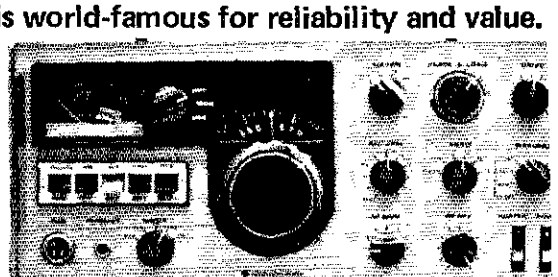

QST
January 1974
75 Cents
devoted entirely to Amateur Radio
Satellite DX Achievement Award
YEAR IN REVIEW
WR9AAA
ARRL Fights 224-225 MHz CB
The Micromountaineer
ARRL 10-Meter Contest
16 jamboree on the air jamboree sur les ondes
OFFICIAL JOURNAL OF THE ARRL

WHEN YOU BUY KENWOOD ...YOU BUY PRIDE, PLEASURE & PERFORMANCE

Pride in knowing that you own today's ultimate in state-of-the-art technology . . . pleasure in operating a rig whose day in, day out performance wi show you why the Kenwood name is world-famous for reliability and value.

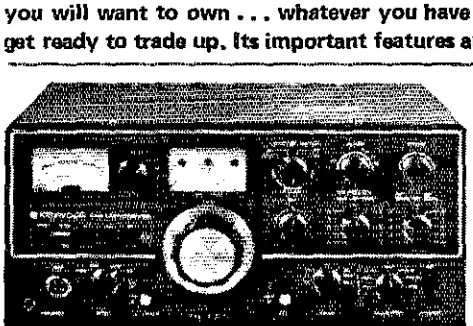


Kenwood's superb solid state SSB transceiver

TS-900

. . . the ultimate transceiver. The promise of the transistor has been fulfilled. Here is the transceiver you will want to own . . . whatever you have now, get ready to trade up. Its important features are far too numerous to list. Its specifications are supe The TS-900 is unquestionably the best transcei of its kind ever offered. The price . . . . $795.

PS-900 (AC Supply) $120.00, the DS-900 $140



TS-520 Kenwood's go every place . . . do everything transceive

The new TS-520 is the transceiver you have wanted, b could not buy until now. It is a non-compromise, everything, go everywhere 5 band transceiver for SSB CW that performs equally well at home, in an automobi airplane, boat or trailer. The TS-520 features built-in power supply, built-in 12 volt DC power supply, built VOX with adjustable gain delay and anti-VOX.

The price . . . . . $599.

Kenwood's winning pair

The R-599A is the most complete receiver ever offered. It is solid state, superbly reliable, small and lightweight, covers the full amateur band . . . 10 thru 160 meters, CW, LSB, USB, AM, AM.N and FM.

The price $439

The T-599A is mostly solid state . . . only 3 tub has built-in power supply, full metering (ALC, RF output and high voltage), CW-LSB-USB- operation.

The price $459

See the Kenwood line at the following dealers: CALIFORNIA Communications Headquarters, San Di • Gary Radio, Inc., San Diego • Ham Radio Outlet, Burlingame • Henry Radio, Anaheim • Henry Ra Los Angeles • Sequoia Stereo, Arcata • Webster Radio, Fresno • FLORIDA Amateur Electronic Sup Orlando • Amateur-Wholesale Electronics, Miami • IDAHO United Electronics Wholesale, Twin F ILLINOIS Erickson Communications, Chicago • Klaus Radio, Inc., Peoria • INDIANA Graham Electron Indianapolis • Hoosier Electronics, Terre Haute • Radio Distributing Company, South Bend • IOWA Ho Industry, Council Bluffs • KANSAS Associated Radio Communications, Overland Park • LOUISIANA onics, Inc., New Orleans • MARYLAND Electronic International Service Corp., Wheaton • Professional E tronics, Baltimore • MICHIGAN Electronic Distributors, Muskegon • Radio Supply & Engineering Compa Detroit • MINNESOTA Electronic Center, Minneapolis • MISSOURI Ham Radio Center, St. Louis • He Radio, Butler • MONTANA Conley Radio Supply, Billings • NEW JERSEY Simon Side Band Company, Ridge • NEW YORK Adirondack Radio Supply, Inc., Amsterdam • Harrison Radio Corp., Farming NORTH CAROLINA Vickers Electronics, Durham • OHIO Amateur Electronic Supply, Cleveland • Com nications World, Cleveland • Queen City Electronics, Cincinnati • Srepco Electronics, Dayton • OKLAHO Derrick Electronics, Broken Arrow • Radio, Inc., Tulsa • OREGON Portland Radio Supply, Portl PENNSYLVANIA JRS Distributors, York • Kass Electronics, Drexel Hill • SOUTH CAROLINA Accu Inc., Greenville • SOUTH DAKOTA Burghardt Amateur Center, Watertown • TEXAS Douglas Electron Corpus Christi • Electronics Center, Inc., Dallas • Industrial Distributors, Dallas • Ed Juge Electronics, Fort Worth • Madison Electronics, Houston • UTAH Manwill Supply Company, Salt Lake City • WA INGTON Amateur Radio Supply Company, Seattle • WISCONSIN Amateur Electronic Supply, Milwau

Savoy

BASSETT

igh efficiency mobile
nd portable antennas
or all amateur bands,
AP, MARS, CB,
ECURITY,
UBLIC SERVICE,
ARINE, AND
OVERNMENT USE.

2-6-10-15-20-40-75

Identical size, cost, and appearance

FULLY ADJUSTABLE TO FREQUENCY IN FIELD

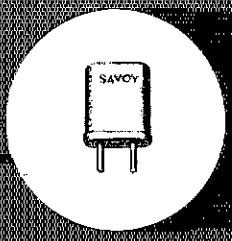
Low weight, low drag, high strength fiberglass

- Polished chrome brass standard ⅜-24 thread
- High gain collinear on 2 meters

MODEL DGA-2M
$29.50 postpaid
in U.S.A.

$3.75
Postpaid in U.S.A.

TYPE 900 A TYPE 901



HIGH ACCURACY CRYSTALS
FOR OVER 30 YEARS

Either type for amateur VHF in Regency, Swan, Standard, Drake, Varitronics, Tempo, Yaesu, Galaxy, Trio, Sonar, Clegg, SBE, Genave.

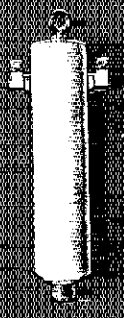
Quotes on request for amateur or commercial crystals for use in all other equipments.

Specify crystal type, frequency, make of equipment and whether transmit or receive when ordering.

