. and now a second WAS on 6 meters from Nev. WA7ESM, WA7JVO, WA7KVV, K7NKF, W7PBV, W7VX, K7ZOK and W7ZT were reported handling health and welfare messages for the Rapid City, SD flood victims. W7BEM is leaving Las Vegas and will be off the air for awhile, he is selling all his gear, good luck Bro. Joe. K7HPO and his crew were reported operating FD from Mtn. Pass. SNARS group installed K7YVN as their new pres., believed to be the first YL to serve as pres. of a RC in Nev.; WA7IRW, vice-pres.; WA7KOE, secy.-treas.; WA7OZT, sgt.-at-arms; W7INU, trustee; WA7JLK, K7QOP and K7ZAU, dir. K7SFN hosted the looters as well as the winners for a picnic lunch after the transmitter hunt, the signals weren't all cricket, K7SFN kept swinging the beam. W7PBV and K7ZAU attended WCARS-7255 Executive meeting in Fresno. W7ILX reports activity on the PON, W7OK reports some conditional licensees have been asked to appear for re-examination by the FCC. Traffic: W7ILX 32.

SACRAMENTO VALLEY - SCM, John F. Minke, III, W6KYA - SEC: W6SMU, Health and welfare traffic during the (skeleton) flood was handled via 2 meters by the local Sacramento amateurs. The Sacramento Amateur Radio Club, W6AK, again operated from Somerset for Field Day. Unfortunately, the generator ran out of oil, forcing them to operate from commercial mains. The North Hills RC, K6IS, operated from Grouse Ridge, near the 7500-ft. level in Nev. Co. The GEARS of Chico will hold its annual Steakbake on Sept. 16 in Bidwell Park. Contact K6HTM for details. WA6YVW of Paradise became a Silent Key on May 21. New Novices in Chico are WN6QMS, WN6RIJ. K6YZU has assumed NCS duties for NCN/1 on Thur. evenings. NCN, Northern Calif. Net, meets daily at 0200Z and 0330Z on 3630 kHz. The second session is a slow speed net designed for beginner traffic handlers. The net is always looking for check-ins, with or without traffic. W6KYA reached 160 worked toward DXCC, that being XV5AC of Vietnam. Don't forget the Calif. QSO Party in Oct. Traffic: (June) WA7KZL/6 80, W6LNZ 12, WA6IBJ 11, WA6FGU 10, W6KYA 2, (May) WA6IBJ 67, (Apr.) K6YZU 19.

SAN JOAQUIN VALLEY - SCM, Ralph Saroyan, W6JPU - The North Hills Radio Club is holding their 7th Annual Calif. QSO contest on Oct. 7, 1972. It starts at 0001 Sat. and ends 2400 GMT Oct. 8, 1972. WB6SBM is on 2 meters with a homebrew transmitter and receiver. WB6QWE and K6PEO are on RTTY on 145.80. The Delta Amateur Radio Club will hold their meetings at the Red Cross Bldg., 936 N. Commerce St., Stockton. They meet on the 3rd Thur. of every month at 8 P.M. The Yulock ARC held their FD at Don Pedro Dam with 18 operators and 7 transmitters using the call W6BXN. The Stockton ARC held their FD near Wallace, Calif. with 6 operators. The Fresno ARC held their FD near Shaver Lake. WA6EXV worked K6YNB/7 in Utah on 43.2 MHz. The Tulare ARC held their FD at Miramonte, Calif. The Southern San Joaquin Valley Net meets every Tue. at 7:00 P.M. on 146.88 MHz. WA6FCR is recovering from a heart attack. WA6UDQ and XYL are vacationing in Europe. W6YKS is active on 50 MHz. W6DPD and K6ZMW worked VP5RS on 50 MHz ssb. K6ZMW is working on 1296 equipment. Traffic: WA6CPC 8.

SANTA CLARA VALLEY - SCM, James A. Hauser, WA6LFA - SEC: WA6RKB. RM: W6BVB. Active on the NTS nets were W6BVB, W6YBV, W6NW and W6RFF who now is NCS on NCN; W6KZJ operated Field Day with the San Carlos Club; W6DEF also participated in Field Day, 2-meter CD nets Field Day, communications for the Redwood City July 4 parade and communications for the Powder Puff Derby. W6IQU, W6ZRJ was at W6VZT/6 for Field Day and also attended the FM West Convention in Fresno. W6HAD, W6LFB, W6AUC is active on the phone nets as is W6OII. W6EJ reports hamming is slow for the summer. W6OAT is back from a June vacation. WA6RKB busy with work and an antenna construction project. W6NLG was on Field Day, has a new QTH and new 2-meter gear. WB6GJ is getting his antennas up now that school is out. Received Field Day messages from K6DXK/6 San Carlos Radio Club, K6TV/6 Foothill Amateur Radio Society and W6OTX/6 Palo Alto Amateur Radio Assn.

NCN	NTS	3630 kHz	7:30 P.M. Dy
Specs	AREC	146 MHz	7:45 P.M. M
SCV	AREC	146 MHz	8:00 P.M. T

W6ZRJ bulletins: 7:30 P.M. 3590/7129 15-20 wpm cw, 8:30 P.M. 3815 ssb, 9:00 P.M. 3615 RTTY 850-Hz shift. Traffic: (June) W6BVB 226, W6YBV 141, W6NW 132, W6RFF 103, W6KZJ 101, W6AUC 74, W6DFE 73, W6JOU 30, W6HAD 17, W6ZRJ 17, W6OII 15, W6LJ 11. WA6RKB 3, (May) W6RFF 14, W6LFB 8.

NEW from **RP** TONE BURST ENCODERS

- UP to 5 fixed tones (factory set)
- ADJUSTABLE:
—Duration
—Output
- NO BATTERIES needed.
- FULLY ADAPTABLE
- EASY INSTALLATION
- CONTINUOUS TONE POSSIBLE
- FULL 1 YEAR RP Warranty



PRICES:

TB-5 5 tone std. encoder \$37.50
(1800, 1950, 2100, 2250, 2400 Hz.)

ST-2 Single tone decoder \$37.50
(Specify 1800, 1950, 2100, 2250, or 2400 Hz.)

Special tones — Inquire
Add \$1.80/unit for shipping (Ill. residents add 5% tax)

FREE SPEC SHEETS
NOW AVAILABLE

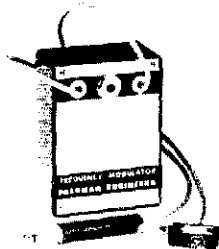
RP Electronics

ORDER DIRECT OR FROM
AUTHORIZED DEALERS

BOX 1201Q
CHAMPAIGN, ILL.
61820

FM YOUR GONSET COMMUNICATOR

- New! Plug-in modulator puts the Communicator transmitter on FM.
- No modification or rewiring on your Communicator. Just plug into mike jack and crystal socket.
- Compact self-contained modulator measures 4" x 3" x 1 1/2".



- Works with Communicator I, II, III, IV and GC-105.
- FM at a tenth the cost of a new rig.
- Frequency adjust for netting built in.
- Built-in tone burst available. Keyed by push-to-talk switch.

• \$34.50 postpaid U.S.A. Built-in tone burst \$10.00. Specify Communicator model and tone-burst frequency. California residents add 5% sales tax. (MC-6/U crystal and 9 volt transistor battery not supplied.)

• Send for free descriptive brochure.

PALOMAR ENGINEERS

BOX 455, ESCONDIDO, CA 92025

PICKERING RADIO CO
Post Office Box 29
Portsmouth RI 02871



IS IT EASY TO LEARN THE CODE?



Frankly, no. Neither was it easy to learn how to read without two things: Proper instruction, and practice. CODEMASTER tapes, proven in over five years of sales of thousands of tapes all over the world, give you that essential instruction. No other teaching system offers you a more proven method, more accurate sending, more complete guidance. Select your CODEMASTER tapes below!



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-1 1/2: An intermediate tape, especially for General Class exam study. No instruction; just practice. 1/2 hr 11 WPM; 1 hr 14 WPM; 1/2 hr at 17 WPM. Includes coded groups and straight text.

CM-2: For Extra-Class license study. Mostly straight text; some code groups. 1 hour at 20 WPM; 1/2 hour each at 25 and 30 WPM. For real QRQ, play this tape at twice speed!

CODEMASTER tapes are 2 track monaural; available in two styles: 7-inch reel (3 3/4 IPS) and cassette. Be sure to specify both the program (CM-1, etc) and the style (reel or cassette). Any tape, \$6.95 postpaid USA 4th class. Any two tapes, \$13.00; all three, \$17.00 PPD. For air shipment in USA add 50¢ per cassette or 80¢ per reel. (Immediate delivery. Mastercharge and BankAmericard honored; give us your account number. CODEMASTER tapes are made only by Pickering Radio Company, PO Box 29, Portsmouth, RI 02871. See your dealer or order direct. Satisfaction guaranteed.



EXCLUSIVE 66 FOOT

75 THRU TO METER DIPOLE

NO TRAPS — NO COILS — NO STUBS — NO CAPACITORS

Fully Air Tested — Thousands Already in Use



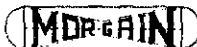
#16 40% Copper Weld wire annealed so it handles like soft Copper wire—Rated for better than full legal power AM/CW or SSB-Coaxial or Balanced 50 to 75 ohm feed line—VSWR under 1.5 to 1 at most heights—Stainless Steel hardware—Drop Proof Insulators—Terrific Performance—No coils or traps to break down or change under weather conditions—Completely Assembled ready to put up—Guaranteed 1 year—ONE DESIGN DOES IT ALL; 75-10HD—ONLY \$12.00 A BAND!

Model 75-10HD ... \$60.00 ... 66 Ft ... 75 Thru 10 Meters
Model 75-20HD ... \$50.00 ... 66 Ft ... 75 Thru 20 Meters
Model 80-40HD ... \$42.00

Model 75-40HD ... \$40.00 ... 66 Ft ... 75 Thru 40 Meters
Model 40-20HD ... \$33.00 ... 35 Ft ... 40 Thru 20 Meters
69 Ft ... 30-40-15 Meter (CW)

OR THRU YOUR FAVORITE DISTRIBUTOR

ORDER DIRECT OR WRITE FOR FULL INFORMATION



300 Shawnee
Leavenworth, Kansas 66048

IS BACK

ROANOKE DIVISION

NORTH CAROLINA - SCM, Chuck Brydges, W4WXZ - SEC: W4EVN, PAM: WB4JMG, RM K4GCN. Field Day had many NC clubs out and initial reports indicate a high rate of publicity to local medias. Silent Keys gained and NC lost a valued and respected amateur W4BKL, ex-W4CJN, on June 19 at Raleigh. He will be missed by all. WB4TNB dropped the "N" and is General. New OBS is W4BUZ. New EC is K4GHR. WA4JCS added an HW-101 and wattmeter to equipment pile. W4ACY, W4KFC and W2TUK attended W.Va. conclave at Jacksons Mill. WA4JCS upgraded to Advance Class. W4WXZ attended Raleigh ARS meeting June 7. The new Grifton repeater call is W4NBR. The Wilson ARS gave Novice test to 7 hopefuls, all passed and awaiting the written. WB4KPD continues catching vhf openings. K4CHU is trying for 3-generation hamdom, son is WN4AAU and grandson waiting for ticket. New Fayetteville Novices are WN4ACM and WN4AFU. WB4PL, Sister Sue, active again after illness. Welcome back! Amateur Radio Week was June 25-July 1 in N.C. and WXZ accepted Governor's proclamation in Raleigh with K4COJ, WR4ZSM and WA4AFB. WA4WZQ searches for vhf openings. Official ceremonies were held in Charlotte at the new Charlotte ARC Hq. at WSOC Radio and TV. Mayor John Belk attended and comments were presented by WB4ETF and W4WXZ. The call of the late Earle Gluck, W4CO was officially presented and Mrs. Gluck attended. This club now has 21 members. The Eden ARC presented "Hams Wide World" to club and local high school. Contact W4ACY for this fine film. Traffic: (June) K4GCN 253, W4EVN 192, W4WXZ 60, K4MC 50, WB4TNC 31, WB4NRZ 26, K4VBG 25, WB4VBM 22, W4OFO 16, W4ACY 12, WB4HGS 11, WB4TNB 11, WB4JMG 10, WA4JCS 9, W44VNV 9, WB4CES 6, WA4KWC 5, (May) WB4SFC 30, WB4TNB 21, W4ACY 15, WB4CES 10, WA4JCS 2, WR4BGL 1.

VIRGINIA - SCM, Robert J. Slagle, K4GR - Asst. SCM: A.E. Martin, Jr., W4THV. SEC: WA4PBG, Asst. SECs: WA4JFF, WB4CVY. PAM: WA4FGC, RMs: WA4EUL, WB4NNO, K0PIV/4, W4SHJ. Regret to note that W4BVQ, W4OP and W4OPM are Silent Keys. Hurricane Agnes walloped us good the week of June 18, just prior to the week of June 25 which Governor Holton declared Amateur Radio Week in Va. The ECs, ARCC and RACES carried out an orderly and timely and coordinated exercise that gave everyone advance notice of flood crestings. In spite of the real exercise, we held Field Day almost as usual with many locations reporting in. WN4ZCE on the air for two months. K4MSG back stateside but in N.C. WN4UPO looking for Mont., Nebr. and Idaho. WN4AJW is the only YL on ODU campus but is watched over by WB4JTT. OO W4HU reports 18 out of band second harmonic violations this month! W4HR is moving to Eastern Shore and has joined Eastern Shore ARC. Director, W4KFC making most of the meetings. W8VDA reports Murphy's Law problems. West Va. Jackson's Mill finer than ever, particularly because there they recognized our lovely K4LMB as deserving the Roanoke Division Service Award. W4KX finally got WFVA moved. W4DM vacationing. WB4DRB and WB4JMD coming in strong on VRN. K0PIV/4 revamping shack. W4UQ Michiganing. K4BHS been out of town. WB4KIT hopes to have 2-meters this month (me too). Busy month not hamming for K4JML.

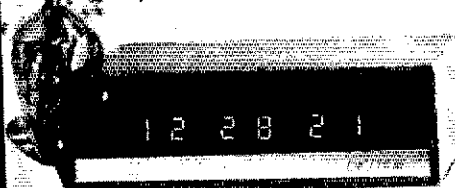
VSMN	3947 kHz	0715/1630 M-F
YSBN	3435 kHz	1800/2200 Dy
YSN	3680 kHz	1830 Dy
VN	3680 kHz	1900 Dy
VFN	3947 kHz	1930 Dy
VRN	3625 kHz	2000 Dy
VPON	3908 kHz	2215 I

Traffic: (June) W4UQ 302, W4YZC 295, K4KNP 291, K0PIV/4 248, K4KA 140, W8VDA/4 118, WB4DRB 105, WB4KIT 99, WA4FGC 72, WA4PBG 69, WA4JFF 62, K4GR 45, W4KFC 36, WA4UNS 31, K3VIV/4 28, WB4PCK 27, K4VIG 26, WB4KBJ 23, WB4RDV 22, WB4RZW 20, W4THV 18, W4TE 17, W4DM 16, WB4YAH 13, K4FSS 10, WB4SSE 10, K4LDR 9, W4MK 7, K4JML 5. (May) K0PIV/4 333, WB4SSE 23, W4DM 5.

WEST VIRGINIA - SCM, Donald B. Morris, W8JM - SEC: W8BNDY. RM: W8BBG. PAMs: W8DUW, W8IYD, K8CHW. Phone Net Mgr.: W8BBMV. W8EFKC was named Amateur of the Year at the 14th Annual ARRL State Convention at Jackson's Mill. Tri-State ARA of Huntington won the Field Day award. W8BBMV was elected to the post of WVN Phone Net Mgr. and W8CYB continues as CW Net Mgr. PARA provided a receiver for W8CZT during his illness in Fairmont hospital. I regret to report the passing of W8HKN of Bluefield. First Annual Thumpin Keger Hamfest was held in Bluefield. WN8LAI and W8DUV presented their huddies with Life Membership during the State Convention. K4LMB, founder of YLRL, received the 1972 Roanoke Division Public Service Award at Jackson's Mill. Sorry to lose W8SSA, he has been

LOW COST DIGITAL CLOCK KITS

(12 OR 24 HOUR)



Easy reading 7 segment display tubes. Solid state components. Printed circuit. Accurate 60 cycle line, time reference. Simple, push button settings. Displays hours, minutes and seconds. Easy step by step instructions.

USE YOUR MASTER CHARGE
OR BANKAMERICARD
Order or write
for details:

Kit price: \$74.50
Choice of cases extra:
Metal - \$10/Walnut - \$20
Calif. residents add 5% tax.
Money back guarantee.



506 Main St. • El Segundo, CA 90245/772-6176

FACSIMILE AND TELETYPE . . .

Machines - Parts - Supplies



DESKFAX 6500
transceiver conversion in
May 1972 QST. Complete
unit \$15 (2/\$25)



TOROIDS 88 or 44
mHy. 30/\$10 pp in
U.S.A. only
(5/\$2.50) Never
potted - center
tapped

- Ribbons for all Teletype (nylon) 12/\$3.50 pp
- 11/16-inch paper tape 40 rolls - fresh - \$8
- Single sheet roll paper (8-1/2 inch) - fresh - \$12.50/case/12
- 60speed Mod 15-19 gears (74912-74913) \$3.50 per set pp
- Manual (TM11-2258) for TXC1-A,B,C,D fax transceivers \$7.50 pp
- FAX paper: 12 x 9 inch for TXC-1, cut up for deskfax, 250 sheets \$3 per package.



**VAN'S W2DLT
Electronics**

3022 Passaic Avenue
Stirling, N.J. 07980
Phone (201) 647-3639



send stamp
for new
picture
catalog



QUADS! QUADS! QUADS!

Prices are for complete quads. Enjoy all the advantages of a full-sized quad. All quads complete with hardware. Noisy locations our specialty.

**SPECIAL DEAL ON A QUAD/
TOWER COMBO, OR ON A TOWER ONLY.**
Ppd to nearest freight terminal.

- ★ 2 element, 3 band (10-15-20) \$69.95
- ★ 3 element, 3 band (10-15-20) \$99.95
- ★ 4 element, 3 band (10-15-20) \$129.95

F.O.B. TAMPA, FLORIDA

(813) 988-4213
406 Bon Air Ave.

SKYLANE PRODUCTS Temple Terrace, Fla. 33617

Technical Excellence in Electronics.