BASSETT VACUUM TRAP ANTENNA SYSTEM
Complete packaged multi-band antenna systems employing the famous Bassett Sealed Resonators and Balun from which air has been removed and replaced with pure helium at one atmosphere. Operating bands are indicated by model designation.

MODEL DGA 4075	$59.50
MODEL DGA-204075	$79.50
MODEL DGA-2040	$59.50
MODEL DGA-152040	$79.50

BASSETT VACUUM BALUN



The famous sealed helium filled Balun . . . employed with the DGA Series Antenna Systems. Solderless center insulator and easily handles more than full legal power while reducing unwanted coax radiation. Equipped with a special SO-239 type coax connector and available either 1:1 or 4:1.

MODEL DGA-2000-B . . . $12.95
Postpaid in U.S.A.

CONTACT YOUR DISTRIBUTOR OR WRITE FOR DATA

Savoy Electronics, Inc.

P.O. Box 5727 - Fort Lauderdale, Florida - 33310

Tel. 305-563-1333 or 305-947-9925

1933

Collins started in business to build a better transmitter –became the leader in amateur radio.

1974

Still the performance leader.

We intend to keep it that way.

Collins Radio Company
Amateur Products
Cedar Rapids, Iowa 52406
Phone 319/395-4507

COLLINS

OFFICES

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

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.

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

OUR COVER

Picture clips of amateur activities in 1973 create this month's cover. See page 9 for more details.

QST

JANUARY 1974

VOLUME LVIII NUMBER 1

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 —

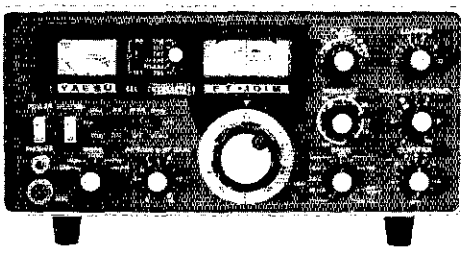
YAESU

YOUR ASSURANCE OF PERFORMANCE & QUALITY

Amateur Price Net
Subject to Change

IT'S HERE NOW The NEW FT101B

With These Added Features and NO INCREASE IN PRICE



$649.00

1. VFO (warning lite) on or off
2. Clarifier (warning lite) on or off
3. Noise blanker on insert card
4. 8 pole filter for better rejection
5. Sidetone output
6. Antitrip input

Amateurs *and* Maritime operators around the world have discovered the FT101's versatility and reliability. Many of the outstanding signals you hear are using the FT101. It's all here—AM, CW, SSB. Receiver sensitivity 0.3 microvolts 10dB signal to noise ratio. 160 meters through 10 meters. Citizen's Band, WWV, 25 and 100 kc calibrators, 5 kc clarifier for net or mobile operation. The built-in noise blanker assures in-motion mobile-peak performance with minimum of noise.

Transmitter stability under most adverse conditions is superb. PEP 260 watts SSB, 80 watts AM, 180 watts CW. 117 V AC supply built-in. 12 V DC fused power cable, AC cable, all accessory plugs are furnished. Matching units available for FT101B, FP101 patch. FP101, speaker FV101 VFO, FL2100 linear. See your local dealer for demo and brochure.

DEALER'S SERVICE POLICY—Factory Service available after warranty has expired.

ADIRONDACK RADIO SUPPLY 518-842-8350
185 West Main Street, Amsterdam, New York 12010

AMATEUR ELECTRONIC SUPPLY 414-442-4200
4828 W. Fond du Lac Ave., Milwaukee, Wisc. 53216

AMATEUR ELECTRONIC SUPPLY 305-894-3238
621 Commonwealth Avenue, Orlando, Florida 32803

FRECK RADIO SUPPLY 704-254-9551
38 Biltmore Avenue, Asheville, North Carolina 28807

GRAHAM ELECTRONICS 317-634-8486
133 S. Pennsylvania St., Indianapolis, Indiana 46204

HAM RADIO CENTER 314-993-6060
8342 Olive Blvd., St. Louis, Missouri 63132

HAM RADIO OUTLET 415-342-5757
999 Howard Avenue, Burlingame, California 94010

HAMTRONICS 215-357-1400
4033 Brownsville Rd., Trevose, Pennsylvania 19047

HARRISON RADIO 516-293-7990
20 Smith Street, Farmingdale, Lt. New York 11735

HENRY RADIO 213-272-0861
11240 W. Olympic Blvd., Los Angeles, California 90064

JUGE ELECTRONICS 817-926-5221
3850 S. Freeway, Fort Worth, Texas 76110

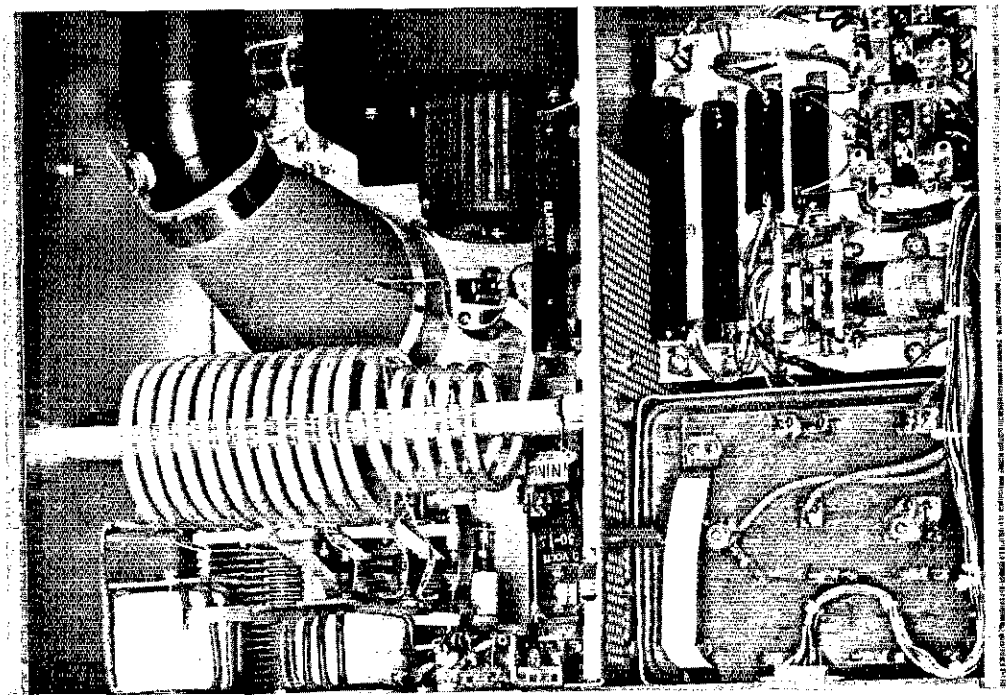
RACOM ELECTRONICS 206-255-6656
15051 S.E. 128th St., Renton, Washington 99055

WEBSTER RADIO 209-224-5111
2602 Ashlan, Fresno, California 97326

WILSON ELECTRONICS 702-451-5791
P.O. BOX 116, Pittman, Nevada 89044

WE TRY TO BUILD THE ALPHA 77 TO LAST FOREVER

NO MATTER WHAT YOUR OPERATING INTERESTS ARE. . . .