On our small, friendly campus the emphasis is on Living as well as Learning. Extra-curricular social activities, student clubs, a student operated radio station, student government, new dormitory and a full sports program help provide a world of your own in which to prepare for tomorrow. Associate Degree in Engineering Electronics. B.S. obtainable. G.I. approved



VALPARAISO TECHNICAL INSTITUTE
Dept. A2, Yellowstone Trail, Valparaiso, Indiana 46383

what is an antenna noise bridge?



Antenna Noise Bridge (an-'ten-a noiz brij), n. Omega-t's name for a specialized testing device that checks your antenna system for resonant frequency and coaxial impedance.

Obtain maximum efficiency by determining the resonant frequency for any type of antenna with the solid state, self-contained Antenna Noise Bridge...

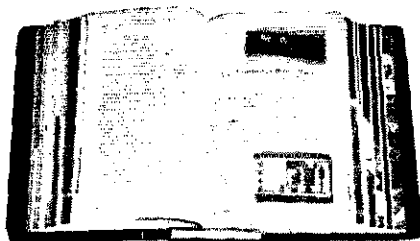
Two models... TE7-01 for 1-100 MHz range, \$29.95... the TE7-02 for 1-300 MHz range, \$39.95.

Sold through amateur radio dealers
or direct from the factory.



omega-t systems incorporated

320 TERRACE VILLAGE • RICHARDSON, TEXAS 75080 • (214) 231-5121



PROTECT YOUR INVESTMENT!

You do have an investment in your copies of QST.

PRICE **\$4.00** EACH


Available only in the United States
and Possessions

Don't endanger your investment by letting QSTs gather dust on a shelf or in a corner.

Protect them with sturdy QST Binders; each holds 12 issues. Gold labels are included for showing what year QST is inside.

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

GROTH-Type
COUNTS & DISPLAYS
YOUR TURNS



- 99.99 Turns
- One Hole Panel Mount
- Handy Logging Area
- Spinner Handle Available

Case: 2x4"; shaft 1/4"x3"
Model TC2: Skirt 2 1/4"; Knob 1 1/4"
Model TC3: Skirt 3"; Knob 2 1/4"

R. H. BAUMAN SALES
P.O. Box 122, Itasca, Ill. 60143

transferred by his company to Ohio. West Va. State Radio Council organizational meeting set for Oct. 14 in Parkersburg. WBHLA won top honors in the state in the OOTC QSO Party and W8JM with highest in the 8th District, 5L-OM Phone Contest. WVN CW Net with 85 stations, passed 44 messages and the Phone Net with 283 check-ins handled 34 messages. Traffic: W8RCYB 82, W8BPOS 55, W8JIM 21, W8BNDY 20, W8WCK 19, W8B8XF 8, W8JWX 8, W8DUV 7, K8QEW 6, W8N8KMJ 5, W8AOKG 5, W8N8II 4, W8AEC 3, W8B8MV 3, W8B8MG 3, W8EEO 2, W8BAKR 1, W8BT 1, K8CFT 1, W8CKX 1, W8ACRW 1, W8GDP 1, W8KAN 1, W8KWL 1, W8NCD 1, W8B8NES 1, W8APFB 1, W8THX 1.

ROCKY MOUNTAIN DIVISION

COLORADO - SCM, Clyde Penney, WA0HLQ - SEC; WA0QOY, RM: W0LRN, PAMs: W0BAWG, W0LRW, WA0WYF. Many Colo. amateurs joined thousands of others across the nation in rendering yeoman service to the public through handling emergency traffic in connection with the flood disasters on the East Coast and Rapid City, SD. WA0SZW is doing a fine job with Intruder Watch service, K0GEZ is enjoying his new Yaesu FT-101 transceiver. The SSN now has a group of volunteers who will go anywhere in Colo. to erect a suitable antenna for anyone who would like to join SSN. Congratulations to WA0ZWA who just received his Extra Class ticket. Net traffic for June: Columbine QNI 849, QTC 62, informals 125, 26 sessions, CCN QNI 237, QTC 142, 30 sessions. SSN QNI 207, QTC 160, informals 27, 32 sessions, time 684 minutes. Traffic: (June) K0ZSQ 870, K0YFK 490, W0WYX 348, W0LQ 197, K0JSP 122, W0IW 120, W0LRN 117, W0AXW 106, WA0ZWA 87, W0CCB 81, W0BDNY 70, W2TPV/6 64, WA0WYF 52, W0SIN 40, W0BSS 35, W0DRG 29, WA0TMA 26, W0KTH 19, WA0HLQ 18, W0LAE 14, WA0YH 14, W0BCK 8, WA0YD 6, W0BY 3, K0GEZ 1. (May) K0ZSQ 814, K0YFK 418, K0OTH 116, W0BDLE 93, W0BSS 27, K0GEZ 4. (Apr.) K0OTH 44.

NEW MEXICO - SCM, James R. Prine, W5NUI - New officers of the El Capitan VHF Radio Club of New Mex. are W5MDM, pres.; W5ALTP, secy-treas. This is the only active club in the eastern side of the state so contact one of the officers and lend your support to the endeavor. Field Day messages were received from W5YQ, W5PTQ, W5BRIG, W5VQK and W5PDO. WA5WBN was an stand by during a recent forest fire near Jemez Springs. The Albuquerque Club supported a search near Taos according to the TV news. I thought the SEC was in Albuquerque! Traffic: W5UH 257, W5DAD 138, W5PDI 58, K5MAT 41, W5MYM 30, WA5OHI 15, W88JNI/5 15, W5BWW 7.

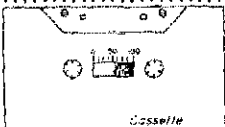
UTAH - SCM, Carroll F. Soper, K7SOT - SEC: W7WKF, RM; W7OCK. In the Mar. report it was reported WA7FS was pres. of the Cache Amateur Radio Club. This was in error, the pres. is WA7MXZ. WA7JLM accidentally came in contact with a 16KV bus while working at one of the local radio stations, his injuries were a burned left foot and a fractured right knee cap, caused by a fall of 10 feet to the concrete floor below. The Ogden repeater is under test operations on 146.22, 146.82 MHz. WA7MEL member of Army MARS under call AD7MEL. Traffic: W7EM 123, W7OCK 98, WA7HCQ 37, K7CLO 35, WA7MXZ 22, W7IQU 13, WA7MEL 6, W7GPN 2.

WYOMING - SCM, Wayne M. Moore, W7COL - SEC: K7NQX, RM: W7GMT, PAMs: W7TZK, K7YUK, K7YUK. O8Ss: K7NQX, W7SDA, WA7FHA, K7YUG. Nets: Pony Express, Sun. at 0800 on 3920; YO daily at 1830 on 3608; Jackalope Mon. through Sat. at 1215 on 7260 (alt. 3,920); Wx Net Mon. through Sat. at 0630 on 3920; PO Net 1900 Mon. through Fri. on 3950. We now have (at this writing) a couple of hams in Rawlins! W7YVW and W7YTVX. Probably more of them have received their tickets by now so, listen for them. Another new one in Casper - W7YQV. During July, W7IEP vacationed on the west coast and K7SLM vacationed down south. Casper and Cheyenne were in competition on FD week end again this year. The Casper Club finally got a replacement repeater and it is working fine. Traffic: W7TZK 108, K7YVA 94, W7SDA 80, WA7NHP 31, K7SLM 30, K7ITH 17, W7HNI 13, W7NK 10, W7ILL 2, K7TKF 2.

SOUTHEASTERN DIVISION

ALABAMA - SCM, James A. Brashear, Jr., W4BEKJ - SEC; W4DGH, RM: W4HFU, PAM: W4WLG. The Tuscaloosa ARC FD site was hit by a tornado. Fortunately, there were no serious injuries; however, while members were away from the FD site (hauling gear home, etc.) someone stole the generator they were using. The Auburn Univ. ARC and Birmingham ARC groups had some rain during the FD period. Thanks to the following for

OSOs EN ESPAÑOL **OSOs AUF DEUTSCH**



Courses in Spanish, German, and Japanese designed for amateurs. Enables hams to exchange greeting and signal reports and to chat with foreign hams. Each course has many typical QSOs, technical terms, and slang. Narrated by native speakers.

Spanish course: 75 minutes Spanish dialogue with English-Spanish manual taped on 7" reel 3 3/4 IPS for \$11.95, on C-90 Cassette \$10.95, on 5" reel \$9.95. For *German course* running 90 mins. add \$2 to above prices. *Japanese course* 30 mins. same prices as Spanish course. Dual language manuals alone \$2.50. Mailed 3rd class in U.S. PPD. Send checks to:

FOREIGN LANGUAGE OSOs, Box 53, Acton, Mass. 01720.

WORLD QSL BUREAU

5200 PANAMA AVE. RICHMOND CA 94804 USA

THE ONLY QSL BUREAU to handle all of your QSLs to anywhere; next door, the next state, the next country, the whole world. Just bundle them up (please arrange alphabetically) and send them to us with payment of 5 cents each.

BUILD YOUR OWN SPACE-AGE TV CAMERA



ONLY \$199.95! **SPACE-STATE CAMERA KIT** Ideal for experimentation, home education, industry, etc. • High quality • Backed by over 50 years of lab & field testing • Fully Guaranteed • Connect to any TV set without modifications • Simply step construction manual • Model 1173A Series • Compatible with video (1173.20) prepaid anywhere in USA & Canada (less video) ship \$126.99

PHONE OR WRITE FOR CATALOG.
DIAL 402-969-9771

Many other kits, parts and plans available including starter kits, focus, diff. coll., video, tube, control plans, audio subcarrier kit, etc.

BOX 453-OD **ATV Research** DAKOTA CITY, NEBR. 68731

HAM RADIO CENTER
WANTS
Used Amateur Equipment
Buy - Sell - Trade
Distributor for all major brands

COLLINS KENWOOD
DRAKE TEMPO/ONE
GALAXY SIGNAL/ONE

Write to Bill Du Bord, W0KFF
for Trade-In Quote & Used List

Ham Radio Center Inc.
8342 Olive Bl. St. Louis, Mo. 63132
Phone (314) 993-6060

originating FD messages to the SCM: WB4FIR, W4EBL, WB4WBJ, W4KGB, K4BFT, WB4NLM and K4MQU. WB4WBJ, pres. of Auburn Univ. ARC wishes to express his thanks to Mr. Bill Thornton and the Lee Co. CD Unit for the use of a generator for their FD operations; also a big thanks to operators WB4ADT, WB4LNM, WB0BUM/4 and WB4JKF. He also welcomes WASLIO to the club and the Ala. section. K4JK took in FD with WN4UNM; they had an 80-meter antenna and worked about 40 stations. Like many others in July, K4JK was off on a vacation. WB4ADT reports he worked DXCC in about 6 months and it took him about 18 months to get the confirmations. He also received his EF degree (Auburn) and will move to Fla. for graduate work at U. of Fla. in Sept. WB4WUS still having some rig and antenna problems; he recently passed the Advanced Class exam. WB4SVH says time for AEND is limited. WB4LAL recently got back into net activities. WB4LNM says not to forget the Auburn Univ. ARC when FD winner award is made. Congratulations to WB4PJU and XYL on recent arrival of new son. K4HJX getting reorganized and will be QNI nets again regularly. WB4WBJ making changes in shack. He reports no formal club meetings this summer and activity light at Auburn Univ. ARC. New officers of the Birmingham ARC are WB4PJU, pres.; WA4HMB, 1st vice-pres.; WB4JLJ, 2nd vice-pres.; WB4UOL, secy.; K4REL, treas.; W4BJG, D.E.C. K4ZZE has succeeded W4QAU as NM of AFNR. Welcome to the following hams: WN4s AAP, AAX, ABA, ABZ, ABW, ADR, AFG, AFK, AFL, AFM, AFN, AFX, AHZ, AIA, AJT, AJO, ZKX, ZLU, ZNE, ZNF, ZNG, ZNM, ZOD, ZOG, ZOI, ZOS, ZOW, ZYQ, WA4TEM and WB4ZXW. Traffic: WB4SVH 238, WB4FKJ 174, K4AOZ 122, WB4JMH 72, WB4ADT 24, WB4LAL 17, WB4SVX 12, WB4LNM 7, K4HJM 5, WB4LTD 4.

EASTERN FLORIDA - SCM, Regis K. Kramer, W4LE - SEC: W4IYT, Asst. SEC: W4SMK, RM: WB4OMG, PAMs: WB4OGX 75, W4SDR 40, W4ROA enjoyed FD with W4EHW/4 and is moving to new QTH in Ft. Lauderdale. K4QG really enjoying his traffic and DX activities. K4FAC is planning QSY to MIA and will be with Southern Bell. WB4HJW clearing equipment for WB4RZM, a Silent Key. K4HLT and XYL K4HLU plus son WA4AIR have traded off their 0 MO calls for Pompano Beach QTH. Welcome to Fla., Bob. W4FRI and W4OZF are regular reporters in the OO dept. W4OZF has DXCC-180 plus DXCC-105 phone. After 18 years as K6GHO we welcome K4HJT of MIA where he has infiltrated the FMers and hopes to make it back on hf soon. WB4CBP performs FB Public Service running East Coast phone patches to boys down at KC4USN. St. Pete. ARC came through with FB support of the QFTN Crystal Pool. Who will be the first to make QFTN's Novice BPL? K4HLC is QRL county hunting. WA2HHO/4 is QRV from U. of MIA until June '73. K4SCL is newly elected Mgr. of the FAST Net which is part of the NTS. When you copy one of our E. Fla. sw OBS transmissions send him an encouraging word now and then by Radiogram. K4BLM, WB4PTH and WB4QFH have received their 10/10 numbers. W4NGR is working on his WAC - Worked All Campsites. WA4ZZG reports 29 different stations including 16 Central and South American stations operating /W4 handling a total of 527 phone patches, during month of June. FB Rafael! Renewals: WB4AIW and WB4OMG as ECs plus W4IYT, ORS, OBS, New appointments: WB4WHK, OPS and W4UJL, EC Orange County. Those interested in QRS and OPS appointments can contact your RM, PAMs or the SCM. We work together on issuance, renewal reminders etc. Reminder: Sept. 16 and 17, the Platinum Coast ARS will host the 7th Annual Melbourne Hamfest. Traffic: (June) WA4SCK 517, WB4AIW 501, K4SCL 348, WB4OMG 248, WB4NCH 235, W4ILE 155, WB4HJW 138, W4SDR 130, WB4PNG 119, W4DVO 116, W4IJK 114, WA4NBT 107, WB4HKP 101, WB4WHK 100, W4FFF 98, W8BZY/4 74, W4NGR 69, WB4PTH 64, WB4SKJ 56, WB4SQA 52, W4BM 51, K4GJ 48, W4IYT 48, K0ECC/G4 45, WB4OQA 42, K4QG 42, W4YPA 42, W4HHD 40, WA4BGW 35, W4SMK 34, WB4TPJ 34, W4DQS 31, W4NTE 31, W4ROA 31, W44FJA 26, W4IA 26, W4MML 25, W4KRC 23, WB4GHD 22, W4DFP 21, W4IAD 20, W4GUF 19, WB4OXA 19, WB4ONR 18, K4EBE 17, WN4UNV 17, K4EZE 16, WB4JSK 15, WB4SYL 15, WB4UOC 14, W4IJJ 13, K4EYN 12, WB4RLU 12, W4YFX 12, WB4FJY 11, K4HLC 11, WB4MIQ 11, W4OGX 10, WB4SMA 10, W4TJM 10, WB4AID 9, W4FH 9, W4DDW 8, K4FLV 8, WB4MIQ 8, W4OOH 8, W4VLK 7, WB4BNH 6, WB4FLW 6, W4LSR 6, W4RHA 6, K4BLM 5, WA4BMG 5, WA2HHO/4 4, WB4HPR 4, WB4JIQ 4, W4KGI 4, W4WZR 3, W4LDM 2, WB4NI 2, W4EHW/4 1, W4FIQ/4 1, W4HAW/4 1, K4JVA/4 1, W4NVU/4 1, WB4RNC/4 1, WN4SZE 1, W4WHK/4 1, WB4YX/4 1. (May) K4FAC 55, WB4BNH 29, K4SJH 10, K4GFV 3, W4WZR 3.

GEORGIA - SCM, A.J. Garrison, WA4WQU - Asst. SCM: John T. Laney, III, K4BAI. SEC: WA4VWV. RMs: K4BAI, WB4SPB.

TOWER AND ANTENNA HEADQUARTERS

HY-GAIN - A/S - MOSLEY
TELREX - KIRK - WILSON
NEWTRONICS - CUSHCRAFT

UNIVERSAL - HEIGHTS
SPAULDING - TRISTAO
ROHN - TRI-EX - E-Z WAY
ROTATORS BY I'Y-GAIN & CDE

Midwest Ham Headquarters

For Over 33 Years

HAMS! Write For Free Catalogs and Wholesale Prices!

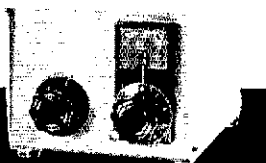
ELECTRONIC DISTRIBUTORS, INC.

1960 Peck

Muskegon, MI 49441

Tel: 616-726-3196

UPC



Unique

WIRE TUNER

RANDOM WIRE ANTENNA TUNER

All band operation (80-10) with any wire over quarter wavelength. Absolute 1:1 SWR. Full amateur legal power. Turn counting dial on rotary inductor for exact resetability. Ideal for portable or field day operation.

- ALL BAND OPERATION
- UNITY STANDING WAVE RATIO
- IDEAL FOR PORTABLE
- COMPACT, 5" x 6 1/2" x 10"
- FULL YEAR MONEYBACK GUARANTEE

SOLD FACTORY DIRECT ONLY - \$63.00
W6's add 5% California sales tax. Send check or money order (\$15.00 deposit on C.O.D.'s)

Price F.O.B. factory.

to: **Unique PRODUCTS COMPANY**

1003 SOUTH FIRCREFT STREET
WEST COVINA, CALIFORNIA 91791
TEL. 213-331-2430

Net	Freq.	Time(Z)/Days	QNT	QTC	Mgr.
G5N	3595	0200/1050/2300 Dy	805	288	K4BA1
GTN	3718	2200 Dy	101	19	WB4SPB
Ga_SSB	3975	0000 Dy	905	62	WB4DMO

Good food, fun and fellowship was the order of the month throughout Georgia during the month of June. The Atlanta Hamfest/Georgia State ARRL Convention was a smashing success. Our hats off to the membership of the Atlanta Radio Club. They obviously put much time and effort into the entire affair. League President Dannels and Southeastern Director Stricter both contributed their fair share toward the success of the Convention. Then came Field Day, even the old weatherman smiled on most of the southeast. Most clubs throughout the state were active and the contacts were fast and furious. K4OWV, the newly elected pres. of the Huntsville, Ala. Radio Club was a recent guest of WA4WQU. Traffic: (May) WB4RUA 197, W4EEP 123, WB4QGN 119, K4BA1 115, W4AMB 56, W4RNL 48, WA4WQU 43, W4CZ2 42, W4PIM 37.

WEST INDIES - SCM, Pedro J. Piza, Jr., KP4AST - SEC: Paul Girard. The Radio Club of Puerto Rico participated in Field Day with 14 operators. KP4QV is very active on 40 meters with the jargonaut from the mobile. KP4DHD has a Tecrex Triband beam. KP4AST moved to a new QTH on top of a 3000-ft. hill. He has a five-element 20-meter at 160-ft, and an eleven-element 6-meter at 170-ft. KP4RD and KP4BMJ were in Europe for vacations. KP4DEX is getting a new triband beam. KV4HZ and KP4AST worked VP8KF on 160 meters. KP4BQ moved to a new QTH. Traffic: KP4WT 139.

WESTERN FLORIDA - SCM, Frank M. Butler, Jr., W4RKH - SEC: WA1KB, RM: K4LAN, RTTY: W4WEB, PAM: WA4IZM, VHF: WB4KGW. Net time for W. Fla. Phone Net is 2300Z. Groups taking part in FD included W4UC/4, WA4ECY/4, WB2LVW/4, K4HOX/4, W4NN/4, WB4VCZ/4, W4RYZ/4 and W4GGU/4. Pensacola: WN4ABF is a new ham. WB4ONW is now an NCS on the WFPN. Three local clubs joined to operate W4UC/4 for four days in Cordova Mall shopping center. Much of the operating was done by WB9AIU/4. K0BAD/4 had a fine PSHR score of 61 this month. WB4QEO repeater was hit by lightning but is OK now. K4SVX visited ARRL Hq, and W1AW. Port Walton: New ham WN4ZVS is owner of a local BC station! WA5FJV/4 and WA4WCT are on 449.1

fin and planning a 450 MHz repeater. A section LO/EC meeting, arranged by K4CLM, drew a large crowd. The old police station, local club meeting place, received a face-lifting by PARC members. Hurricane Agnes, followed by tornados, damaged a number of antenna farms. W4UXW and WB4HTT, aided by W3ZVT, are assembling a 20-ft. sailboat kit. Panama City: W6DSD/4 is new EC for Bay County. WB5AXD/4 now operates 15 and 20 meters from HL9TK. Port St. Joe: W4INU works at the Cape San Blas tracking station. Apalachicola: K4BDY provided the only communications for the Weather Bureau radar during part of Hurricane Agnes. Quincy: K4QDN runs an F1DX-560. Tallahassee: WN4VPL earned a QFTN Net certificate. Traffic: K0BAD/4 239, W4RKH 18, WA1KB 6.

SOUTHWESTERN DIVISION

ARIZONA - SCM, Gary M. Hamman, W7CAF - SEC: K7GPZ, RM: K7NHL, PAM: W7UXZ. The following is a list of some of the groups that participated in Field Day:

Call	Group Name	Contacts	Transmitters
W7YE	Mountain Moguls	3,000	4
W7IO	Ariz. ARC	1,162	3
WA7APE	Scottsdale ARC	520	4
W7GV	Old Pueblo ARC	377	3
WA7LAZ	Hualapai ARC	273	1

Open 2-meter repeaters operating in Ariz. with their approximate radius of coverage to a mobile unit are:

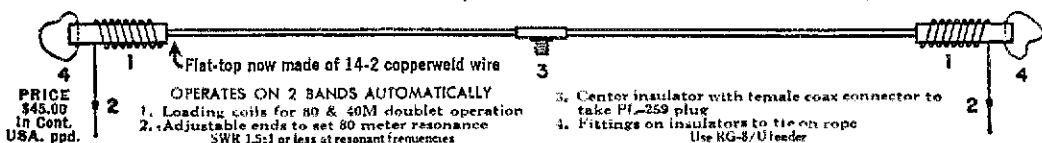
Call	Location	Coverage	Input/Output
W7AJU	Mingus Mountain	70 mi.	146.161/76
WA7CEM	Phoenix	30 mi.	146.161/76
WA7CEM	Phoenix	40 mi.	146.34/94
WA7HUH	Globe (KACLS)	100 mi.	145.68/146.85
WA7KYT	Bisbee	40 mi.	146.34/94
WA7LAZ	Kingman	100 mi.	146.34/94
WA7LBB	Show Low	60 mi.	146.34/94
WA7KZW	Tucson	20 mi.	146.34/94
K7VOR	Phoenix	30 mi.	146.04/28

Section net awards were earned by WA7HIT, WA7JCK, WA7KOE, K7MTZ, WA7NHQ and K7RLT. Traffic: K7NTG 232, K7MTZ 148, W7PG 50, W7CAF 30, W7DOS 29, WA7QVN 17, WA7NOA 12, W7LLO 10, WA7JCK 3, K7ZMA 1.

LRL-70 ANTENNA

70' LONG, 80 & 40 M

Power rating 2 Kw, P.E.P. or over



LATIN RADIO LABORATORIES

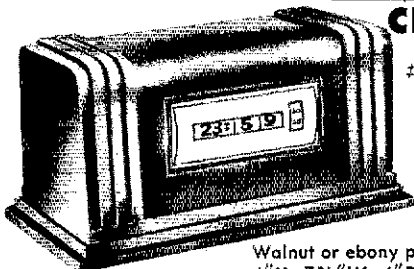
Box 44

Owensboro, Kentucky 42301

TYMETER
"Time At A Glance"
DIGITAL CLOCKS



24 HOUR CLOCK



#100-24H

\$16

Made in U.S.A.

Walnut or ebony plastic case. 4"H, 7 3/4"W, 4"D. 110V 60 cy. Guaranteed One Year.

At Your Dealer, or DIRECT FROM

PENNWOOD NUMECHRON CO.

DIVISION OF LCA CORPORATION

7749 FRANKSTOWN AVE.

PITTSBURGH, PA. 15208



Emblem Decals



Attractive black and gold ARRL emblem decals are available to League members from Headquarters. They measure approximately 4 by 2 inches, will adhere to almost any surface, metal, glass, wood, plastic, and come complete with directions for applying. Use them to dress up your car, station equipment and shack. They're supplied at 10 cents each — no stamps, please — to cover costs.

AMERICAN RADIO RELAY LEAGUE

Newington, Connecticut 06111

PHASE TWO

**BASE MOUNTED
SILICON
HIGH VOLTAGE
RECTIFIERS**



FEATURES

- Rectified output current of 1.0 amperes at 55°C.
- Voltage types from 5000 to 10,000 volts.
- Rugged construction featuring the use of non-cavity glassivated diode elements with all diode inter-connections welded.
- Value engineered over the similar numbered JEDEC types.
- Capable of meeting the requirements of MIL-S-19500/418 (except for I surge).
- Available in 1-99 quantities either off the shelf or within 2 weeks.

BASIC RATINGS

TYPE NO.	PRV V peak	I_o (T _{case} = 55°C) A av	I surge (1 ~ 50μs) A peak	PRICING \$ 1.99
RC5477	5000	1.0	50	5.70
RC5478	6000	1.0	50	6.40
RC5479	7000	1.0	50	7.00
RC5480	8000	1.0	50	7.70
RC5481	10,000	1.0	50	8.50

FOR MORE INFORMATION CONTACT:

RECTIFIER COMPONENTS CORP.

124 ALBANY AVE. FREEPORT, N.Y. 11520 TELEPHONE: 516-868-0470

**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 50-072
Washington, D.C. 20016

• Please send me information on Amateur Radio training.

• Name _____ Age _____

• Address _____

• City _____ State _____ Zip _____

• ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL

.....

Yes!



I would like to become a member of ARRL and help support its many services to amateurs and amateur radio. Here's my \$7.50 (\$8.50 in Canada, \$9.00 elsewhere). Sign me up for a year's membership and twelve big issues of QST! Additional family members at the same U. S. or Canadian address, memberships only (no QST) \$2.00.

My nameCall.....

Street

CityState.....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-9-72

LOS ANGELES - SCM, Eugene H. Violino, W6INH - SEC: WA6QZY. Field Day is over and a total of 14 clubs sent in FD report messages. The OOTC group had a day in the mountains (Mt. Wilson) guests of W6MAB visiting the local TV transmitting stations. 60 members took the Sun. outing. W6QLL, past pres. of the Long Beach Club is still very active in club affairs. Requests come in for clubs that have code and theory classes so please let me know the particulars if your club has such classes. The So. Calif. DX Club meets the first Thur. each month at Cliftons. The Antelope Valley Club did not have a Field Day this year. WA6OFC has been in the hospital. Santa Clarita Club held transmitter hunt in July and annual picnic in Aug. The Ramona Radio Club participated in operation "disaster" with the city of San Gabriel. It was very successful. WB6GGO plans to have a few drills to keep the gang on their toes. Those interested in licensing classes should get in touch with secy. WN6GLZ of the San Gabriel Club. The TRW Club also has code and theory classes for those in that area. WB6WFI expects to have new equipment on the air for RTTY, also operated portable from the desert, with WA6BLK. W6MLZ has been named publicity chmn. for the QCWA chapter. WB6D01 operated mobile VE6, VE7, VE8 and K17 from July to Sept. 10. W7GAQ/6 collecting old telegraph keys. WB6HDJ who is 14 years old passed his Advanced Class and also built homebrew keyer and swr meter. WA6GSV reports that WA6DQR, WA6GGK, WB6ATV, WA6CTB are operating Facsimile on two meters. WA6ZKJ finally made WAS. I am glad to see that a lot of the fellows are checking their appointment expiration dates and sending their certificates in for endorsement. We will miss K6EA while he and XYL are vacationing at Lake Bemidji, Minn. W6OK was nominated to board of SCDXC. WA6MFM working on 10-ft. portable dish for 1240 MHz, also worked K7ZMA repeater in Kingman, Ariz. from Mt. Fraizer, with 10 watts. WA6MOD picked up an emergency call through W6FNO repeater about fire at Lake Arrowhead, he contacted the forest service and the fire was contained. W6RCV taking it easy till Sept. when conditions improve. WA6OWJ would like to have a get-together with OO appointees in the section, that makes two who want a meeting, any more interested parties? K6BUU now sporting new linear on 15 and 20 meters. Traffic: WB6BBO 553, W6INH 259, W6MLF 238, W6LYY 101, W6QEO 58, WA6ZKJ 41, WA6AAW 40, W6IVC 35, WB6PKA 35, W6QAE 35, WB6KKG 27, K6OPH 20, W6BYIZ 13, K6EA 10, WB6TPO 4, WB6SSZ 3.

ORANGE - SCM, Jerry L. Verduff, W6MNY - Asst. SCM: Richard W. Bierbeck, K6CID. SEC: WB6CQR. PAM: K6YCI. RMs: WB6AKR, W6BNX. WA6DBX is a new OBS for Novice band bulletin transmissions Sun. and Mon. at 2100 on 21111 kHz and 2130 on 3725 kHz at 10 wpm. W6VOZ's neighbor WB6PPC received his General Class ticket and poses QRM since he is 4 blocks away. WA6NDA has moved to Santa Rosa. W6BNX was the subject of a feature writeup in the Orange County REGISTER regarding his communications assistance to the So. Dak. floods. WB6AKR has a new Hy Gain three-element beam. W6I B reports the Desert RATS club is building a 2-meter fm repeater. WB6ASR and WB6RAL are building 4CX-250 amplifiers for 220 MHz. K6YNB, K6GJD and K6SVL obtained 1751 QSOs from Sierra Peak in Field Day which is an all time high for Class-1A operation. Field Day messages were received by the SCM from the following clubs/groups: Anaheim ARA, K6SYU/6; Barstow ARC, WA6TST; Citrus Belt ARC, W6JBT/6; Fullerton RC, W6ULI/6; Individual group, K6PJC/6; Newport ARS, W6MRQ/6; Riverside County ARA, W6TJ/6; San Bernardino County CD, W6CV/6. This represents a total of over 97 operators and 44 AREC/RACES members, all reporting excellent band conditions. WB6ZOK received a new electronic fist and squeeze key for his birthday. The San Bernardino Co. repeater, WA6ALV now is also operational on 220 MHz; 221.860 input, 224.860 output. My thanks to all of you for your excellent support these past 3 years. I have enjoyed serving as your SCM. Send your future reports to Acting SCM Bill Weise, W6CPB, 1753 Iowa St., Costa Mesa 92626. 73 to all! PSHR: W6MNY 46, WA6TVA 39, WB6AKR 36, WB6JOT 30. Traffic: WB6VTK 254, W6MNY 100, WB6AKR 67, W6ISIC 62, W6WRJ 51, WA6YWS 35, K6YCI 23, K6GGS 20, WA6TVA 14, W6QBD 9, W6CPB 8.

SAN DIEGO - SCM, Paul C. Thompson, W6SRS - Asst. SCM: Art Smith, W6INI. SEC: W6TAL. RM: W6LRU. Congratulations on the fine participation in Field Day throughout the section. This event gives us a fine chance to use our emergency preparedness learning in an actual event. Group picnics were held throughout the summer. Amateur Radio Week was proclaimed by the San Diego County Board of Supervisors, the City of San Diego and the City of El Cajon between June 18 and 24, 1972. Super FD 4 Om rhombic by WA6GYR and WA6LCZ. New 2-meter fm gear for WA6KZN, WA6CUW, WA6UGG and W6SRS. Murphy visited W6DEF on FD. New RATT converter for K6ROR. Thanks to W6VNO for his

I would 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

- ARRL HANDBOOK \$4.50
The standard comprehensive manual of amateur radiocommunication
- UNDERSTANDING AMATEUR RADIO \$2.50
Written for the beginner—theory and how-to-build it.
- VHF MANUAL \$2.50
A new and thorough treatment of the amateur v.h.f. field
- LICENSE MANUAL \$1.00
Complete text of amateur regs, plus Q&A for amateur exams
- HOW TO BECOME A RADIO AMATEUR \$1.00
All about amateur radio and how to get started

- A COURSE IN RADIO FUNDAMENTALS \$1.00
Use this in conjunction with the Handbook
- ANTENNA BOOK \$2.50
Theory and construction of antennas
- SINGLE SIDEBAND FOR THE RADIO AMATEUR \$3.00
The best s.s.b. articles from QST
- THE MOBILE MANUAL \$2.50
The best mobile articles from QST
- HINTS AND KINKS \$1.00
300 practical ideas for your hamshack
- 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

QS-9-72

efforts as Dir. TCC Pacific. WA6BDW announced his retirement from the P.O. WA6AMK is pinch hitting on PAN. Listen for WA6DMB OBS schedules. K6EC and W6MAR are busy as OOs. W6JOU is filling RN6 and PAN sessions. Murphy's Lawyers operated FD from Paradise Mt. The annual meeting of the Confusion Net was held in San Diego with members coming from Guam, Yak, Okinawa and other Pacific Islands. AREC numbers are growing. This is your opportunity to become part of this important team. Plan on attending the SW Division Convention in Santa Maria in Oct. PSHR: W6BGF 38. Traffic: W6BGF 373. W6VNO 292. W6JOU 264. WA6AMK 191. WB6HMY 114. W6DEY 29. W6SR5 10. W6TAI 5.

SANTA BARBARA - SCM, D. Paul Gagnon, WA6DEI - RM: W6UJ. PAM: K6EVQ. My new address is 1791 Hedon Circle, Camarillo, 93010. Several clubs/groups were heard on Field Day. Conejo, W6HE; Mike and Key, W6DM; Satellite, W6AB; Santa Barbara, W6LUC; Paso Robles/Estero, W6LKF; Ventura County, K6MEP; Explorer Scouts, WA6UOW. Section net certificates have been earned by Wes DKQ, IDU, KW, NY, OAL; K6s CFI, ELO, EVQ, TOE, YHK; WA6s DDO, DEI, DHS, FHH, GCR, KRA, PFF; WB6s ECM, EDG, GRW, IMM, PGK, PYD, VGC. The big SW Division Convention is in Santa Maria Oct. 21, 22. WA6GEN is now Advanced Class and working 20 and 40 cw. W6MUL was married on FD week end. WB6MXM hosted the Mission Trail Net annual Roundup in Oxnard. WA6TMO made 7 intruder watch reports in June. K6GHI is designing 1- and 5-watt solid state rigs for 2-meter fm and is modifying repeater WA6SIN for 450. K6CFJ now has his tower and tri-bander up over Camarillo. Advisors WB6MWJ and K6VIE took 18 explorer scouts on Field Day for some first hand emergency operating experience. OO WB6BWZ mobilized across the country to Fla. where he is TDY working on the SKYLAB program. The Ventura County Emergency plan is a great plan. Contact EC: K6VBX or asst. ECs K6CFJ, K6YLQ or WB6BOQ to get your assignment. Op Aids 4, 9B and 13 should be "under the glass" at all stations. They are free for an SASE from ARRL. PSHR: WA6DEI. Traffic: (June) WA6DEI 210, WA6MBZ 106, WB6MXM 59, W6LKF 8, W6JTA 7, WA6TMO 6, W6MQP 4, K6YLQ 2. (May) WA6JOX 6.