THIS MAXIMUM-LEGAL-POWER DELUXE LINEAR AMPLIFIER WILL HANDLE ANYTHING YOUR AMATEUR LICENSE ALLOWS – ALL THE WAY FROM 10 THRU 160 METERS – AND DO IT EFFICIENTLY, QUIETLY, AND RELIABLY

DX AND CONTEST TIME IS HERE – Long stretches of heavy operating really put equipment to the test. *The rugged* ALPHA 77 *is built to run maximum legal power in any mode, for any length of time,* with a healthy margin of safety. Even if you goof changing bands at 3 a.m., the 77's protective circuits and husky components will vigorously resist damage.

ALPHA 77 by Ehrhorn Technological Operations, Inc. - $1995. A great investment in performance and pleasure. Write or phone Don Payne, K4ID, for information and a *king-sized trade on your old gear.*

PAYNE RADIO

Phones: Six Days (615) 384-5573 Nights, Sundays (615) 384-5643

Box 525 Springfield, Tenn. 37172

Don't miss the ALPHA 77 *. . . and an important new product preview . . . Visit ETO's display at SAROC and Miami/Tropical Hamboree.*

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 licensees or higher may be appointed ORS, OVS, OPS, OO and OBS. Technicians may be appointed OVS, OBS, or VHF PAM. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

ATLANTIC DIVISION

Delaware	W3DKK	Roger E. Cole	345 E. Roosevelt Ave.	New Castle 19720
Eastern Pennsylvania	W3HK	George S. Van Dyke, Jr.	4007 Convent Lane	Philadelphia 19114
Maryland-D.C.	W3EA	Karl R. Medrow	RFD 1	Davidsonville 21035
Southern New Jersey	W2YPZ	Charles F. Travers	State Police Drive	Trenton 08628
Western New York	K2KCK	Richard M. Pitzerme	407 Woodland Rd.	Syracuse 13219
Western Pennsylvania	W3NFM	Robert F. Gawryla	1463 N. Allen St.	State College 16801

CENTRAL DIVISION

Illinois	W9PRN	Edmond A. Metzger	1520 South 4th St.	Springfield 62703
Indiana	WA9FED	Michael P. Hunter	701 Bobs Court	Beach Grove 46107
Wisconsin	K9EHI	Roy Pedersen	510 Park St.	Juneau 53039

DAKOTA DIVISION

Minnesota	WA0VAS	Casper Schroeder	10971 Quincy Blvd. N.E.	Blaine 55434
North Dakota	W0DM	Harold L. Sheets	21 Elwood Ave.	Grand Forks 58201
South Dakota	WA0CPX	Ed Gray	Rt. 3	Salem 57058

DELTA DIVISION

Arkansas	WA5VWH	Jimmie N. Lowrey	6301 Taper Lane	Fort Smith 72901
Louisiana	W5GHP	Robert P. Schmidt	5100 Press Dr.	New Orleans 70126
Mississippi	W5NCB	Walker J. Coffey	RFD No. 2	Oxford 38655
Tennessee	[illegible]	O. D. Keaton	Rt. 1, Medearis Dr.	Old Hickory 37138

GREAT LAKES DIVISION

Kentucky	WA4DJJ	Fred H. Huddle	604 Amanda Furnace Dr.	Ashland 41101
Michigan	W8ZBT	Ivory J. Clinghouse	1227 Rose Dr.	Niles 49120
Ohio	W8IMT	William E. Clausen	403 Canyon Dr. S.	Columbus 43214

HUDSON DIVISION

Eastern New York	K2SJN	Graham G. Berry	50 Parrot Ave.	New Rochelle 10801
N.Y.C. & Long Island	*WB2CHY	John H. Smale	20 E. Willow St.	Massapequa 11758
Northern New Jersey	WA2UOO	John M. Crovelli	446 Mt. Airy Road	Basking Ridge 07920

MIDWEST DIVISION

Iowa	K0YVH	Al Culbert	P.O. Box 406	Charles City 50616
Kansas	K0HXP	Robert M. Summers	3045 North 72nd	Kansas City 66109
Missouri	K0YVH	Larry S. Phillips	2482 W. Randolph	St. Charles 63301
Nebraska	K0OAL	V. A. Cashon	134 Pine St., Box 488	Chadron 69337

NEW ENGLAND DIVISION

Connecticut	W1GVP	John J. McNassor	218 Berlin Ave.	Southington 06489
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	68 Beechwood Rd.	Halifax 02338
Maine	K1TEV	Peter F. Sterling	39 Latham St.	So. Portland 04106
New Hampshire	W1SWX	Robert Mitchell	Box 137-A	Chester 03036
Rhode Island	K1AAV	John E. Johnston	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 02137

NORTHWESTERN DIVISION

Alaska	KL7CUR	Roy Davie	Star Route - Montana Creek	Willow 99688
Idaho	W7ZNN	Donald A. Crisp	1508 Alder Drive	Lewiston 83501
Montana	W7RZY	Harry A. Roylance	113 Northwest View	Harlowton 59036
Oregon	K7WWR	Dale C. Justice	1369 N.E. Sunrise Lane	Hillsboro 97123
Washington	W7QGP	Mary E. Lewis	10552 Sandpoint Way N.E.	Seattle 98125

PACIFIC DIVISION

East Bay	K6DWR	Charles R. Breeding	4130 Raleigh Ct.	Fremont 94536
Hawaii	KH6GQW	J. P. Corrigan	P.O. Box 698	Kaneohe 96744
Nevada	K7ZOK	Harold P. Leary	1812 N. Saylor Way	Las Vegas 89108
Sacramento Valley	WA6MVD	Norman A. Wilson	Route 1, Box 730	Woodland 95695
San Francisco	K6NUT	Thomas A. Gallagher	Box 31168	San Francisco 94131
San Joaquin Valley	W6JPH	Ralph Sarovan	6204 E. Townsend Ave.	Fresno 93702
Santa Clara Valley	WA6LFA	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	*WA4HFP	Beth Miller	1809 Highland Ave.	Camden 29020
Virginia	K4QIR	Robert J. Slagle	3515 - 25th St. N	Arlington 22207
West Virginia	W8IM	Donald B. Morris	1136 Morningstar Lane	Fairmont 26554