WEST GULF DIVISION

NORTHERN TEXAS - SCM, L.E. Harrison, W5LR - Asst. SCM: Frank A. Sewell, W5IZU. SEC: WA5VJW, PAM: W5BOO. RM: W5QGZ. Thanks for support given W5IZU. Enjoyed some 2000 mile visits with hams including 3925, 3930, 3970 groups plus Temple, Maurvaul, Quitman, QCWA Tyler. OBS approved for W5JAX. Temple ARC June meeting featured SSTV and FD activities reports 700+ contacts made. Garland ARC reports KSKJR on RTTY and WA5DJR chasing counties. TTN held 31 sessions in May, 189 QTC and 1450 check-ins. OO W5QPX submitted over 60 observations. FB gil. SEC: WA5VJW continues to file her reports for 100% participation. W5HT sold SCM 2-meter transmitter T-278 and it works FB. G.M. Howard, Dallas FCC O-in-C, ex-SKK retired from service after 34 years. 2 meters are open and Texoma hamfest is near. W5NT is one of few people who placed his gripes in writing to the proper people. W5HIP Pottsboro, ex-Dallas OT would like to hear from some of the fellows. ARRL pres. Dannels will attend Texoma Hamfest scheduled for Oct. 27 to 29. He may accept other invitations to address clubs in the area. Your Dir. can help you if your club is interested. W5TI is to be congratulated on his work and interest in the OO program. While I think of it, any you guys and gals know where I may contact the following: K5OIF, W5CBT, W5TVS, WA5QWA, WA5MUQ, W5UJF and W5DJW. W5SFX is busy with phone patches from overseas. W5SGRZ is new on 15 meters, searching for Novice net. KC Club FTW reports W5MBO and XYL transferred to Hawaii; W5SELW passed his General. Some 90 people showed up for May meeting. W5TI says thanks W5ZNO for food. W5NFGM and W5NFGN assisted with drinks. Thanks to the many clubs for sending FD messages. Traffic: W5TI 254, W5QU 175, W5SEEE 81, W5SHN 53, WA5RUF 23, W5LR 20, W5IAR 18, W5SFW 14, W5SFX 11, K5SXXO 8, W5IZU 3, W5FC 1. W5QGZ 1.

OKLAHOMA - SCM, Cecil C. Cash, W5PML - Asst. SCM: Joe M. Schlosser, WA5IMO. SEC: WA5FSN. RM: W5RR. PAMs: W5MFX, WA5WHV, K5DLE and WA5ZRU. June is the big month with the VHF Party and FD. To top it all off we had an all Oklahoma free picnic at Okla. City, the first of which we hope to make an annual affair. It is a two day camp out and picnic and next time it will be the first week end in June. We think this year was a great success with about 150 attending. W5SAXH was active during the Rapid City flood handling traffic into Okla. City. W5JJ is batching it for about six weeks while his wife visits their son

NOVICES

Need Help For Your General?

Recorded Audio-Visual
THEORY INSTRUCTION
EASY - FAST - PROVEN

No Electronics Background Necessary

13 RECORDED THEORY LESSONS WITH
ILLUSTRATED STUDY GUIDE

Electron Theory - Math - Resistance - Voltage Drops - AC Inductance - Capacitance - Tubes & Transistors - RF-Amplifiers - Oscillators - TVI - Power Supplies - Modulation

CASSETTES \$49.95 REEL TO REEL \$44.95

For Additional Free Information:

AMATEUR LICENSE INSTRUCTION

P. O. Box 6015 Norfolk, VA 23508

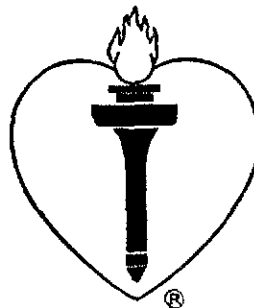
NEW SB-144

FM TRANSCEIVER, 12 channels complete with xtals for 146.16/146.76, 146.34/146.94, and 146.94/146.94, dynamic mic., "S" and output meter, ceramic filter, back lighted dial, FET front end, double conversion, tiltable mobile bracket, 12V DC built in. (Amateur net \$239.95) OUR LOW INTRODUCTORY PRICE \$199.95. With AC supply (reg. \$259.95) \$229.45. Write for literature.

AMATEUR-WHOLESALE ELECTRONICS
8817 S.W. 129 Terrace, Miami FL 33156
Telephone 305-233-3631

Your Heart Fund Fights

HEART ATTACK
STROKE
HIGH BLOOD
PRESSURE
INBORN HEART
DEFECTS



CQ de W2KUW

WANTED FOR CASH

APN84, HP612, ARC 51's, Eimac/Varian Tubes
618T3 T/R, 304TL tubes, 490T Antenna Tuners,
Collins 51RV 51S1 51V4 51Y4 51Z4 621A 728 860E
SG2 479 618M, or any other Collins item.

Fall Specials For Sale

Tektronix 105/107/108/109 ea.	\$ 65.00
Tektronix 128	35.00
Tektronix 181	75.00
Tektronix 190S.G.	75.00
HP185B with dual trace	250.00
HP120A	150.00
HP122AR	225.00
HP330B	200.00
GR1605A Imp. Comp.	150.00
Krohn Hite Band Pass Filter Model 330A	125.00
Fluke 801	75.00
R388/51J3	250.00
R390 plain	395.00
R390A excellent	585.00
R390A new	750.00
R391 excellent	395.00
R392 excellent	350.00
51S1	895.00
SP600JX	295.00

Sierra Electronics 340B Envelope Delay Test Set Current Production Item. Cost \$5,000. Our Special	1,250.00
Measurements 65-B	175.00

(This is a partial listing of hundreds of test items available. Write for specific requirements)

We will buy for cash any tube, transceiver, receiver, or test gear at 5% over prevailing market price.

The Ted Dames Company

308 Hickory Street Arlington, N.J. 07032
(201) 998-4246 Nites (201) 998-6475

WSTKC in Germany. K5OTM is one of the most active members of OLZ and RNS. We are sure happy to see OLZ keep up steam. Field Day reports were received from W5HTK, W5LOW, W5EKL, K5VOZ and W5JP. Congratulations to new General Class WB5FQI and double congrats to WB5BJN and WB5ETT for going all the way from Novice to Advanced. New officers of the Lawton Ft.-Sill ARC are WA5JFY, pres.; W5FW, vice-pres.; WNSFEP, secy.-treas. Traffic: K5TEY 536, W5RB 76, W5SAXH 49, W5FKL 31, W5ZOO 31, W5MFX 27, W5PML 22, K5OTM 14, W5SAZS 11, WB5CWX 11, K5WPP 10, K5COX 8, W5SFSN 7, W5WRC 4, W5AOUV 3.

SOUTHERN TEXAS - SCM, E. Lee Ulfrey, K5HZR - SEC; K5HXR. PAM: W5KLV. RM: W5SSE. Congratulations to new ECs W5HWY and W5AMIN; OO W5SOW; OPS WB5CUR; OVS: W5AQCP and W5ZDU. OO reports received from K5HHA, W5AMIN, W5RBB and K5SBR. K5ROZ again made PSHR, OVS W5AQCP and W5ZDU report good vhf openings during June. New officers for STEN are: W5WR, NCS; W5FA, alt. NCS; W5KLV, secy.-treas. OBS/ORS W5ABQ did some pmch-hitting for RM W5SSE during June. OPS WB5BGV visited ARRL Hq. and WIAW and says he worked WIAW on 146 MHz. EC W5ICL advises that Orange ARC participated in SET with Red Cross on Field Day. Club stations of So. Tex. heard on FD: W5DPA, W5DX (TSARC), W5ES, W5KA, W5ND, W5SC and K5SKE (GAYLARCS). WB5CTH says Colo. County Club active on FD. EC W5KR has retired but not from radio and should be more active. W5VE and K5VUY became Silent Keys during the month.

Net	KHz	Sess.	QNT	QTC
TN*	3961	30	1405	102
7290 Tfc	7290	44	1955	728

*NTS. Traffic: WB5CUR 151, W5AMUM 115, W5B5WV 96, W5FJN 96, W5HWY 95, W5YXS 91, W5ABO 74, W5ATI 67, K5HVI 63, K5EFH 62, K5HZR 61, W5VW 59, W5YEA 56, W5ZDU 55, W5ZPD 40, W7WAH/5 37, W5TFW 32, K5RVF 18, W5BHO 13, K5ROZ 13, W5JFZ 12, W5SGBT 11, W5UKN 8, K5WQM 7, W5RBB 5, W5S5GV 4, K5HUA 3, W5KLV 3.

CANADIAN DIVISION

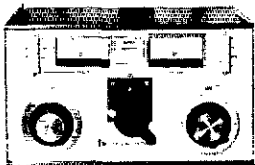
ALBERTA - SCM, Don Sutherland, VE6FK - Asst. SCM; Mrs. Donez Booth, VE6YL. SEC: VE6XC. PAM: VE6ALQ. FD is over and with it the worst WX of the summer. Congrats to the Hat Man Club and the Cold Lake Club for their fine efforts. The annual CARL picnic was hampered by bad WX. However, the ARLA meeting formed a VHF Freq. Advisory Committee with two members - VE6LH and VE6ABW. Conditions have been poor for the APSN. VE6AQF continues to be a real work horse on the net. EC VE6FM reports a very successful communication effort during the March for Man. An amazing amount of traffic was handled, thanks to RTTY. EC VE6AGZ reports good success with the communications provided for the endurance test by the Vulcan Light Horde Assn. When planning your fall activities - put the Jubilee Hamfest of the NARC at the top of your list. CARA is also celebrating their 50th year, expect this should bring a large contingent to Edmonton Sept. 16 and 17. Ex-VE6TM sends his best 73 to all his old friends. Traffic: VE6FK 26, VE6FV 5, VE6SS 4, VE6YW 4, VE6AWK 3, VE6FS 2, VE6AVV 1, VE6AWF 1.

BRITISH COLUMBIA - SCM, H.L. Savage, VE7FB - Holidays somewhere in the hills of Oregon. I've heard of "County Hunters Certificate," out here we have covered many counties and it seems to have no amateurs visible or even in some places no people! I suggest that come next year they sponsor "me" as a rare county DX station and we visit again this fantastic Central Oregon and work county hunters, Hi. Field Day reports and contacts - it seems again the B.C. section was out in force even against adverse weather, snow, rain and cold. The British Columbia CN and BIB funds for equipping blind amateurs with radio gear received a big shot in the arm from Canadian Pacific ARA, Point Grey ARC, also the Kiwanis Kerrisdale Branch. Vancouver Island Picnic at Nanaimo and QCWA party week later in Victoria was well attended and very good activities.

MANITOBA - SCM, Steve Fink, VE4FQ - Field Day has come and gone. Hope you had a chance to participate. Reports were received from VE4s DD/4, MB/4, KE/4 and EA/4. Elin Elin EC: VE4NW reports the appointments of VE4HH and VE4NC as asst. ECs. Welcome. VE4MA has been going great guns on 6 meters, working KP4 on July 2. Andy's also been welcoming some vhf/uhf visitors at the QTH. Premier Schreyer proclaimed July 9-15 as Amateur Radio Week. VE4EW leaves shortly for Botswana for about one year and hopes to be on with an A2 call. Your SCM finally lost an antenna after five years; previously we stuck to lawn mowers - coax cables. MTN: 17 sessions, 36 QNT, 15 QTC. MFPN:

The ALPHA SEVENTY

New Model PA-77



Eimac 8877 Air-Cooled • final 1500 watts dissipation • 4000 volts plate voltage • 25 mfd oil-filled capacitor • vacuum variable tuning capacitor • vacuum relays for T/R switching • 6000 volt-20 amp Bandswitch • 3000 watts PEP continuous duty • 1500 watt continuous duty transformer • Ultra-Quiet—Ultra-cool • only 9½"x17"x18"—70 lbs • it's perfection for \$1795.

If you want to move up to the BEST, give DON PAYNE, K4ID, a call for personalized service, a brochure, and a KING-SIZE trade-in on any gear you have—one piece—or the whole station.

PAYNE RADIO

Box 525

Springfield, Tenn. 37172

6 days

Nites - Sundays

(615) 384-5573

(615) 384-5643

30 sessions, 598 QNI, 26 QTC. Traffic: VE4RO 28, VE4CR 14, VE4JA 11, VE4PG 9, VE4HR 7, VE4HA 6, VE4JK 4, VE4AP 3, VE4LN 3, VE4WT 3, VE4QF 2, VE4EJ 1, VE4MB 1, VE4OP 1, VE4PA 1.

MARITIME - SCM, W.D. Jones, VE1AMR - RMs: VE1RO, VO1CA, PAMs: VO1FX, VE1YO. NBARA annual meeting was held in Fredericton on the afternoon of July 1; the newly-elected executives are VE1ABW, pres.; VE1YV, vice-pres.; VE1JJ, treas.; VE1SL, secy. The chicken Bar-BQ was cancelled compliments the WX man. Congratulations to VE1AOG on new Advanced certificate. Welcome to VE1AXH a new amateur, this makes a total of 5 amateurs in the family of VE1IT and VE1AUB with a couple of new certificates planned for next year. VE1APX in St. John has been voted Lion of the year. VE1AAB has earned her WAVO Award, the first White Cane operator to do so. Traffic: VE1ARB 118, VE1RO 99, VE1AMR 51.

ONTARIO - SCM, Holland H. Shepherd, VE3DV - VE3AZS takes over as editor KWARC fine bulletin from VE3CBU. "Ham and His World 1972" will once again be hosted by VE3OSC at Ont. Science Centre, Don Mills, Oct. 18 through 22. A new addition to the exhibits will be a complete message handling booth. VE3EMO has taken over as mgr. of the popular Pot Hole Net which meets every Sat. and Sun. on 3760 kHz. Ont. has unique distinction of being only province not issuing amateur license plates, but let me assure you it wasn't through lack of effort on our part. Trans-Canada Net Sat. sessions moved to 14.130 MHz. DXers should check into the Commonwealth Net on 21.354 MHz for some of those hard to get prefixes. SARC Award is easier to earn when you check into the SARC Net which starts at 1030 EDST on 28.400 MHz then moves to 3760 kHz at 1100 EDST. RSO, under VE3BC, is compiling list of 2-meter and 75-meter mobiles in Ont. for emergency use. Send information to RSO, Box 334, Toronto S50. Best wishes to VE3GKR, newly-licensed White Caner, and to his sponsor, VE3TW. Congratulations to WSRC, and the personal efforts of VE3AR, VE3FZL and VE3CWN for collecting \$1773.00 for CNIB program for putting White Caners on the air. A sincere welcome to our wonderful world of amateur radio to the OARC's 1971-72 beginner's class graduates VE3AMN, VE3GKC, VE3EYJ and A. Karlenick and Mike Husik who are awaiting their calls. Ont. has moved from county-wide responsibility to city/town responsibility for ECs in the Ont. AREC. Majority of communications, it is hoped, will take place through 2-meter repeaters and 2-meter simplex mobiles. Traffic: (June) VE3SB 203, VE3DPO 102, VE3GT 44, VE3ATR 25, VE3LHt 25, VE3BHC 21, VE3DU 21, VE3ASZ 20, VE3GJG 20, VE3GBR 19, VE3EHL 11. (May) VE3ERU 119, VE3AWE 54, VE3DOC 14, VE3AJU 1.

QUEBEC - SCM, Joe Unsworth, VE2ALE - VE2APT and VE2BON are new Advanced Class licensees. VE2IS was visited by a VE7 and VE2JD visited by a VE6 and VE4HE is portable in Montreal area for a few weeks. VE2JO was down to see K3AY. RAQI convention a etc tres bon avec beaucoup de bonne forum en technique et diverse activite et aussi les clubs MARC et VE2RM ont pris part, avec: VE2XW. Des message de Field Day ont etc recu de les stations VE2GA/p2, VE2VYR/p2, et VE2BDM/p2, malheureux que les Auteurs qui a etc actif sont pas avec vous les messages. New calls heard on 2 meters, VE2BBK and VE2BKA, VE2DU and VE2DIT. It is now hopeful that in next few months that there will be an SEC appointment and the AREC in the Quebec section will be reorganized. The VE2RM club met with W2DZN to discuss inter communication by 2 and 3/4 meters. VE2WM and XYL are now in Ottawa for about six weeks. VE2BMQ showed the VE2RM club project frequency counter to those interested at the RAQI convention with direct readout on 2 meters with an accuracy of one part per million. VE2JO assisted by VE2ALE on the slide projector gave an excellent talk on the five year history of VE2RM. VE2AYP and family spent a few weeks in the Montreal area on vacation. PSHR: VE2APT 30, Traffic: VE2DR 54, VE2DLG 52, VE2LV 37, VE2BP 35, VE2ALE 20, VE2EC 15, VE2APT 12, VE2UY 6.

SASKATCHEWAN - SCM, Barry Ogden, VE5BO - Have heard excellent reports re relaying mobile traffic by various VE5s and VE6s (especially from the mountainous areas near Banff-Jasper). There has been quite a bit of unintentional QRM caused by some operating on, or very close to, the nets and running into, and past the starting time causing a delay in net operations. Please take time to become familiar with net frequencies and operating times. VE5CU ably filled in for yor truly at the ARRL meeting at the Hamfest in Moose Jaw and provided an FB explanation of League organization and activities. Amateur radio exists because it provides a service. Get in the stream and enjoy the trip! Traffic: VE5KF 36, VE5BO 17, VE5HP 6, VE5RE 6, VE5OH 2, VE5SN 2, VE5GF 1, VE5LC 1, VE5SE 1, VESTA 1.



SATURN SIX MOBILEER
S-2 6M Ant. only \$12.50
S-1 Ant, Mast & Mnt 17.75
3L 6M Hilltopper 14.95
8L 2M Hilltopper 16.95

Also 6&2 Lunenburg Beams, Halos, Hula-Hoops
HI-PAR PROD. Box 88 FITCH, MASS. 01420

RADIO TELETYPE EQUIPMENT

Teletype Models 35, 33, 32, 29, 28 ASR, 28 KSR, 28 LPR, 28 LRX Reperf-trans. 3 speed., 28 LXI, 28 LBXD1, 14, 15, 19, Page Printers, Performers, Re-performers, Trans-Dist. polar relays, tape winders, cabinets. Collins Receivers, 51J-3, 51J-4, R-388, R-390A. Frequency Shift Converters.

ALLTRONICS-HOWARD CO.

Box 19, Boston, Mass. 02101 Tel: 617-742-0048

NEW DIAL TELEPHONES

Wall mount, color light grey, bell compatible, Model SSB2901, Belgian made Prepaid U.S.A. \$20.00 each
H.P. 200AB, Audio Oscillator, 20HZ to 40KHZ, like new. Prepaid U.S.A. \$200.00 each
New, Mobile Communications Mike, low impedance dynamic type, push to talk switch, curly cord, no hanger. English made. Prepaid U.S.A. 2 for \$6.00
LEEDS RADIO CO. 570 Warren St., New York, N.Y. 10007
Tel: (212)-267-3440

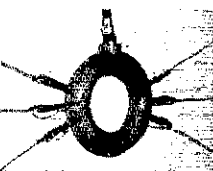
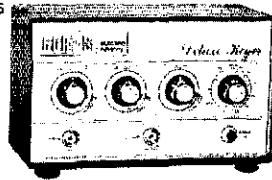
EK-404 DELUXE KEYS \$124.95

- ALL THE FEATURES YOU'VE ASKED FOR
- 115Vdc AND +12Vdc
- READ JAN. 1972 CO AND MAR. 1972 DST FOR REVIEW OF SIMILAR EK-402 PROGRAMMABLE KEYS

WRITE FOR BROCHURES

GRANDS ELECTRO DEVICES

874-4090 MOUNTAIN VIEW CALIFORNIA 94040 TEL 415/454-3176



LOW SWR HI EFFICIENCY
Ring transformers for Quads, Dipoles, Vees, Yagis, and Mobile Antennas. Completely weather proof. Triband Quad units \$24.95, all others \$18.95. Postage prepaid in U.S.A.

H & H ENGINEERING
P.O. Box 68 La Mirada, Calif. 90638

NEW GLADDING 25

FM TRANSCEIVER, 25 WATTS OUTPUT, 6 channels complete with xtals for 146.34/146.76 and 146.94/146.94, low power position, completely separate xmit-rec xtal switching. (Amateur net \$249.95) OUR LOW INTRODUCTORY PRICE \$208.50. With matching AC supply (reg. \$299.95) \$254.00. Write for literature. Ham-M's \$99.00.

AMATEUR-WHOLESALE ELECTRONICS
8817 S.W. 129 Terrace Miami, FL 33156 305-233-3631

KW107 *It's beautiful!*
SUPERMATCH \$134.95
Prod in USA & Canada
Money Back Guarantee

- * E-Z Match Tuner
- * SWR Meter
- * Power Meter
- * Dummy Load
- * Antenna Switch
- * 350 watts PEP

Clean up the untidy tangle of wires around the shack and your wife will think it's beautiful!

KW Electronics



Send for FREE Literature

SSB-SSB-SSB-SSB-SSB-SSB-SSB-SSB-SSB-SSB-SSB

SIMON SIDE BAND COMPANY

Holland Mt. Rd., Oak Ridge, N. J. 07438

201-697-4246

Dealer for Kenwood, Tempo,
Henry Amplifiers, Standard Radio,
Dycomm and SBE

Service to all makes of Ham Radio
Equipment. We sell, buy, and trade all
used equipment. Antennas by - Hy-
Gain, Newtronics, Cush Craft, etc.
Hours: Tues. - Fri. 4:30 - 9:00 P.M.,
(mornings by appointment)



Sat. - 11:00 - 6:00 P.M.

Sun. - 11:00 - 4:00 P.M.

Proprietor - Bert Simon W2UUN

SSB-SSB-SSB-SSB-SSB-SSB-SSB-SSB-SSB-SSB-SSB



I can give you personal service on
helping you select better gear per
dollar for your operating pleasure.
Over 30 years experience. Big trades,
easy terms. Used bargains.

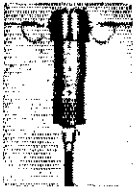
VAN SICKLE RADIO SUPPLY CO.

Gene Van Sickle, W9KJF Owner
4131 N. Keystone Ave.
On the northeast side of
Indianapolis, Indiana 46205

DUAL BAND ANTENNAS

BAND	LENGTH	COST
80/40M	120 ft	\$35.00
40/20	67	29.50
20/15	32	17.50

Single 75 or 50 ohm coax required. Balun
installed - \$15 extra. Postpaid continental
USA. Brochure available. HOUSE OF
DIPOLES, Box 8484, Orlando, Fla. 32806.



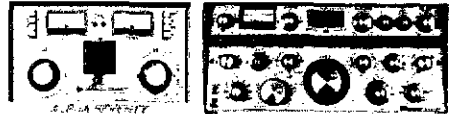
THE "HI-Q-BALUN"

- For Dipoles—Yagis—Inverted V—Doublet
- Puts Power in Antenna
- Full Legal Power 3-40 MC.
- Small—Light—Weather-proof
- 1:1 Impedance Ratio—Coax Fitting
- Yokes Place of Center Insulator
- Built-in Lightning Arrestor
- Helps Eliminate TVI
- Fully guaranteed

\$9.95 PPD
U.S.A

VANGORDEN ENGINEERING
Box 515, Brielle, N.J. 08730

signal/one CX7-A



NEW Alpha 77A - now by CMI • New 8877
final • THE linear for THE CX7-A. YOU
will never know how little it costs to own THE
incomparable prestige CX7-A or ALPHA 77A
until YOU write or phone us the trade-in deal
YOU WANT. We usually say YES.

NO ONE ANYWHERE BEATS OUR DEAL!



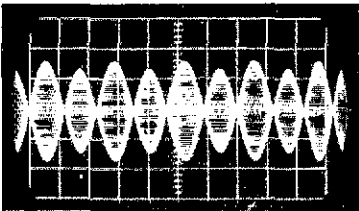
AMATEUR-WHOLESALE ELECTRONICS
8817 S.W. 129 Terrace • Miami, FL 33156
Days (305) 233-3631
Nights-Weekends (305) 666-1347

F.C.C. EXAM MANUAL

The Original Test-Answers exam manual
that prepares you at home for FCC First
and Second class licenses. Includes Up-
dated multiple choice tests and key
schematic diagrams. PLUS - Self-Study
Ability Test. - ONLY \$9.95 Postpaid



COMMAND PRODUCTIONS P.O. BOX 26348-T
RADIO ENGINEERING DIVISION SAN FRANCISCO, CALIF. 94126



Two-tone test pattern with modulation
caused by carrier leak-through.

**WHAT'S
WRONG?**

Proper adjustment of your SSB rig is a must by today's operating standards.
An improperly adjusted transmitter can create havoc on our crowded bands.

The Fifth Edition of SINGLE SIDEBAND for the RADIO AMATEUR has a
complete chapter devoted to adjustment and testing SSB equipment. But
that's not all. You will find construction articles on everything from QRP
transistorized transceivers to high power linear amplifiers.

Fifth Edition \$3.00 in U.S.A. proper \$3.50 elsewhere

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others. No box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 50 cents per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 15 cents per word will apply to advertising which, in our judgement, 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 15-cent 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 50-cent 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 QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., Box 394, Mamaroneck, NY 10543.

PROFESSIONAL CW operators, retired or active, commercial, military, govt, police, etc. invited to join Society of Wireless Pioneers - W7GA/Q6 Box 530, Santa Rosa CA 95402.

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For information contact Rose Ellen Bills, WA2FGS, Secretary, 17 Craig Pl., Pennsville, NJ 08070

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to WB2MBF, Box 532, West Hempstead, NY 11552

AN INVITATION NYC area hams and SWLs are invited to attend NY Radio Club meetings - 2nd Monday of every month, Williams Club, 24 E. 39th St., near Madison Ave., at 8 PM - New membership wanted. Interesting programs.

PEORIA Hamfest - September 17, Peoria, Illinois, same place as last year. For details, see September issue of QST, Hamfest Calendar. Banquet Saturday, Sept. 16 at V Junction, \$5.50 per person. Cocktail hour 5:30 to 8:30, dinner 6:30. Two motels within walking distance. Reservation deadline Sept. 4, cancellation Sept. 11, 150 maximum so get those reservations in early. Hamfest ticket registration \$1.50 advance. For either banquet tickets or advance Hamfest tickets write: Wendell McWilliams, WN9DVI, Box 1, Roma, IL 61562.

FOUNDATION for Amateur Radio Annual Hamfest Sunday, 22 October, 1972, at Gaithersburg, Maryland Fairgrounds.

CINCY Stag Hamfest: The 35th Annual Stag Hamfest will be held on Sunday, September 24, 1972, at the old new Stricker's Grove, on State Route 128, one mile west of Ross (Venice) Ohio. Check local area map for new location. Lots of food, flea market, model aircraft flying, and contests. \$5 cost covers everything. For further info, contact: John Bruning, W9DSR, 6507 Fairbush Ave., Cincinnati, OH 45213

AMERICAN Red Cross emergency R.C. annual hamfest and auction - Sept. 17 at 10:30 A. M. Talks on ATV, fm, and RTTY. Guest speakers and manufacturers reps. \$2 registration. Flyer available. WB2QBP 90-07 Merrick Blvd., Jamaica, NY 11432

ANTIQUÉ Wireless Association National Historical Radio Conference, Smithsonian Institution, Washington, D.C., Sept. 22, 23, 24. Specialized programming for old time operators, historians and collectors. Information write: Lincoln Cundall, W2QY, 69 Boulevard Parkway, Rochester, NY 14612

QSL777 Samples 2be. DeLuxe 25c. Religious 25c. (Deductible) Sackers, W8EDK, Box 218, Holland, MI 49423

TRAVEL-PAK QSL Kit - Send call and 10c; receive your all sample kit in return. Samco, Box 203, Wyanntskill, NY 12198

QSLs, Second to none. Same day service. Samples 25c. Ray, K7HLK, Box 331, Clearfield, UT 84015

PICTURE QSL cards of your shack, etc. from your photograph. 500, \$12.50. 1000, \$16.25. Also unusual non-picture designs. Generous sample pack 25c. Half pound of samples 50c. Raum's, 4154 Fifth St. Philadelphia PA 19140.

QSLs, samples 10c. Fred Leyden W1NZJ 454 Proctor Av. Revere MA 02151.

CREATIVE QSL cards. Personal attention. Imaginative new designs. Send 25c. Receive catalog, samples and refund coupon. Wilkins Printing Box 787-1, Atascadero CA 93422.

SAMPLES 20c. Harry Sims, 3227 Missouri Ave. St. Louis MO. 63115.

QSLs 3-color glossy 100, \$4.50. Rutgers Vari-Typing Service. Free samples. Thomas St. Riegel Ridge, Milford, NJ 08848.

QSLs 300 for \$4.65, samples dime, W9SKR, Ingleside, IL 60041

RUBBER stamps \$1.50 includes tax and postage. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

QSLs "Brownie," W3CJ, 3111 Lehigh, Allentown PA 18103. Samples 10c. Catalog 25c.

DELUXE QSLs, Petty, W2HAZ, PO Box 5237, Trenton NJ 08638. Samples 10c.

COMPLETE QSL catalog 300 cuts, 10 report forms, ink and stock samples, plus ten sample QSLs. 25c. Corneilson's Quality QSLs, 321 Warren St., N. Babylon, NY 11704

3-D QSLs - Increased returns assure users' satisfaction. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Bolles, Little Print Shop, Box 9848, Austin TX 78757.

QSL, SWL, WPE cards, Samples 25c. Log books, file cards, decals. Malgo Press, Box 375 Toledo OH 43601.

QSLs, SWLs, WPE samples 15c. Nicholas & Son Printery, PO Box 11184, Phoenix AZ 85017

FRAME Display, and protect your QSLs with 20 pocket plastic holders. 3 for \$1, 10 for \$3. Prepaid and guaranteed. Tepabco Box 198T Gallatin TN 37066.

QSLs - Thin dime brings samples. Alkanprint, Box 3494, Papago Station, Scottsdale, AZ 85257

Excellent QSLs, reasonable. Samples 25c. W9CL Press, R.R. 1 Box 811, Carmel, IN 46032

QSLs, 3 color glossy, globe, eagle, straight key, ham with earphones on front, report form on back, 100 - \$4.75 postpaid, Rusprint, Box 7975, Kansas City, MO 64115

QSLs 300 for \$4.65, samples dime, W9SKR, Ingleside, IL 60041.

QSLs - custom QSLs, brochure 25c. W1FLX QST, Designs, 20 Britton St., Pittsfield, MA 01201

QSLs - See our new leatherfinish cards before you buy. Samples 10c. Practical Products, Box 1365, Pittsfield, MA 01201

QSL - SWL cards featuring all of the exciting designs of the late Warren Rogers K1AAB. Samples 25c. Jim Patterson, 3013 North Victoria St. Paul MN 55113.

1000 adr labels, 4 lines, \$1.25. L. M. Hamilton, 19509 Flavian Ave., Torrance, CA 90503

GORGEOUS QSLs. Rainbows etc. Top quality! Low Prices! Samples 10c. Refundable. Joe Harms, W4BLQ, Box 158, Edgewater, FL 32032

200 two color QSLs \$5.20, stamp for samples, Mark, WB6NKO, 2534 El Tamas Wey, Carmichael, CA 95608

START Packing! Plane or R. R. tickets, Road-maps. Got 'em? Then you're ready to take off for the gala ARRL Hudson Division Convention, Oct. 21-23, Hilton Motor Inn, Parrytown, N.Y. Plenty of Free Parking. Exhibits, 2-meter FM RTTY, lectures, contests, V1-XYL events, gabfests, N.Y. City sightseeing, Prominent Banquet Speaker. All ya' need to know from Dave Popkin, W2CCF, 303 Tenafly Road, Englewood N.J. 07631.

THE FINDLAY Hamfest is September 10 at Riverside Park in Findlay Ohio. For tickets contact Clark Foltz, W8UN, 122 East Hobart St., Findlay, OH 45840.

WE buy tubes. Maritime International, 834 Hemlock St., Franklin Square, NY 11010

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY 10012.

WIRELESS sets, parts, catalogs, bought, traded, Lavery, 118 N. Wycombe, Lansdowne PA 19050.

WANTED: All types of tubes. Top prices paid for Varian & Eimac. Jaro Electronics Corp. P.O. Box 414, Orlando, Fla. 32802. For fast action call Toll Free: 800-327-7799. Ask for Bob Hoffman.

WANTED: An opportunity to quote your ham needs. 33 years a ham gear dealer. Collins, Drake, Galaxy, Tempo, Kenwood, Ten-Tec, Hy-Gam, and all others. Also \$25,000 inventory used gear. Request list. Chuck, W8UCG, Electronic Distributors, Inc. 1960 Peck St. Muskegon MI 49441. Tel: 616-726-3198

HAM ticket - Amateur radio license course for Novice, General, Advanced, Extra Class. Write for information, Clayton Radio Co., 220 Mira Mar Av., Long Beach CA 90803.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 So. Washington St., Kennewick, WA 99336

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductors and resistors. Astral Electronics, 150 Miller St., Elizabeth NJ 07207. Tel. 201-354-2420

WANTED: Teletype machines, parts Models No. 28, 32, 33, 35, 37. Cash or trade for Drake equipment. Altronics-Howard Co., Box 19, Boston MA 02101. (Tel. day or night 617-742-0048)

VERY inter-esting! Next 6 big issues \$1. "The Ham Trader," Sycamore, IL 60178

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando, FL 32806

WANT wireless (early) magazines and equipment for W4AA historical library. Wayne Nelson, Concord, NC 28025

CAPACITORS - Brand new aluminum Electrolytics, 275uFd at 500vdc. Ten for \$19.50. K4IHP, 6835 Sunnybrook Ln., NE, Atlanta GA 30328

TV camera kits, plans, parts. Go ham TV the easy, economical way, Catalog 25c. ATV Research, Box 453-Q, Dakota City, NE 68731

TELETYPEWRITER machines, parts, bought, sold. S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale, FL 33310

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, PO Box 6015, Norfolk VA 23508.

SWAN OPEN HOUSE! On October 7 and 8, 1972, Swan Electronics will host its second Annual Open House. Enjoy refreshments, plant tours, technical talks, movies, etc. Free prize drawings for licensed amateur radio operators...also, ladies and kids. Located next to Oceanside Airport, overnight trailer and camper facilities will be available. Join the "Talk-in" on 7260 kHz and 146.24 MHz. Don't miss this family affair - include this visit to Swan in your vacation plans. Any questions? Call: 714-757-7525. Swan Electronics - 305 Airport Road, Oceanside, CA 92054.

WANTED: tubes, transistors, equipment, what have you? Bernard Goldstein, W2MNF, Box 257, Canal Station, New York, NY 10013

TOWER climbing safety belt/lanyard \$21.50, prop pitch rotor \$65. T/S 175 frequency meters \$45. 2M handtalker \$50. coax rf switches multiplication \$16-\$48. Free list. Link, 1000 Monroe Tpk., Monroe, CT 06468

PREPARE for ham exams! Use Posi-Check. Original, expertly devised, multiple-choice questions and diagrams covering all areas tested in FCC exams. Keyed answers, explanations, IBM sheets for self-testing. All newly revised and up-dated. General Class \$4.25. Advanced Class \$4.50. Extra Class \$4.75. Each applies to its own class only. First class mailing included. Add 25c per copy for air mail. Send check or money order to Posi-Check, P.O. Box 3564, Urbandale, Des Moines, IA 50322

TOROIDS 88, 44, and 22 mhy - can of five for two (\$2) dollars post paid. M. L. Buchanan, P.O. Box 74, Sequel, CA 95073

GREENE Center Insulators, with or without balun - a tough number to beat - free flyer. Kaufman Industries, Box 817Q, Reeds Ferry, NH 03054

DISCOUNTS! Standard, Sonar, Clegg, Robyn, Mosley, Cush, Craft, Others! Also Marine Gear. Write stating needs. Arena Communications, Dept. C 1169 N. Military Hwy., Norfolk, VA 23502.

100 GUMMED photo stamps, send photo and \$2.50 to L.M. Hamilton, Box 4373 Torrance, CA 90510

WANTED: BC-348 must be in excellent condition, with a-power supply, instruction book, and schematic diagram. John Adams, 312 E. 4th St., Metropolis, IL.

NOVICE crystals 40-15M \$1.60; 80M \$2.10 postpaid. 24-hour shipment. Free flyer. Nat Stinnette Electronics, Tavare, FL 32778.

WANTED to buy: Sensibly priced Measurements Corp. Model 80 signal gen., and Boonton Model 160-A Q meter. Must be clean and in good working order. Also desire to buy RCL impedance bridge. Please state firm price. WICER, ARRL, 225 Main St., Newington, CT 06111.

4CX250Bs - \$5.50 EACH, 4X150As \$3 each 2N3832s \$2.50 each, 3 for \$5.50, with spec sheet. WAZKOL, 207 Woodlawn Ave., Williamstown, NJ 08094.

SELL or trade SBE-SB34, Mic. AC cord, instr. #200 or Collins 516F2 and 135B. Sid Ness W2CTZ/3 7401 New Hampshire Ave., Hyattsville MD 20783.

MINT condition guaranteed: SR-150 with matching A/C, \$295; D/C, \$50; NCX-3 with matching A/C, \$150; Swan 500C with matching A/C, \$385; 32V3, \$149., W9HF, 5005 Indiana, Fort Wayne, IN 46807.

HEATH GC-1A solid state all band receiver \$45. Terado Trav-electric portable ac supply \$50. W2KOY, 850 Richmond Rd., East Meadow, NY 11554.