ROCKY MOUNTAIN DIVISION

Colorado	WA0HLQ	Clyde O. Penney	1626 Locust St.	Denver 80220
New Mexico	W5RF	Edward Hart, Jr.	1909 Moon N.E.	Albuquerque 87112
Utah	W7OCR	John H. Sampson, Jr.	3618 Mt. Ogden Drive	Ogden 84403
Wyoming	W7COL	Wayne M. Moore	142 South Montana Ave.	Casper 82601

SOUTHEASTERN DIVISION

Alabama	WB4FKI	James A. Brashear, Jr.	3002 Boswell Drive	Huntsville 35811
Canal Zone	KZ5ZZ	James L. McMullen	P.O. Box 2869	Balboa
Georgia	W4BYG	Ray LaRue	2258 Hudson Drive	Lilburn 30247
Northern Florida	W4RKH	Frank M. Butler, Jr.	323 Elliott Rd., S.E.	Fort Walton Beach 32548
Southern Florida	*W4KGJ	John F. Porter	6840 S.W. 51st St.	Miami 33155
West Indies	KP4AST	Pedro J. Piza	Box 2001	Ponce, PR 00731

SOUTHWESTERN DIVISION

Arizona	W7CAB	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 92626
San Diego	W6GHF	Cyril F. Huwar, Jr.	305 Jamul Ave.	Chula Vista 92011
Santa Barbara	WA6DEI	D. Paul Gagnon	1791 Hedon Cir.	Camarillo 93010

WEST GULF DIVISION

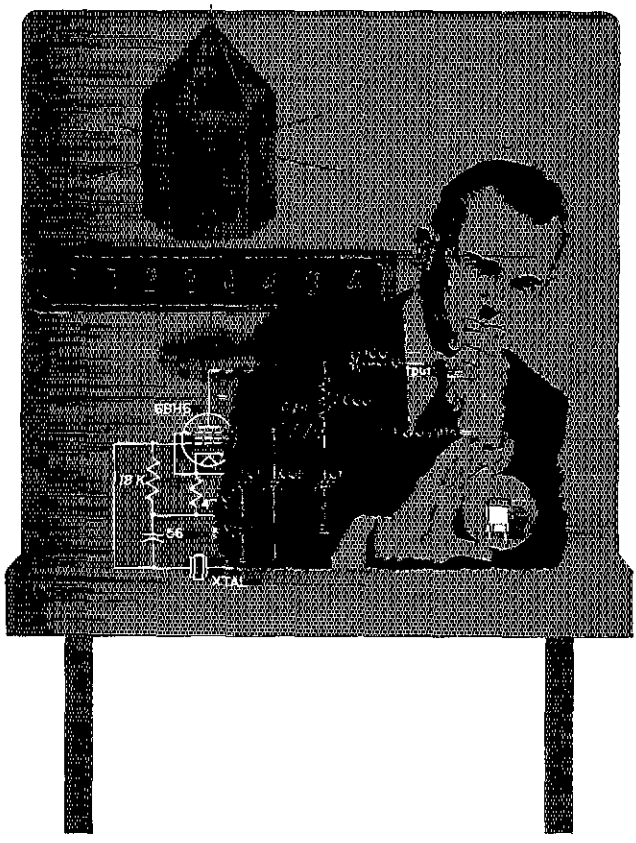
Northern Texas	W5LR	J. L. Harrison	1314 Holly Glen Drive	Dallas 75232
Oklahoma	W5PML	Cecil C. Cash	1802 Smith Ave.	Lawton 73501
Southern Texas	W5KR	Arthur R. Ross	P.O. Box 3561	Brownsville 78520

CANADIAN DIVISION

Alberta	VE6EK	Don Sutherland	444-25th Ave., N.E.	Calgary, Alta. T2E 1Y3
British Columbia	VE7FB	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	Ind Mgr. Bourget	Vaudreuil, P.Q.
Saskatchewan	VE5RP	Percy A. Crosthwaite	R.R. 3	Saskatoon S7K 3J6

* 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

INTERNATIONAL

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, WØTSN, 1952 — 1962
HERBERT HOOVER, JR., W6ZH, 1962 — 1966
ROBERT W. DENNISTON, WØDX, 1966 — 1972

Officers

President . . . . . HARRY J. DANNALS,* W2TUK
16 Arbor Lane, Dix Hills, NY 11746
First Vice-President . . CHARLES G. COMPTON,* WØBUO
1170 E. 90th St., Inver Grove Hgts., MN 55075
Vice-Presidents . . . . . ROBERT W. DENNISTON, WØDX
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, WØBWJ
FRANCIS E. HANDY, W1BDI
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
1302 18th Street, 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* VE3C
Box 660, Waterdown, Ontario L0R 2H0
Vice-Director: A. George Spencer VE2M
171 Kipling Ave., Beaconsfield, Quebec

Atlantic Division

HARRY A. McCONAGHY W8SV
8708 Fenway Dr., Bethesda, MD 20034
Vice-Director: Jesse Bieberman W3KT
RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355

Central Division

PHILIP F. HALLER W9HPC
5000 S. Tripp Ave., Chicago, IL 60629
Vice-Director: Edmond A. Metzger W9PRN
1520 South Fourth St., Springfield, IL 62703

Dakota Division

GARRY J. SHIMA . . . . . WØPAN
11417 Goodrich Rd. S., Bloomington, MN 55437
Vice-Director: Thomas M. Kulas . . . . WAØIAW
6741 Wentworth Ave., Minneapolis, MN 55423

Delta Division

MAX ARNOLD W4WHN
612 Hogan Rd., Nashville, TN 37220
Vice-Director: John H. Sanders WB4ANX
2149 Heatherly Rd., Kingsport, TN 37660

Great Lakes Division

RICHARD A. EGBERT W8ETI
6479 Red Fox Rd., Reynoldsburg, OH 43068
Vice-Director: William F. Clausen . . . . WØIMI
403 Canyon Dr. S., Columbus, OH 43214

Hudson Division

STAN ZAK K2SJO
13 Jennifer Lane, Port Chester, NY 10573
Vice-Director: George A. Diehl W2IHA
20 Wilson Ave., Chatham, NJ 07928

Midwest Division

PAUL GRAUER . . . . . WØFIR
Box 190, Wilson, KS 67490
Vice-Director: Richard W. Pitner . . . . WØFZO
2931 Pierce St., Sioux City, IA 51104

New England Division

ROBERT YORK CHAPMAN W1QV
28 South Road, Groton, CT 06340
Vice-Director: John C. Sullivan W1HHR
Whitney Road, Columbia, CT 06237

Northwestern Division

ROBERT B. THURSTON* W7PGY
7700 31st Ave., N.E., Seattle, WA 98115
Vice-Director: Dale T. Justice K7WWR
1369 NE Sunrise Lane, Hillsboro, OR 97123