A SELLOUTH! Collins 500 cycle filter, \$50. DX Engineering special compact for \$293 \$40. Electrovoics 684 with switch in base, \$40. Drake MN-2000 matchbox, \$100. T.O. Keyer with Brown Key, kever modified so all rear controls now up front. Looks good, \$60. QST, 1926 to date, \$150. Mosley CL-33, \$50. Will not ship beam, QST's. KRCR Co. Ed Schneider, PO Box "C", Brooklyn, NY 11204.

AUTOMATIC keyer wanted - for public service code practice program similar to WIAW in the Cincinnati area. Boehme or equivalent variable speed equipment using Wheatstone perforator tape desired. Wheatstone Perforator also needed. Parts information on both above units wanted. Any system using five or eight level teletypewriter tape received on-line also considered. Wen Clayton K4KLB, 140 Eighth Ave., Dayton, KY 41074, 606-581-8805.

TECH Manuals - \$6.50 each: R-388/URR, R-389/URR, R-390/URR, R-390A/URR, R-220/URR. S. Consalvo, W3HJD, 4905 Roanne Dr., Washington, DC 20021

FOR SALE: HQ170, HT32, W2UGM, 66 Columbus, Closter, NJ 07624, 201-768-1884.

GROUNDRED grid filament chokes, 30 amps \$5. Plate chokes 800MA \$3. 3-30MCS. PPUSA48 William Deane, 8831 Sovereign Rd., San Diego, CA 92123.

E-Z WAY Tower, crank-up, layover 40 foot with ground post. Must pick up. WIMZE.

"DON and Bob" new guaranteed buys. SBE144 (249.00 list) 209.95; SBE-450 (399.95) 339.00; Gladding 25 1/2, 50 with AC 255; standard SR825M 299.99; Motorola HE 150 500; Diode 25A/1000PV 39c; Ham-M 9c; TR 44 59.95; Mosley G18 12c; CL36 149.; Hygain TH61XX 139; Hyquad 99.400 Rotor 148.; 20ANS 129; Cetrion 572B/T160L 13.95; KY65 Code ID 5.95; Trixer MW50 229.; MW85 305.; Write Quote note. Prices collect. Mastercharge, BAC. Full warranty, Madison Electronics, 1508 McKinley Houston, TX 77002 7132242668.

DRAKE 2NT mint \$110; HQ 140X gen cov revr, needs alignment \$85.; Contaflex telephoto lens \$85. mint. 1-615-233-1895 WBQBHB

COLLINS: 30L-1 with manuals in mint condition \$350. J. Gordon 8-42 Cedar St., Fairlawn NJ 07410 201-791-5392.

GONSET - Linear Amplifier, GSB 201, 1500 watts PEP, excellent, \$175. Nat Capron, 43-34 172 St. Flushing NY 11358 212-358-3009.

WANTED: R220 in excellent condition. John Raymond, Superior Plating Co., 2500 Post Rd, Fairfield CT 06430.

QST full years, 1957, 58, 60, 61, 63, 65, 66, 67, 68, 69 and assorted since 1945. Also CQ 1960 thru 1965 and assorted since 1955. Make offer. Jack Fath, 1335 Lacebark Trevoise PA 19047.

FOR SALE: Hickok 877 5-inch wide-band oscilloscope with HV probe, variable R.F. input, fine working condition \$100. Helimore high capacity carrier monitor, unused, best offer over \$50.; Lafayette semi-automatic bug, like new, \$8.; Superex amateur headphones, good working condition, \$10.; Homegrown filament checker, \$4.; Lightning arrester, \$3. Michael Benoff WA3BZX, 2850 Livingston St., Allentown PA 18104 215-423-5991.

MOTOROLA 2M fm gear, Mocom-30, D33CMT, 4T, 2R, \$175. U43GCT 2T, 2R Vanguard Preamp, \$125. 140D, 3T-2R Vanguard, \$85. 80D 3T-R-Vanguard, \$65. All with accessories and crystals. Will ship or deliver. WIMBX, 203-758-8858, Prospect CT 06712.

QST - 1925 through 1971; missing: Nov., '46; Aug., Sept., '47; Jan., May, 48; Feb., April, '49; Sept., '53. Make offer. W2BGO.

SURPLUS transistorized NBFM Transceiver 25-50 MHz \$60. DX-60 Transmitter \$40. WB9FHC, 203 Woodbine Wilmette IL 60091.

HEATH SB101 Transceiver, SB200 linear, SB600 Speaker and microphone \$500. HW22 40M Transceiver w/ac power supply \$90. Hammarlund HQ-110C \$75. Triplett 630 Multimeter \$35, all good condition with instruction books; also Gonset 656 Receiver ac/dc power supply \$50. Bob McKenny, W4VFG 6062 Shadyside Ave., North Hollywood, CA 91606, 213-762-7818.

VHF/UHF Wattmeter 0-120W \$55; Lafayette 2M 120W mobile amplifier complete \$75 Measurements 505 Standard Test Set \$50. Swap vhf/uhf gear, list sase. W4API, Box 4095 Arlington VA 22204.

HEATH SB-301 with am cw filters \$200. Heath HX-30 6 meter SSB, cw, amp exciter \$130. Collins R-388 \$300. WB6NTL 1400 Teneighth Way, Sacramento, CA 95818.

FOR SALE or trade: 70EA, 351D2 Collins Mobile Mount for KVM-2/2A \$140. each or will trade for Collins 3-line gear. Distributor and others inquiries invited. Jerry Marshall, Rt. 3 Box 127, Edmond OK 73034.

TEMPO 2000 2kw Linear. Four months old, Like new, \$350. Will ship. John Humphrey WA8UKJ 216-538-3235.

HEATHKIT HW-12 + AC supply excellent condition throughout. \$105 + ship. M.R. Walls, PO 35263, GA Tech, Atlanta GA 30332.

SWAP for receiving equipment, Thomas Register, 7 volumes, each 1600 pages, McEates 4 volumes; Conover-Mast; etc. Need Collins filter F455F821. Kennedy, 791 Greenwich St NYC NY 10014.

SELL: TR4, AC4, MS4, RV4, mint absolutely perfect in every way. Paid \$850 one month ago will sacrifice for \$675. Becoming Chaplain and going overseas. Yelvin WB2VIN 49 Parkville, Brooklyn NY 11230.

TEKTRONIX Sampling Scope with 451/5T1. Fluke 803 ac/dc. EH Research 120B Pulse Generator 10 MHz. Electronic Measurements 2-212A power. Make reasonable offer. G. Capasso 2B Quarry Dr. Wappingers Falls NY 12590

FOR SALE: Heathkit DX-60B and HG-10B \$90. WAZPXW 326 Howell Ave Riverhead NY 11901.

SELL National NCX 500 transceiver, power supply, mint condition, \$275. Test equipment - VTVM, etc. HQ129X, perfect, make offer, W2IAW 187 Central Lynbrook NY 11563.

WANTED: Paris for Linear WB2SMQ, 628 Anchor Ave., Beachwood NJ 08722.

COLLINS 32S3, P/S, 75S3, fine condition, \$700. Hal keyer, Brown key, like new, #40. Accessories. Reason, no time. Pickup or ship UPS. Mt. Forsyth, 904 Glenview Carbondale, IL 62901.

GOING TO College. For sell TR-4, MS-4, AC-4, Adcom 350-12 dc supply. Separate or together; best offer. Pat Boulden, 2109 S. 23rd St. Ft. Smith AR 72901. 501-782-0981.

WANTED: Instruction manual for AMECO two-meter converter, CB-2K, will buy, WA5SMJ Box 402 Amarillo, TX 79105.

SELL: Heathkit SB301 with cw filter \$150. Heathkit SB200 \$150. You pay shipping. Excellent condition, WB4QPH, Clarence W. Wandrey 1549 Findlay St. Deltona FL 32763.

WANTED: Matching speaker for HQ-129X, WIGAM, 14 Ocean View Ave. Tiverton RI 02878.

FOR SALE: HW-100 transceiver, SB-600 spkr, and HP-23A pwr supply \$290, EICO xmtx 720 \$50, HG-10 VFO \$25, HM-15, SWR \$10, and Model 15 w/table \$90. WA0TCM Darell Heiselman, Box 426, Holton KS 66436.

SELL: Collins KWM-2, FM-2 supply, 30L-1, mint condition, manual cables, pks, 3rd \$800, Galaxy V M3, xtal cal, VOX, remote vfo, Delux Station Console, ac supply excellent \$425; TA-33 beam \$40; Hicoec Dynamic Card-a-Matic mod. 123A almost new \$125, WSIXQ, 1212 Chama NE Albuquerque NM 87110.

SB5-34 FOR SALE: little use, expedition canceled. \$225. W3MR 182 Clubhouse Rd. King of Prussia PA 19406

HALLICRAFTERS SX-146 80-10 meter receiver, with .5 and 2.1 KHz filters \$160. WA7QAX, Don Long, 121 J St. SW Quincy WA 98848.

FOR SALE: Swan 500, 117XC, 14X, VOX2. Spare finals. Extremely reliable. Must sell. \$350 or best offer. WA2FYA 518-346-1604.

BTI LK2000 HD, 3KW 3-1000Z amplifier. Six mos. old. Mint \$650. Hubert Box 183 D, RR 2 Millbury OH 43447. Tel. 419-856-8212.

COLLINS 30 8-1 linear, excellent. \$725. Pick up only. W9DQD, 54712 Merrifield Mishawaka, IN 46544 Tel. 219-255-7930.

SELLING 5 meter Deluxe 60W transmitter with Ameco Converter #75, John Mansheitz, W9JCS, 1311 B Fort Madison IA 319-372-2092.

REASONABLE offers considered: Topaz C10WDG 250 watt mobile p.s.; Kupfrin 100 watt mobile p.s.; Gonset 108-128 M.C. aircraft tuner; Gonset audio amplifier/p.s. 110vac use of tuner; shielded ignition coil/distributor cap 6 cyl.; Masco intercoms. 15 watt 6 meter completely self-contained portable linear w/built in p.s. Article QST, Hal Greenlee; Heatsink and diodes Dual Diode System article, 4/66 73 magazine; vibrator p.s.; Ameco 2 met. pre-amp; DN-50 mic. w/p.T.T. stand; 1500 watt fixture and brand new bulb, 110vac. by Busch Stadium St. Louis - ideal for field day night/backyard light up. Richard M. Jacobs, 1301 W. Estes Chicago, IL 60626. 312-338-1975.

HALLICRAFTER, SR150, and PS150 AC \$300; Swan Z50C and 117XC \$300; Drake AC3 \$50. All in good condition. Philip Schwelber, W9GCG, 4536N50 St. Milwaukee WI 53218.

HEATHKIT HR-10B RCVR, un used, \$45. Johnson Viking Adventure, good, \$25. Heathkit CB-1 transceiver \$15. Tom Woods 3975 Interstate 55N Apt. V-6 Jackson MS 39216.

SWAN 500C like new, complete with 117XC power supply xtal Calibrator Vox and Microphone \$400 prefer local buyer W2WY 213-661-4189.

CONTACT us for new or reconditioned Collins, Kenwood, Tempo-One, Drake, Galaxy, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We try to meet any deal and to give you the best service, best price, best terms, top trade-in. Write for price lists. Try us. Henry Radio Butler MO 64750.

COLLINS sale. Collins 32S-3 transmitter less than one year old, SN 1011448 for \$599. Collins 75S-3 receiver mint for \$425. Both above for \$970. Antique Western Electric 4-D receiver for \$120. QST's 1932-1968 for \$100. New Ten-Tec Argonaut, power supply, microphone for only \$225. Want Collins KWM-2A. Write only, Paul Kluewe Edmore MI 48829.

HALLICRAFTER HT-32B Excellent condition first \$170 takes it. Norm Palmer WAZZGE 18 Turner St. Eatontown NJ 07724 201-542-1504.

HAMMARLUND HQ180A general coverage receiver 540 kHz to 30 MHz. Write WA3GPA 295 W. Prospect Ave. Pittsburgh, PA 15205.

Will swap brand new HR-2A for all band s.s.b. xceiver, John C. Gibson, 241 Naval Garden Dr. Middletown RI 02840.

SACRIFICE! 1922 thru 1968 QSTs 46 complete years in yearly holders. \$180. cash. No shipping. Must pick up. W5WQX. 6824 Lucey Dr. Baton Rouge, LA 70811.

FOR SALE: Allied Model A-2515 communications receiver. Excellent condition, \$50, plus postage. James Campiche, Box 535, Long Beach WA 98631.

HW-101 CW FTLT ac, dc pwr. sup's D104 mic, \$350; Gonset 1132-linear, \$200, 6 meter; 6 element H.G. W.S., \$20, 6 meter; CB6 converter WPS \$15, 6 meter; BC 312D rcvr P.S. \$25; HQ 170, \$150. K2JPPZ, Bayshore, LI NY 11706, MO5-8529.

SALE! Brand new Tempo-one, w/ac one supply. Have warranty card. In boxes, ready to ship or demonstrate for pick-up sale. \$350. 516-538-3877. Write: Simon 1694 Linden Place LI NY 11566.

DX100/DX100B with SB10 SSB, \$75 K4CUL 106 Bonaventure, Greenville SC 29607

TOO much gear must sell, same as new, Galaxy GT-550 and ac/speaker \$375. Nice NCK5 mark II and ac/speaker \$350. Nice Hunter Bandit 2000C table top linear full kilowatt \$300. Extra nice KWM-2 and ac/speaker and 30L-1 linear Richard Schark 417 North Ferry Ottumwa, IA 52501 Phone 515-682-5741.

SW3: WITH supply, four ham coils, clean, original \$100, cash. Power supply 3800 VDC 1.5 amp \$75. Pole pig 7000 V 2 amp hypersol core in case, new oil \$40. Cal Sales only W.C. Martin 714-625-1232.

75A4, MINT condition, B & W 5100B-51SB, D104 hand mike, with manuals, working fine \$500, or reasonable offers \$250V-1300VA power supply. Make offer. Raymond H. Reniff WIJZJ, Ashfield, MA 01350, Tel. 413-628-3215.

FOR SALE: matched UTC Linear Standard power supply units. LS-185 HV trans., LS-105 Swing Choke, LS-96 Filter Choke, LS-83 Fil. trans, 5 VAC 60 amp. Delivers 3, 2.5, and 2.1 KVDC at 1.2 amp. CCS, Guaranteed perfect. Will crate and ship freight collect. Reasonable offers considered. George Smith, W5HP, Route 1, Box 137 Pottersboro TX 75076. Tel. 214-786-2713.

POWER sources, Kurz and Root MD26 motor generator 220/100v-100v 400CPS ± 1 CPS/output at 500 amps, and rectifier 440/100v 28VDC/output at 500 amps. Best offer buys both units \$100. M.N. Luchen K0VWH 7804 State Line Prairie W3age LS 65208.

SHACK cleaning: Central Electronics 200 V, \$350. Drake I receiver, \$85. Eico 3 inch scope, \$45. good condition. Shipping extra, WA8ZSM, 2660 Greenfield Mount Pleasant MI 48858.

FOR SALE: Collins 30L-1 linear, excellent \$295. Gonset G-28 Transceiver 10 meters am, like new, \$95, H. Slutske, 100 B. Doheny Dr., Los Angeles, CA 90048.

HEATHKIT DX-60B xtals \$85. Drake 2C with 2CQ and calib. \$220. Both in very fine shape and recently factory aligned. Alan Stiles 56 Cambridge Ave. Garden City NY 11530.

SWAN 500C, 117SC PS, factory reconditioned, VOX, Drake WA wattmeter, Drake LP filter, \$495, 18AVQ Vertical, \$35 W5BEEZ, 9251 Savanna, Shreveport LA 71108. 318-686-1921.

TRUCK: Pickup here. Teletype 19 page printer, 14 tape puller, transistor type repair, Q-58/F8 receiver, CW-89A Proc. Martin conv. Edico SBA-CE 10B, RCA AR88 Receiver, Panadapter, BC 610 Xmtx, BC 221 fm, manuals all, parts, pwr supplies, test gear and much more. Trade for Collins SSB exciter or Blakely, W6WZY, 601-332-1215 Greenville, MS 38701

WANTED Central Electronics 20-A and matching VFO or 20-A alone must be in good working condition. Walter Harvey PO Box 241, Seneca Falls NY 13143

WANTED: Tubes 850, 852, 860. Tnx/W1BE, W1BB, Stewart S. Perry, 36 Pleasant St. Winthrop MA 02152

WANTED: Cheap Globe King VFO and xtals. HQ 129 rcvr. BC-610 all working James Francis 1631 N 12th St McAllen TX 78501.

FREE ac and dc supplies, other extras with purchase of mint condition SR-150, \$299. Will trade for Krait, Pro-Line r/c system, 6M or 72 MHz. K4GBL, 1935 Second Albany GA 31705.

MOTOROLA Handi-Talkie Receiver and Xmtx, with leather case, excellent condition \$45. Factory wired Arcoo Nuvistor 2m conv. 28 MHz IF-\$15. PL-172A unused \$55. Sielke, 1825 5th Ave. North Great Falls MT 59401.

QRP Ten-Tec FMA3 rcvr, antenna tuner, svr bridge headphones, key, mint. \$65. Alan Biddle, WA4SCA, Box 54, Moody AFB GA 31601.

SSTV - using our pc boards kits. EKY Video Vision. Box 15 Stockholm NJ 07460.

HOSS trader Ed Moory says he will not be undersold on cash deals! Shop around for your best deal and then call or write the boss before you buy! New Collins KWM-2, amateur net, \$1,248; 75S-3B, \$662; New Drake TR-4, amateur net, \$599; T4-XB, \$495. Will take your used equipment in trade on new Collins and Drake. Special package deal - buy a new Drake L4-B linear for \$825, and receive as a bonus a 50 ft. Robin foldover tower, regular price, \$280. for only \$60; you save \$220. Used TR-4, average, \$399. Moory Electronics Co. PO Box 506 DeWitt, AR 72042 Tel: 501-946-8220.

SELL: Gonset G-50 good clean condition; all band dipole antenna with 600 ohm line porcelain spreaders. 100x insulators; xtals FT-243 holders 1940, 8552.5, 3573, 3590, 3854, 3997, 5310, 7013, 13610; tubes new (2) 5Z3, (2) 6R4G, 6146, (2) 807, used (2) 616G, RK4D32, 866A, (2) H40Z, many others. Make offers. W3QLW 1328 Hillside Ave. Honesdale PA 18431.

FOR SALE: TR-3, RV-3 plus power supply \$375; CE100V \$200. Alan Gaft, K1MGA, 1175 Farmington Ave. Apt. 1-107, Bristol CT 06010.

SEATTLE Area: Hammarlund 180A and spkr. no. 300. Drake TX 4B Xmitter, pwr, and speaker \$50. Heath Sta. console 75. Sig. Monitor 75. \$5 desk mic. 15. Heath solid state keyer 25. All new condition with manuals. M. Smith 2021 Sidney Rd. Port Orchard WA 98366 Tel. TR6-5128.

SELL: Knight TR-106 \$60, Ron Robinson, 1108 Village Rd., Chaska, MN 55318.

NEW family addition. Must sell new FT-101, \$475 or best offer. W6IBC 209-478-1550.

WANTED: Heathkit SB-640. Dan Umbarger, W8ZCQ, 2753 Elliott Ave. Columbus, OH 43204.

HEATHKIT SB-300 with am filter. Excellent. Offers? Doug Murdock, 1019 McMahon Hall, UW, Seattle WA 98195.

HEATH RX-1, s/s ps rect. Novice/Beginner. You ship. \$85. College. WN2CKH 11 Holley Dr. Homer NY 13077.

DRAKE TR3 ac spk. make offer SB 301 Make offer sase please. Paul Kubik, 402 Fourth St. Rochester MI 48063.

SWAN 500C, 117X power supply for sale, perfect condition, \$400, ship prepaid. J.D. Weiss W4TJU, Box 15117, Orlando FL 32809.

NC-300 RECEIVER, 160-10, sb/cw/am, very good, \$100 plus shipping. Need Johnson 275 watt matchbox. WB4GKI, Rob Huckaby, Georgia Tech, Box 36261, Atlanta GA 30332.

STARVING student must sell: HW-32A, mint, \$90; HQ-170 w/cr. \$160, Viking-1 w/WFO \$70, \$15. Ameco w/f Pre-amp w/pd. \$15. Bargainable. Gary Bottom, WA9YKC, 2615 N. 69 St, Wauwatosa, WI 53213.

FOR SALE: Lamplinn 105B excellent condition \$160. Complete with manual. BC-221M with regulated supply, mint, \$75. New 5894 tubes \$15. ea. Have TS-119 uhf signal generator, make offer. K9AKG/A, 420 Northside Dr. Griffin GA 30223.

HEATH gear wanted: SB-101, SB-102, SB-200, SB-220, SB-600, SB-610, SB-630, SB-640, HP-13A, HP-23A. State price and condition. Sell: DX-100, Viking 6N2, Viking two meter vfo. Best offer. Bernard Novy, WB5BHM, 1946 Cincinnati San Antonio TX 78228.

WANTED Instrutograph Code machine with Continental Morse tapes both in good condition will pay cash and delivery charges. Ernest Melvey, 6416 Francis Ave. No. Seattle WA 98103.

NCX-5 MKII WITH NCX-A ac supply for sale, Digital frequency unit, latest model, very good condition, \$250 plus postage from Phila. B. Kelly, 416 Aldan Ave. Aldan PA 19018.

SWAP: Martin Alto Saxophone for ham gear. WA2GMD, 8 Hollis Pl. Huntington Station NY 11746.

SERVICE manuals most Hammarlund equipment since 1930 \$5 each postpaid. Will align your Hammarlund receiver to original specifications. 15 years factory experience. Wayne Cordell, K4HCS, Blue Ridge Communications, Rt 3, Weaverville NC 28787. 704-645-7070.

SWAP, have new Marine equipment. Salesman's Samples, vhf hf huffers, scanning dividers, all unimpaired latest models. Want Swan 500CX, KWM2A, Galaxy GT-550A, Drake TR4, Swan 600R/T Combo or what have you. Larry Arnold K4AET Gwynn, VA 23066.

HEATH: HW-7A 2 meter transceiver, super perfect condition, factory aligned, little used, with manual, \$100. HR-10 receiver, good condition, xtal cabler, spkr., manual, \$50. WA2GHL, Ronald Mansbach, 34 Rynda Rd. So. Orange NJ 07079. 201-762-7412.

UNUSED gear: Eleo 417 Keyer w/cr, \$45; Deluxe Vibro, \$15; W2AU Balun, \$6; EGW 425 Lo-pass, \$12.50; 14AVQ Vert., \$20; XEL-1 Linear, \$225; add postage. F. S. Eggett, Box 2154 Livonia MI 48150.

FROM Estate of W9MM - Entire Station. Send sale for list and prices. Marguerite Macy Converse IN 46919.

BARGAIN - Gonset GBS 100 sb xmtx Vox booklet, etc. Mint \$130. firm W2AWM Colwell 404 Claridge Ct Point Pleasant NJ 08742.

HEATH HW-16, excellent condition, homebrew speaker, 20 crystals in holder, \$95. WB5EAJ 4712 South Dr. West Fort Worth TX 76132.

SELL brand new Drake FM 2 Meter TR22 AA-22 amplifier, hustler BBLT-144 ant cost \$400, sacrifice \$300. WA2URW, 716-693-5835.

FINE stainless, other, bolts, machine and sheet metal screw, nuts, washers. More! Guying accessories. Insulators, lists 20ct Wall Traesser, WB5BLR, 23716 Starbank, Southfield MI 48076.

WANTED: Wattmeter, W2YYL, 8 Oak St. Stony Brook NY 11790.

QUAD Mosley MCQ 3 band needs wiring. Best offer over \$50. William A. Halliwell, K1MGD, 390 Dwelly St. Fall River MA 02724.

GLADDING 25 FM with matching ac mint. \$225. Robert Wall 119 Van Winkle Ave. Jersey City NJ 07306. 201-795-2812.

TRADE: Have Gonset G-76 6-band xcvr and G-76 dc power supply; want good novice xmtx. WN5QYJ, 6146 Gawait St San Antonio TX 78213.

HEATHKITS: HW-100 HP-23A \$265; HD-10 keyer \$35; HDP-21A microphone \$25; HM-15 swr meter \$12. Excellent condition; all manuals. Everything plus coax switch, blitzbugs, 60" RG-8/U \$325. WA1MCH, 11 Demar Rd. Lexington MA 02173.

COLLINS 75S-1 w/waters rejection tuning \$285, or trade for 30L-1, NCX-3 w/ac and CAL \$195. Collins filters 455N-20 and 455E0 Q200 \$35 each, McCoy 4BB1 w/Miller 1740/1741 Transformers new \$40. Fair 4CX300A w/sockets \$40. H. Weiner, W1BMY, 67 Scott Dr. S. Windsor CT 06074 203-644-2381.

FOR SALE: Swan 350-C, 120-240 power supplies. Unused 14C power supply in unopened carton. Recent factory alignment and factory VOX, cw monitor. \$350 or best offer. Alexander, 135 Clarkson Ave. Brooklyn NY 11226, 212-469-7806.

ESTATE of W2EMI, HRO-60 with xtal cal, select-o-lect, speaker, A,B,C,D,AC coils, \$175, Collins 32V2 xmtx, \$95, RB1.5 rev 15 to 600 KC \$50, brand new Heath 0-9 scope \$45, Heath DX 40 \$40, VF 1, \$15, Gonset Com II never used, \$50, BC 21L, #40, BC211K, \$45, both with ac pwr sup., National NC 66 xcvr \$45, 455E0 Q200, RFED 56 \$25, Cent Elect 10A exciter, \$20, Model A sideband filter, \$20, Old revrs HAL S22R, \$20, McMurdo Silver 5C, \$20, I 177 Tube Tester, \$15 W2HO Mountain Rd. Monroe NY 10950, 914-783-1622.

SB-100, HEATH-installed cw filter, HP-23, \$350. TennaLab 6-el interaced 15/20 beam, \$75. CH6DZ, \$75. Heath IG-102 Signal Generator, \$20. WA3DZ, 301-464-0114. Days, 202-293-8057.

WANT RV-4 Tucker 170 Hilldale San Anselmo CA 94960.

COMPLETE Ham Station for Sale, mostly Heathkit. Send for list. Best offer takes. Jim, 517 E. Emerson Ave. Monterey PK. CA 91754.

TRANSLATOR reads hand-sent Morse code 10-80 wpm without adjustment, converts it to teletype code including LFERS, FIGS, CR, LP. Computer circuit uses 63 ICs on one 8X10 inch board. Kit of four read-only memories, circuit board, 55-page technical manual, \$185. Write for details. Petit Logic Systems, 908 Washington Wenatchee WA 98801.

FOR SALE: All prices firm. No trades please! Hallicrafters SR-400 fac, core sealed, \$475. Hallicrafters SR-400, like new, \$425. HA-20 vfo console w/ built-in vswr, like new, \$75. PS-500-dc mobile power supply, factory sealed, \$75. PS-500-ac supply, like new, \$85. PS-500-A-ac supply, under warranty, \$117. Mosley 2 Element 40M Beam 8-402, \$80, 3 Element interaced 15 and 20M Beam, \$40. W9H/GZ, Alala Rogers, 703 Hurlingham Ct, 325 chaumburg IL 60172. Phone evenings, 312-894-3258.

SELL: Bound QSTs continuous run vols. 4 thru 53. Excellent condition. A. Fitz, Box 252, Lanesboro MA 01237.

FOR SALE: Standard SRC-145 Walkie Talkie with ac supply and charger. Stubby ant, and mike. Crystals for 34-94 34-76. Cost \$225. Norm. Cochr. K8YQR, 26208 Franklin Pointe Dr. Southfield MI 48076. 313-355-1386.

FOR SALE: Central Electronics 200V; National NCL 2000. Both like new and operate like new. Original cartons and manuals, \$700, ship prepaid. K9AHN, 3117 Jeffrey Rd. Baltimore MD 21207.

RTTY; MODEL-15; 14-typing reper w/keyboard; 14-TD; 2/tables power; CV-89A w/comparator; synchronous motors; all good working condition; offer; Gaston, WA6MSO; Palos Verdes CA 90274. 213-541-2200, evenings.

SELL B&W 6100 75A with two filters package deal only both for \$550. WBOT 107-24 114 St. Jamaica, NY 11419.

SELL: Heathkit SB10. First \$55, or will ship COD. WA0HHI, Box 241 Kilowa KS 67070.

FOR SALE: New Johnson phone patch, \$20. Ross Hansen, WN7TZU, Preston ID 83263.

KWM2, SERIAL 11641 factory modified 1965, ac power supply, 31B5, 30L1. Mint condition. Used little. Only sell all. \$1395. Also new Ham M. Baker, \$25. WB5JGH, McMahon 443 C Orange Grove Circle Pasadena CA 91105.

NCX-5 MK-11 DIGITAL readout transceiver, NCX-A, Calibrator, \$300. W6VB 3846 Gundry Ave. Long Beach CA 90807.

FOR SALE: Linear amplifier BT1LK2000 FOR. \$390, W1DBS, John Savonis 410 Blake Rd. New Britain CT 06053.

SELL: Hallicrafters SR-160, dc power supply. Gary Cuttrell Box 765 W.T. Station Canyon TX 79015.

CRYSTALS Airmailed: September QST novice special. Active accurate, economical \$1.25. Five or more. Band mix of cert. frequency choice, scattered. 40M-15M, \$1.25 each, 80M, \$1.65. Less than five. 40M-15M, \$1.50, 80M, \$1.75. Novice QRM dodger, Three FT-243 plus and minus three kilocycles, your choice cert frequency, 30M, \$4.95, 40M-15M, \$3.95. Airmail 15c crystal first-class, 10c. General purpose, FT-243, only 15c. 3500-8600 kilocycle, \$1.50, five at \$1.75 each, net, on sale \$1.45. 1210-3499, \$2.25. 20B5, add 10c cryst. Free by order shd cert. Crystals since 1933. Bob Woods, W0LFS, CW Crystals, Marshfield MO 65706

COMMUNICATIONS Receiver Hy-Gain/Galaxy R-530, serial 817-1029 with 500 Hz/1,5/2,15 kHz filters, \$680; offer. Mint sell, only six months old and like new. John F. Reich, 100 E. Middlefield Rd. Mountain View CA 94040. 415-967-8978.

SWAN 350C with 117 X G power supply for sale. Best offer takes. J.D. Houck, WB9FER, Box 7798 Warren AFB WY 82001.

NC300, \$110. UTC BMI 1000 and 1500 Hz filters 350 each. Dave, WA2YVJ 311 Rifton St. Elmont NY 11003.

DRAKE 2B, \$200. HT37 with Astatic 10D and stand, \$200. Both, \$375. Ld/Lulu 6 meter transmitter, \$45. Ameco Nuvist 6 meter converter, \$30. Barry isseks, 66-15 Thornton Pl. Forest Hills NY 11375.

WX SATELLITE picture rig. Will sell to amateur qualified to operate and maintain my complete APT Station. Includes all components from antenna to fax, except tape recorder. Pick up only. Low price, \$385. For information write or call Chas. MCKnight, W4MKM Deltairle VA 23043.

2 METER FM Motorola: Handie Talkie P23DEN PT200 2 watt all solid state, 48.34-146.94. Excellent condition, \$200, 745G dual channel 25 watt mobile on 146.34-146.94 and 146.94 direct good condition with accessories, \$55. Hob Lehman, WB5FDQ Box 158 Booker, TX 79005.

DX'ERS - Dig them out of the mud. New low noise dual gate 40oct Presampler, Nominal 20 db gain, 10-30 MHz. Complete in cabinet. \$29.95. Dynacom, 1183 Wall Rd. Webster NY 14580.

QRP QRP complete line of QRP circuit modules including receivers transmitters cw sb write for data and prices Shields Products Inc. 1104 Prospect Ave. Cleveland OH 44115.

SELL 50' Triex Grankup tower no. MW-30 with custom made house brackets. Best offer or swap. Want: SB303, SB630 and nonworking Hallicrafters HA-6 or HA2, or SB500, 212-871-4186 Fred Andersen, WB2ULX, 230 Ocean Pkwy Bklyn NY 11213.

WANTED: Manual for Central Electronics MM2 oscilloscope, Cerox okay. W7UGV 2010 NW 60th Seattle WA 98107.

HOOSIER Electronics - Your ham headquarters of the Midwest, individual personal service by experienced and active hams. Factory-authorized dealers for the finest ham gear on the market. Drake, Regency, Standard, Hi-Gain, Tec-Rec, Gandy, Cush-Craft, Hustler, plus accessories. Write today for our catalog and try our personal, friendly Hoosier service. Hoosier Electronics, R.R. 25, Box 403, Terre Haute, IN 47802.

SWAN 260 like new, \$300. Harvey Wells, TBS50, \$20. NCL 2,000. Don Severeid; 2802 East 120th; Tacoma WA 98445.

FOR SALE: Heath 20M SSB xcvr. HW 32 A, \$65. Excellent condition. Phone AC 516-269-6875, WB2SBA.

DRAKE 2C, 2CQ, noise blanker and crystal for 14.5-15MHz. Complete \$200. Sorry can't ship W1DOM 29 Belmont St. North Quincy MA 02171. Tel. 617-479-1453.

WANTED: 2M Mobile FM, Gonset communicator, SX-42, NC-183D, Mike Neidich 100 Clinton Ave. Mineola NY 11501 516-294-8344.

TRADE GSB-100 like new, for linear. W7LJZ Box 323 Lyle, WN 98635.

SELL: Drake, R-4B Receiver, T-4XB Transmitter, MS-4 Speaker, AC-4 Supply, sold all together \$700. TR-4 Transceiver AC-4, sold together \$425. Heathkit Lunch Box twoer, one built \$40, one still in kit form, \$35. Barry Warren, WB2ZOA, 21 Westover Rd. Troy NY 12180, 518-272-4914.

WANTED: Parabola of 10 ft. or larger. K Lesh K3RYL, 2750 Belaire Rd. Bethlehem, PA 18017.

WANTED Gonset 111 2 meters late serial number must be mint condition, reasonable, W3TEC. 215-JE5-2358.

SELL: Hallicrafters SX-111 good condition, \$80. WA2LTV; 1801 Tomlinson Ave, BX NY 10461. Tel. 823-8163.

SELL: Drake; TR-4, AC-4, MS-4, ten hours use, Electro-Voice; no. 619 mike, Mosley; TA-33 beam, Hy-Gain; 14AVQ and two 18V Yerticals cone unopened. AAMCO; Pt. Preampifier, DCM, 18V code practice oscillator. Heath; HD-10 Electronic Kever, HN-31 Dummy, HS-24 Mobile Speaker, IM-28 VTM, factory wired, EP-1 VTM applications unit, MM1 VOM. Belden; RG-58U, RG-8U coax, 4 and 8 conductor cable, Midland; 23-126 SWR Meter Johnson; M-100 Hand Key, Terado; no. 50-172 voltage transformer Allied; 30-watt isolation transformer, everything mint with original manuals, cartons, will give details, make offers, WB9CLU, Larry Tucker, RFD 1, Leland IL 60531. 815-495-9140.

SEND sase for price list of duplicate radios, books and magazines, I have for sale or trade, McKenzie 1200 West Euclid Indianola IA 50125.

SENECA VHF1 exc. \$119.95 W6RQZ 1330 Curtis Berkeley CA 94702. Tel. 415-526-7345.

ELECTRONIC Calculators at a wholesale price. Four functions + % divided and stored constant, 16 digit capacity for \$129. One year factory warranty on parts and labor. Established American manufacturer. Send self-addressed envelope for brochure. W6FNQ, 2120 Amherst St. Palo Alto CA 94306.

DRAKE T4XB-R4B-MS4-AC4, extra crystals for 10, 160 and WWV. All cables, manuals, etc. Absolutely perfect. \$800. No shipping. Make sased any band or come operate. Also, Swan 240 transceiver, Shure pit mike. Old but perfect. \$125. W2NZ, 516-641-9355.

QST 1934-1941; 1945-1947; 1953-1962; 1966-1970 inclusive, 8 issues missing, 5 duplicates. All 25 years \$35. you pay shipping. Antique 6 tube Grebe, no tubes, RCA Radiola Super-heterodyne, Second Harmonic, complete, near perfect. Both \$40. you pay shipping, W41WV.

IBM STANDARD electric typewriter, Model B, very good condition. \$125; Jennings 300 uUF vacuum variable w/tuner, \$35; 3600-0-3600 VCT at 1A transformer, \$35; 12 digit numeric push dialer, \$19. K3MNJ, 8361 Langdon St. Phila. PA 19152.

HAMMARLUND all band transmitter HX-50A, \$325; HXL-1 linear amplifier, \$250; HQ-215 all band solid state receiver, \$250; all like new. Request list of test equipment, W2ERV, 14 Bernice Dr. Freehold NJ.