Pacific Division

J. A. "DOC" GMELIN W6ZRJ
10835 Willowbrook Way, Cupertino, CA 95014
Vice-Director: Albert F. Gaetano 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 . . . . . WØSIN
430 S. Swadley St., Lakewood, CO 80228
Vice-Director: Allen C. Auten . . . . WØECN
6722 West 67th Ave., Arvada, CO 80003

Southeastern Division

LARRY E. PRICE W4DQD
P. O. Box 2067, Georgia Southern Branch
Statesboro, GA 30458
Vice Director: Ted R. Wayne WB4CBP
8250 S.W. 108th St., Miami, FL 33156

Southwestern Division

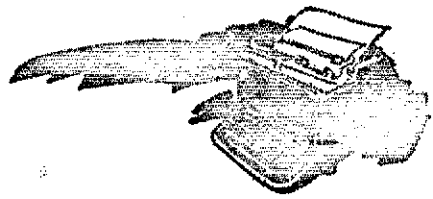
JOHN R. GRIGGS* W6KW
1273 13th St., Baywood Park, San Luis Obispo
CA 93401
Vice-Director: Arnold Dahlman W6UEI
3022 Las Positas Rd., Santa Barbara, CA 93105

West Gulf Division

ROY L. ALBRIGHT W5EYB
107 Rosemary, San Antonio, TX 78209
Vice-Director: Jack D. Gant W5GM
521 Monroe, N.W., Ardmore, OK 73401

* Member Executive Committee

"It Seems to Us..."



A NOT-TOO-FOND "73" TO 1973

"Neither the public interest nor the licensee is served by . . . more regulation than necessary."
— Commissioner Richard E. Wiley, FCC

REGULATION — actual, proposed, upheld, interpreted, hinted at — frames the central theme of amateur history for 1973. In the annals, it may well be recorded as our Year of Unity. In reaction — counterattack, if you will — amateurs were united in one common cause. That cause, of course, was and is opposition to the attack on our frequencies by others, and to the overly-restrictive regulatory trend emanating from FCC. It is a trend amateurs see as a threat to the concept of an unfettered amateur radio, basic for more than a half century.

The year had hardly dawned when FCC denied a couple of dozen petitions for reconsideration in the repeater docket, 18803 (in our view a classic example of "more regulation than necessary"), and two others for reconsideration in the phone expansion matter, Docket 19162. (Though phone had been expanded a modest amount on 40 and 80, it was not widened elsewhere; more importantly, the FCC text seemed to deride amateur emergency networks and training exercises on 80.)

Response was swift, too. "Straitjacket . . . or Flexibility?" asked an editorial in March *QST* as it revealed an unequivocal resolution adopted by the ARRL directors January 18. But more than rhetoric happened, peaking on July 9 with a briefing of the Commissioners (but with frequent staff-to-staff contact continuing at the accelerated level).

But everything so far was merely a warm-up for the battle of the year: on June 8 the Commission released its Notice of Inquiry and Notice of Proposed Rulemaking, Docket 19759, which proposed taking 224-225 MHz from the amateur service for a new Class E citizens radio service. Sparked primarily by a request from the Electronics Industries Association, the plan was to open 40 more channels to the public and — not at all incidentally — create vast new markets for the sponsors. The League asked for a five-month extension; after much jockeying on both sides, FCC granted a 30-day extension. Then came a 72-page Opposition and Request for Oral Argument from the League, along with comments from thousands of individual amateurs and local clubs; letters from members of Congress also reached the Commission. Finally, at Thanksgiving time, the record was closed with the receipt of Reply Comments — including another dozen pages from ARRL pointing out that the position of EIA and its supporters leaned heavily on conjecture with much of the real evidence tending towards the opposite side. At yearend, the matter was in limbo, with no concrete answer expected for at least a month.

Also dangling in space were proposals to raise license fees across the board in Docket 19658, held up by court action (the basic amateur fee would go from $9 to $10 under the measure) and Docket 19555, which under the guise of environmental protection would stringently restrict antenna structures. A more benign measure awaits final action: Docket 19605, which would allow compensation of control operators at certain full-service club stations, e.g., W1AW. An inquiry into the Radio Amateur Civil Emergency Service was undertaken during the summer months; a report from FCC has not yet been released. And late in the year, FCC invited suggestions for rulemaking in the Amateur-satellite Service; the text is in "Happenings" this month.

Only one measure reached the actual-rules stage during the year: provisions for model control by radio were made in new section 97.99 of the amateur regulations. On the other hand, private requests for rulemaking to phase out double-sideband a-m in the hf amateur bands; to create subbands exclusively for double-sideband a-m; and to write rules against "electro-magnetic smog," were all denied by the Commission.

Administrative procedures at FCC to handle repeater and remotely-controlled station license applications evolved slowly throughout the year, following adoption of Docket 18803, and eventually smoothed

(Continued on page 89)

League Lines . . .

In view of the energy problem, effective January 1 W1AW will no longer transmit code practice and bulletins on 15 and 10 meters during late hours when those bands have no long distance propagation. And if the nation goes to Daylight time, the old W1AW schedule (p. 107, October 1973 QST) will again apply.

The IEEE convention in NYC in March will have special attractions for hams. This year a symposium on amateur radio is scheduled for the afternoon of March 28, with K3JTE, WA2INB, W2FMI, K2UYH and W1SL presenting highlights of amateur space communication activities. Don't miss it. And come early: the annual luncheon of QCWA's NY chapter is March 26 at the Engineer's Club; W2PF has details.

Comet Kohoutek is attracting stellar attention. Vhf columnist Bill Smith discusses communications possibilities in "World Above," and a Stray elsewhere reports formation of a special net of interested hams.

Judging from newspaper reports, the FCC special CB enforcement units have been busy: they've visited Boston, Buffalo, Chicago, Dallas, Milwaukee, Norfolk, Va., Portland, Ore., and Alameda and Orange Counties in California, to name a few. Apparently, the reception accorded them by the illegal operators has been less than friendly. Wonder how the engineers would like a few million more to contend with, courtesy of the EIA?

Where one amateur station is remotely controlled from another, as for instance a repeater, two logs are involved -- that of the repeater and that of the control station. The station licensee (or trustee) is charged with the retention of the logs for one year; accordingly such persons should frequently gather up the repeater log sheets from the control stations and keep them on file.

Though logging requirements have been eased in recent years, particularly for mobile stations, FCC staffers point out that a complete, accurate and neat log book can be a strong form of protection for an amateur against possible claims by others of intentional interference or against troubles caused by unauthorized use of the callsign by "bootleggers."

An evaluation of 71 reports of interference to home entertainment devices in Canada, showed that 4 were caused by amateurs, 27 by general radio service (their name for CB) and 40 by commercial stations. Suitable shielding and bypassing cured 90% of the problems on the spot.

The electromagnetic garbage which devastated our 20-meter band during the summer and early fall (complex signals every 4 kHz) was finally cleared up after an unprecedented amount of diplomatic and administrative pressure had been brought to bear by the United States and Canada. Most of what was heard in North America originated in Cuba, but our friends in Europe had similar interference coming from at least one station in the USSR. The amount of time and energy devoted to this problem by the W and VE administrations was indeed gratifying.

Those of you who like to plan ahead, especially in arranging next summer's vacation, might keep in mind that there'll be an ARRL National Convention in New York over the weekend of July 20th, 1974.

Two useful backgrounders for hams, especially new ones, are: "Two Hundred Meters and Down," by Clinton B. DeSoto, a history from the beginning through 1936; and "Fifty Years of ARRL," a collection of the anniversary stories which appeared in 1964 QSTs. Each book is $2, from Hq. only.

Quote of the Month: (WL7HOR to "Poptronics") "I would like to ask how you would feel if one fifth of the 27 MHz CB band was removed from its present use and given over completely to the use of 98¢ toy walkie-talkies."

Interdigital Converters for 1296 and 2304 MHz

This article describes the design and construction of modern, low-noise, interdigital converters for the two top uhf bands. There are no critical coupling adjustments in the microwave portion to hinder the builder. These converters have been duplicated by some amateurs who are well known in uhf circles: WA2LTM, WA2VTR, K2JNG, K2RIW and WA2EIW, who all report excellent results without additional tinkering.

BY R. E. FISHER,* W2CQH

A NEW DESIGN for the mixer portion of these converters was motivated by the author's deep dissatisfaction with most present-day uhf converters used by the amateur fraternity. For example, the first 1296-MHz converter built nine years ago at W2CQH was a dual trough-line cavity affair, well known to many uhf enthusiasts. When first tested its noise figure exceeded 20 dB, almost too high to measure. Only after several nights of tinkering with the various links and probes contained within the box was the noise figure lowered to an acceptable 8 dB. Pity the poor fellow who does not have access to laboratory noise-measuring equipment, and after a few nights of listening with such a poor converter concludes that 1296 MHz is dead. This also suggests the reason why transistor preamplifiers are so popular today. A preamplifier, even if poorly constructed, will usually yield an acceptable noise figure which tends to mask the subsequent noisy converter.

A Filter and Mixer

A layout of the microwave portions of both converters is shown in Fig. 1. The structure consists of five interdigitated round rods, made of 3/8-inch OD brass or copper tubing. They are soldered to two sidewalls and centrally located between two ground-planes made of 1/16-inch sheet brass or copper-clad epoxy fiberglass. One ground plane is made larger than the microwave assembly and thus provides a convenient mounting plate for the remainder of the converter components.

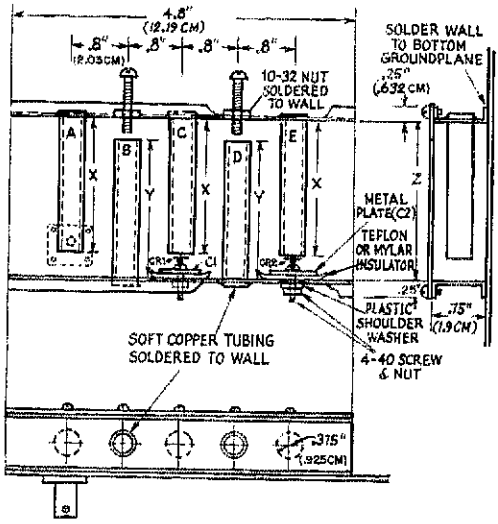
The sidewalls are bent from .032-inch thick sheet brass or they can be made from 1/4 × 3/4-inch brass rod. One edge of each sidewall is soldered to the larger ground plane. The other edge is fastened to the smaller ground plane by 4-40 machine or self-tapping screws, each located over the centerline of a rod. The sidewall edges should be sanded flat, before the ground plane is attached, to assure continuous electrical contact. Note that no end walls are required since there are no electric fields in these regions.

Electrically, rods A, B, and C comprise a one-stage, high-loaded-Q ($Q_L \approx 100$), interdigital filter[1] which is tuned to the incoming signal frequency near 1296 or 2304 MHz. The ungrounded end of rod A is connected to a BNC coaxial connector and serves as the coupling section to the filter input. Rod B is the high-Q resonator and is tuned by a 10-32 machine screw. Rod C provides the filter output-coupling section to the mixer diode, CR1.

* 2 Forum Ct., Morris Plains, NJ 07950.

[1] Fisher, "Interdigital Bandpass Filters for Amateur VHF/UHF Applications," *QST*, March, 1968.

The converter for 1296 MHz. While the mixer assembly (top center) in this model has solid brass walls, it can be made from lighter material as explained in the text and shown in Fig. 1. The i-f amplifier is near the center, just above the mixer-current-monitoring jack, J1. A BNC connector at the lower left is for 28-MHz output. The local oscillator and multiplier circuits are to the lower right. Note that L6 is very close to the chassis, just above the crystal. The variable capacitor near the crystal is an optional trimmer to adjust the oscillator to the correct frequency.



ENCLOSURE DIMENSIONS			
FREQ.	X	Y	Z
1296 MHz	2.00" (5.08CM)	2.00" (5.08CM)	2.25" (5.71CM)
2304 MHz	.9375" (2.38CM)	1.00" (2.54CM)	1.25" (3.17CM)

Fig. 1 — Dimensions and layout for the filter and mixer portions of the interdigital converters. The signal input is to the left rod, labelled "A." Local-oscillator injection is through the diode to rod "E." CR1 is the mixer diode, connected to the center rod in the assembly.

The mixer diode is a Hewlett-Packard 5082-2577 Schottkey-barrier type which is available from distributors for about $4. The cheaper 5082-2835, selling for 90¢, can be used instead, but this substitution will increase the 2304-MHz mixer noise figure by approximately 3 dB.

One pigtail lead of the mixer diode is tack-soldered to a copper disk on the ungrounded end of rod C. Care should be taken to keep the pigtail leads as short as possible. If rod C is machined from solid brass stock, then it is feasible to clamp one of the mixer-diode leads to the rod end with a small setscrew. This alternative method facilitates diode substitution and was used in the mixer models shown in the photographs.