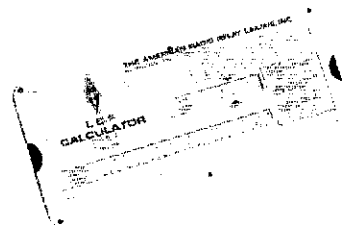
SIGNAL/ONES/ALPHA-70: used CX7 modified to CX7A slightly used CX7A, new CX7A, PA-70 air, new \$1395. Big trades, Payne Radio, Box 525, Springfield TN, days (615)384-5573, nites (615)384-5643

4-BAND beam antenna system. Moved, must sell. TA-33 tribander, TA-40KR 40-meter coils, TR-22R rotator, 40 foot mast, coax, etc. \$75. Antenna is in Covina CA. My new address: WB6DVL, 244 Delgado, San Clemente CA 92672. (714)496-7862

HEATHKITS: Both factory aligned and used under 10 hours; SB-303, \$290; SB-401, \$275. 18-AUQ vert, \$35; Asstic 10-D w/g-stand, \$20; digital clock, \$12; antenna switch, \$10; high power whisper fan, \$10. All mint condition. Will sell separately or as package for \$620. WB2MZU 14 Farmers Rd. Great Neck NY 11024 (516)487-2744

SELL: Shure, model 444 Dynamic SSB desk microphone, W3Btopex Champion bug. Make offer, William Lazzaro 440 Viola Rd. Apt 29 Spring Valley NY 10977

RF POWER meter model HM-102 \$25. Addison Wilson Sr. Box 392 East Brewster MA 02640



L/C/F CALCULATOR

EVER TRY TO DETERMINE COIL
DIMENSIONS FROM THE FORMULA

$$L = \frac{a^2 n^2}{9a + 10b}$$



Then you can appreciate the L/C/F Calculator. It will tell you at the flick of the wrist the number of turns you need for a particular coil, and determining the resonant frequency of a coil and capacitor is a snap!

Save time and be accurate
with this handy calculator.

\$2.00 Postpaid

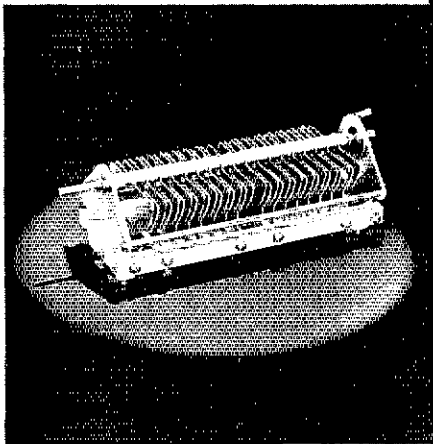
AMERICAN RADIO RELAY
LEAGUE
Newington, Conn. 06111

In memory of a dear departed friend
RUDOLF R. BRAZZI
PYICBS
de W2VMZ

Designed for



Application



16000 Series

Transmitting Condensers

A new member of the "Designed for Application" series of transmitting variable air capacitors is the 16000 series with peak voltage ratings of 3000, 6000, and 9000 volts. Sturdy construction, thick, rounded, polished aluminum plates with 1 3/4" radius. Constant impedance, heavy current, multiple finger rotor contactor of new design. Available in all normal capacities in single and double sections.

**JAMES MILLEN
MFG. CO., INC.**

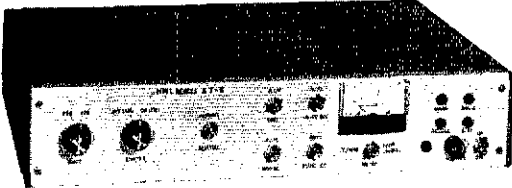
MAIN OFFICE AND FACTORY
**MALDEN
MASSACHUSETTS**



Index of Advertisers

Alltronics—Howard Co.	151
Amateur Electronics Supply	114, 116
Amateur License Instruction	149
Amateur-Wholesales Electronics	149, 151, 152
American Radio Relay League	
<i>Antenna Book</i>	118
<i>Calculators</i>	157
<i>Handbook</i>	1
<i>League Emblem</i>	146
<i>License Manual</i>	132
<i>Membership</i>	147
<i>Operating Supplies</i>	137
<i>Publications</i>	148
<i>Vhf</i>	135
AIV Research	144
Avcom Inc.	138
Bauman Sales	144
Bitell	121
Command Products	152
Cubex Co.	134
Curtis Electrodevices	151
Cush Craft	2
Dames, Ted	150
Drake, R.L.	126, 136, 139
Eimac	Cov. IV
Electronic Distributors	145
F.S. Enterprises, Inc.	142
Foreign Language QSOs	144
Gotham	117
H & H Engineering	151
Hal Communications	159
Ham Radio Center	144
Harrison Radio	160
Heath Co.	110
Henry Radio	5
Hi-Par	151
House of Dipoles	152
Hy-Gain	112
International Crystal Mfg.	7
J & R Electronics	150
Jan Crystal	138
KW Electronics	151
LA Electronics	130
Lafayette	120
Lattin Radio	146
Leader Instruments	131
Leeds Radio Co.	151
Millen Mfg., Co., The James	158
Miller, J.W.	134
Mini-Products, Inc.	128
Mobiliers	140
Mor-Gain Inc.	141
National Radio Institute	127, 147
Omega-T	143
Palomar	141
Payne Radio	139, 150
Pearce Simpson	129
Peonwood Numechton	146
Pickering Radio Co.	141
Poly-Paks	133
PYTCBS, in memoriam	157
<i>Radio Amateur Callbook</i>	113
Rectifier Components Corp.	147
Regency	124
Robot Research	Cov. II
R.P. Electronics, Inc.	141
Savoy Electronics, Inc.	4
Simon Side Band Co.	152
Skyland Products	143
Spectronics	109, Cov. III
Standard Comms.	123
Ten Tec Inc.	119
Tiny Tone Pad Co.	140
Trigger Electronics	132
Uadilla Radiation Products	137
Unique Products Co.	145
Valparaiso	143
Vanguard Engineering	152
Van Sickle Radio Supply	152
Vau's W2DLT	142
Wenschel Engineering Co., Inc.	125
World QSL Bureau	144

CW or RTTY, whichever way you go,
**HAL HAS TOP QUALITY
 YOU CAN AFFORD!**



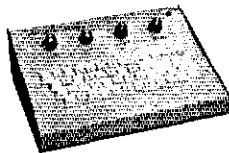
TOP QUALITY RTTY... WITH THE HAL MAINLINE ST-6 TU. Only 7 HAL circuit boards (drilled G10 glass) for all features, plug-in IC sockets, and custom Thordarson transformer for both supplies, 115/230 V, 50-60 Hz. Kit without cabinet, only \$135.00; screened, punched cabinet with pre-drilled connector rails, \$35.00; boards and complete manual, \$19.50; wired and tested units, only \$280.00 (with AK-1, \$320.00).*



TOP QUALITY... WITH THE HAL 1550 ELECTRONIC KEYER. Designed for easy operation; perfectly timed CW with optional automatic ID for sending call letters, great for DX and RTTY; TTL circuitry, transistor switching for grid block, cathode keying. Handsome rugged crackle cabinet with brushed aluminum panel. With ID, only \$90.00; without ID, \$65.00.*

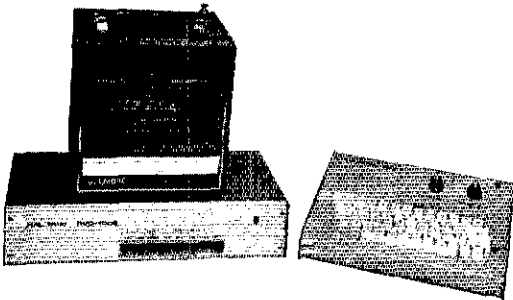
OTHER HAL PRODUCTS INCLUDE:

- ID-1 Repeater Identifier (wired circuit board) . . . \$ 75.00*
- ID-1 (completely assembled in 1 1/2" rack cabinet) . . . \$115.00*
- HAL ARRL FM Transmitter Kit . . . \$ 50.00*
- W3FFG SSTV Converter Kit . . . \$ 55.00*
- Mainline ST-5 TU Kit . . . \$ 50.00*
- Mainline AK-1 AFSK Kit . . . \$ 27.50*



TOP QUALITY... WITH THE HAL MKB-1 MORSE KEYBOARD.

As easy as typing a letter—you get automatic CW with variable speed and weight, internal audio oscillator with volume and tone controls, internal speaker, and audio output jack. Smooth operation; completely solid-state, TTL circuitry using G10 glass boards, regulated power supplies, and high voltage transistor switch. Optional automatic ID available. Assembled MKB-1, \$275.00; in kit form, \$175.00.*



NEW FROM HAL—TOP QUALITY RVD-1002 RTTY VIDEO DISPLAY UNIT. Revolutionary approach to amateur RTTY... provides visual display of received RTTY signal from any TU, at four speeds (60, 66, 75, and 100 WPM), using a TV receiver modified for video monitoring. Panasonic solid-state TV receiver/monitor, or monitor only, available. Complete, \$525.00; Panasonic TV receiver/monitor, \$160.00; monitor only, \$140.00.*

TOP QUALITY... WITH THE HAL RKB-1 TTY KEYBOARD. Gives you typewriter-easy operation with automatic letter/number shift at four speeds (60, 66, 75, and 100 WPM). Use with RVD-1002 video display system, or insert in loop of any teleprinter, for fast and easy RTTY. Completely solid state, TTL circuitry using G10 glass boards, regulated power supplies, and transistor loop switch. Optional automatic ID available. RKB-1 assembled, only \$275.00.*



HAL provides a complete line of components, semi-conductors, and IC's to fill practically any construction need. Send 24¢ to cover postage for catalog with info and photos on all HAL products available.

*Above prices do not include shipping costs. Please add 75¢ on parts orders, \$2.00 on larger kits. Shipping via UPS whenever possible; therefore, street address required.

HAL COMMUNICATIONS CORP., Box 365 A, Urbana, Illinois 61801

Harrison IS*

"HAM HEADQUARTERS U.S.A."

And Harrison is HQ for everything else you need to complete the FB station of your dreams!

FOR ALL THE BEST!

COLLINS



32S3 TRANSMITTER \$938.00

75S3B RECEIVER \$862.00

KWM2 TRANSCEIVER \$1248.00

KENWOOD



R-599 SOLID STATE RECEIVER \$349.00

T-599 HYBRID TRANSMITTER \$395.00

T-511S SSB TRANSCEIVER \$415.00

TEMPO



"ONE" SSB TRANSCEIVER \$319.00

AC/ONE POWER SUPPLY \$99.00

FMP 2 METER FM TRANSCEIVER \$225.00

DRAKE



R4B RECEIVER \$475.00

T4XB TRANSMITTER \$495.00

TR22 2-METER FM TRANSCEIVER \$199.95

ML2 VHF - FM TRANSCEIVER \$299.95

* HERE'S WHY:

- BIG, BIG SELECTION • COMPETENT ASSISTANCE •
- INSTANT AVAILABILITY • SERVICE • And at HARRISON RADIO - CUSTOMER SATISFACTION IS OUR HIGHEST RECOMMENDATION

CHARGE IT! On your Master Charge, or Bank Americard
Spread payments up to two years.

PROMPT ORDER

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
Or - Phone your orders to
(516) 293-7990

TRADE-INS WELCOMED!
The Harrison Trade-In Center needs your old gear, so we can give you top allowances. (Also, will buy for on-the-spot cash.)

Harrison

"HAM HEADQUARTERS U.S.A."®

FARMINGDALE, L.I. • NEW YORK CITY • VALLEY STREAM
2265 ROUTE 110 8 BARCLAY STREET 10 SUNRISE HWY.
2 miles South of LIE exit 49S Near City Hall (At Rockaway Ave.)
(516) 293-7990 BARclay 7-7922 (516) 872-9565

ORDER NOW!
Or, ask for literature.

OPEN NITES TILL 9 P.M.

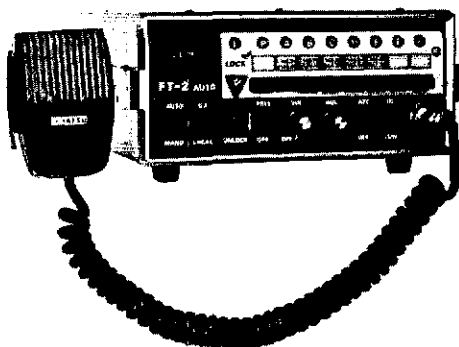
OPEN NITES TILL 10 P.M.

Yaesu presents the great two-meter leap forward

Since Yaesu makes and sells more factory-assembled amateur rigs than any other company in the world, it follows that we'll only place dependable, fully-perfected products on the market.

So now, after more than two thoughtful years of development, here are our entries in the two-meter FM field:

YAESU FT-2 AUTO



Great new features — like Auto-Scan and a special Priority-channel — place the FT-2 AUTO in a class by itself. These unique capabilities are achieved with advanced digital-logic circuits. Here's how they work:

With Auto-Scan on, the receiver scans all 8 channels at 20 channels per second, indicator lights provide a visual channel display, stopping on receipt of a signal. At the end of each transmission, the receiver continues to scan. (Just push a channel button to skip over any channels you wish eliminated from the scanning cycle.) To lock on any frequency being received, simply depress the mike button momentarily. The lock light then glows indicating that transmitter and receiver are working together. To unlock, you again hit the mike button and the receiver continues to scan.

Only Yaesu offers this type of remote, one-handed control of the scanning function.

The Priority-channel feature allows automatic monitoring of a pre-selected frequency. When the receiver stops on a frequency other than the Priority-channel, Auto-Scan will check every two seconds to determine if the Priority-channel is busy. If it is, the receiver reverts instantly to the Priority-channel. Manual or Auto-Scan mode of operation is instantly selectable on front panel. In manual mode, the push buttons function as channel selectors.

SPECTRONICS WEST

1491 E. 28th, Signal Hill, Ca. 90806 / (213) 426-2593

SPECTRONICS EAST

Box 1457, Stow, Ohio 44224 / (216) 923-4567

The FT-2 AUTO will operate from either 117 V AC or 12 V DC power sources.

Receiver/transmitter specifications include: selectable 10 Watt or 1 Watt power-output levels; a frequency-adjustable tone-burst generator for repeater activation: 0.3 uV sensitivity for 20 db quieting; 10.7 MHz crystal filter, in addition to a 455 kHz ceramic filter, for superb adjacent channel rejection; adjustable deviation and mike gain controls; Hi-Q slot-coupled resonators used in receiver front end; all solid-state construction, with diode-protected MOSFET input stage.

This exciting new rig is available now. Just send your check for \$329.95 — or use Master Charge or BankAmericard. We'll even include a free anti-theft mounting bracket that locks up your rig when its going mobile.

YAESU FT-2FB

This new unit features the same receiver/transmitter specifications listed above for the FT-2



AUTO (without the scan feature), but in a compact 6½ x 2½ x 10-inch package that weighs only 4 lbs. The FT-2FB has 12-channel capability, with illuminated frequency readout. It operates directly from a 12 V DC source. This rugged, handsomely-styled transceiver is yours for only \$229.95. (A matching AC power supply with rechargeable batteries for emergency operation is available for \$79.95.)

Both units come with a one-year warranty and are backed by Spectronics' fast, dependable service system. Act today, and be glad you waited for the finest in two-meter FM.

- Send FT-2 AUTO. Enclosed find \$329.95*
- Send FT-2FB. Enclosed find \$229.95.*
- Send more data.

Name _____

Address _____

City _____ State _____ Zip _____

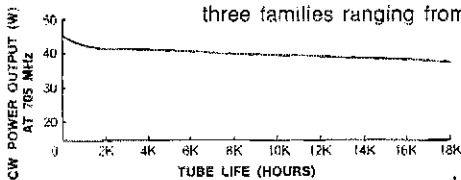
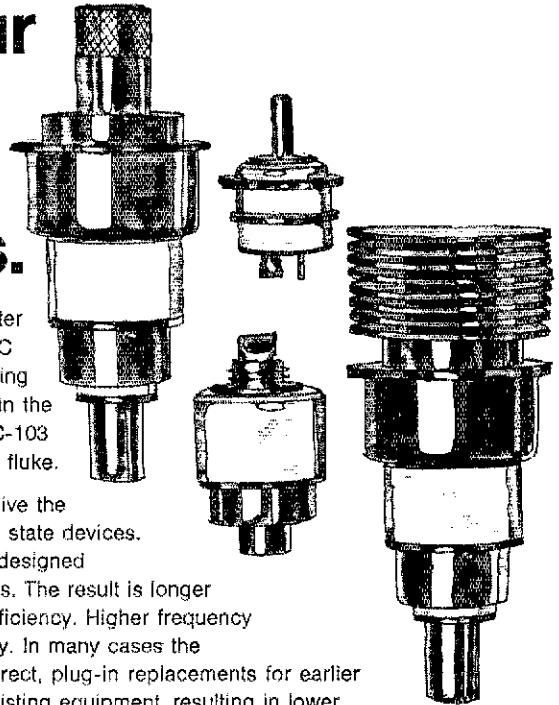
*California residents add 5% sales tax.

NOTE: Both units are supplied with crystals for simplex operation on 146.76 MHz, 146.82 MHz, and 146.94 MHz. Additional crystals are \$5.00 ea.

Plug more life into your system with EIMAC planar triodes.

To make a long story short, after 18,000 hours of life test EIMAC improved 7211's were still delivering over 35 watts CW at 705 MHz in the r-f cavities for the Army's GRC-103 Radio Set. And that's no fluke.

Several design improvements give the 7211 life comparable to solid state devices. These improvements have been designed into all EIMAC planar triodes. The result is longer life. Higher power and efficiency. Higher frequency operation. And better linearity. In many cases the improved tubes are direct, plug-in replacements for earlier models in existing equipment, resulting in lower cost per operating hour to the user.



Right now EIMAC has more than 70 planar triode types in three families ranging from the 2C39A types through the latest miniature planar triodes. In

CW, EIMAC frequency capability goes up to 5 GHz and powers to 450 watts. For pulse applications, EIMAC has models capable of delivering up to 1 kilowatt peak at 6 GHz.

When it comes to planar triodes for retrofit or new equipment, only EIMAC has full capability. For a copy of our planar triodes applications manual, get in touch with EIMAC, 1678 Pioneer Road, Salt Lake City, Utah 84104. Or your local Varian/EIMAC Electron Tube and Device Group Sales Office.