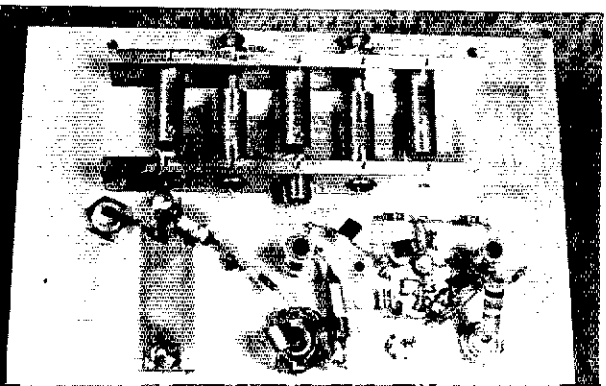
Fig. 1 also shows that the other end of CR1 is connected to a homemade 30-pF bypass capacitor, C1, which consists of a 1/2-inch-square copper or brass plate clamped to the sidewall with a 4-40 machine screw. The dielectric material is a small sheet of .004-inch thick Teflon or Mylar. A 4-40 screw passes through an oversize hole and is insulated from the other side of the wall by a small plastic shoulder washer.

In the first converter models constructed by the author and shown in the photographs, C1 was a 30-pF button mica unit soldered to the flange of a 3/8-inch diameter threaded panel bearing (H.H. Smith No. 119). The bearing was then screwed into a threaded hole in the sidewall. This provision made it convenient to measure the insertion loss and bandwidth of the interdigital filters since the capacitor assembly could be removed and replaced with a BNC connector.

Rods C, D, and E comprise another high loaded-Q (Q_L = 100) interdigital filter tuned to the local oscillator (LO) frequency. This filter passes only the fourth harmonic (1268 or 2160 MHz) from the multiplier diode, CR2. The two filters have a common output-coupling section (rod C) and their loaded Qs are high enough to prevent much unwanted coupling of signal power from the antenna to the multiplier diode and LO power back out to the antenna.

The multiplier diode is connected to the driver circuitry through C2, a 30-pF bypass capacitor identical to C1. CR2 is a Hewlett-Packard 5082-2811 although the 5082-2835 works nearly as well. Fifty milliwatts drive at one quarter of the LO frequency is sufficient to produce 2 mA of mixer diode current, which represents about 1 milliwatt of local-oscillator injection. A Schottkey-barrier was chosen over the more familiar varactor diode for the multiplier because it is cheaper, more stable, and requires no idler circuit.

Fig. 2 shows the schematic diagram of the 1296 to 28 MHz converter. All components are mounted on a 7 × 9-inch (17.8 × 22.9 cm) sheet of brass or copper-clad epoxy-fiberglass board. As mentioned earlier, this mounting plate also serves as one ground plane for the microwave mixer. When completed, the mounting plate is fastened to an inverted aluminum chassis which provides a shielded housing.



A 2304-MHz version of the converter. The i-f amplifier and 144-MHz output connector are to the lower right. The 540-MHz input connector (BNC) and strip line (L3) are at the lower left. A local oscillator and multiplier are on a separate chassis.

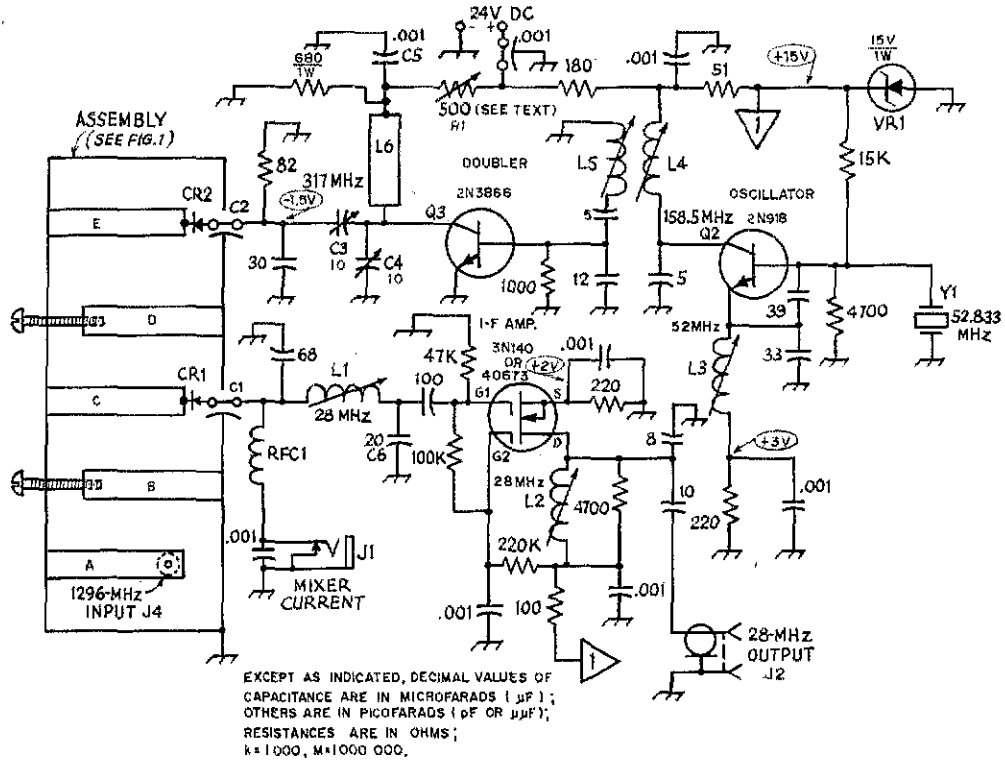


Fig. 2 — Schematic diagram of the 1296-MHz converter with oscillator and multiplier sections included. Dimensions for the filter and mixer assembly are given in Fig. 1.

C1, C2 — 30-pF homemade capacitor. See text and Fig. 1.
C3, C4 — 0.8- to 10-pF glass trimmer, Johanson 2945 or equiv.
C5 — .001-μF button mica.
C6 — 2- to 20-pF air variable, E. F. Johnson 189-507-004 or equiv.
CR1 — Hewlett Packard 5082-2577 or 5082-2835.
CR2 — Hewlett Packard 5082-2811 or 5082-2835.
J1 — Closed-circuit jack.
J2 — Coaxial connector, chassis mount. Type BNC acceptable.
L1, L2 — 18 turns No. 24 enam. on 1/4-inch OD slug-tuned form (1.5 μH nominal).
L3 — 10 turns like L1 (0.5 μH).
L4, L5 — 6 turns like L1 (0.2 μH).
L6 — Copper strip, 1/2-inch wide × 2-1/2-inches (1.27 × 6.35 cm) long. See text and photographs.
RFC1 — 33 μH, J. W. Miller 74F33SAI or equiv.

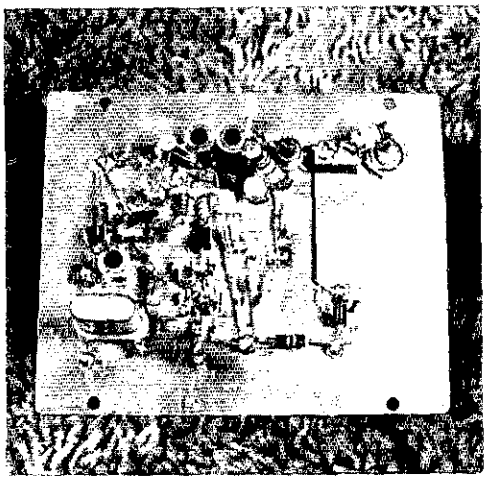
Oscillator and Multipliers

The nonmicrowave portion of the converter is rather conventional. Q1, a dual-gate MOSFET, was chosen as the 28-MHz i-f amplifier since it can provide 25 dB of gain with a 1.5-dB noise figure. The mixer diode is coupled to the first gate of Q1 by a pi-network matching section. It is most important that the proper impedance match be achieved between the mixer and i-f amplifier if a low noise figure is to be obtained. In this case, the approximately 30-ohm output impedance of the mixer must be stepped up to about 1500 if Q1 is to yield its rated noise figure of 1.5 dB. It is for this reason that a remote i-f amplifier was not employed as is the case with many contemporary uhf converters.

Q2 functions in an oscillator-tripler circuit which delivers about 10 milliwatts of 158.5-MHz drive to the base of Q3. The emitter coil, L3, serves mainly as a choke to prevent the crystal from oscillating at its fundamental frequency. Coils L4 and L5, which are identical, should be spaced closely such that their windings almost touch.

Q3 doubles the frequency to 317 MHz, providing about 50 milliwatts drive to the multiplier diode. It is important that the emitter lead of Q3 be kept extremely short; 1/4 inch (6.36 mm) is probably too long. L6, the strip-line inductor in the collector circuit of Q3, consists of a 1/2 × 2-1/2-inch (1.27 × 6.35 cm) piece of flashing copper spaced 1/8-inch (3.18 mm) above the ground plane. The cold end of L6 is bypassed to ground by C5, a .001-μF button mica capacitor

The multiplier circuits are tuned to resonance in the usual manner by holding a wavemeter near each inductor being tuned. Resonance in the Q3 collector circuit is found by touching a VTVM probe (a resistor must be in the probe) to C2 and adjusting the Johanson capacitors until about −1.5 volts of bias is obtained. The 317- to 1268-MHz



The oscillator and multiplier for the 2304-MHz converter. Note that L2 and L3 (top center) almost touch each other. L4, the 540-MHz output strip line, is at the right center with J1 nearby at the upper right.

multiplier cavity is then resonated by adjusting the 10-32 machine screw until maximum mixer current is measured at J1. When resonance is found, R1 should be adjusted so that about 2 mA of mixer current is obtained. As an alternative to mounting a potentiometer in the converter, once a value of resistance has been found that provides correct performance it can be measured and the nearest standard fixed-value resistor substituted. Some means of adjusting the collector voltage on the multiplier stage must be provided initially to allow for the nonuniformity of transistors.

A 2304-MHz Version

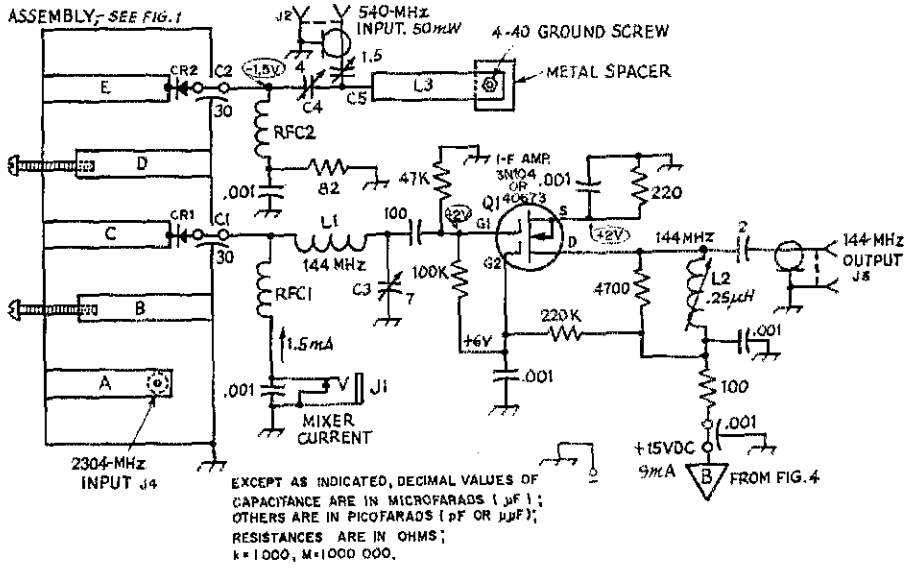
Fig. 3 and 4 show the schematic diagrams of the 2304-MHz converter and multiplier. The mixer and i-f preamplifier was built on a separate chassis since, at the time of their construction, a multiplier chain from another project was available. An i-f of 144 MHz was chosen although 50 MHz would work as well. An i-f output of 28 MHz, or lower, should not be used since this would result in undesirable interaction between the mixer and multiplier interdigital filters.

The 2304-MHz mixer and i-f amplifier section, shown in Fig. 3, is very similar to its 1296-MHz counterpart. Q1, the dual-gate MOSFET, operates at 144 MHz and thus has a noise figure about 1 dB higher than that obtainable at 28 MHz.

The multiplier chain, Fig. 4, has a separate oscillator for improved drive to the 2N3866 output stage. Otherwise the circuitry is similar to the 1296-MHz version.

Fig. 3 — Schematic diagram of the 2304-MHz version of the converter, with the i-f amplifier. The oscillator and multiplier circuits are constructed separately.

C1, C2 — 30-pF homemade capacitor. See text.
C3, C4, C5 — 0.8- to 10-pF glass trimmer, Johanson 2945 or equiv.
CR1 — Hewlett Packard 5082-2577 or 5082-2835.
CR2 — Hewlett Packard 5082-2811 or 5082-2835.
J1 — Closed-circuit jack.
J2, J3, J4 — Coaxial connector, chassis mount. Type BNC.
L1 — 5 turns No. 20 enam., 1/4-inch ID × 1/2-inch long. (6.35 × 12.7 mm).
L2 — 6 turns No. 24 enam., on 1/4-inch OD slug tuned form (0.25 μH).
L3 — Copper strip 1/2-inch wide × 2-11/16 inches (1.27 × 6.86 cm) long. See text and photographs.
RFC1 — Ohmite Z 144 or equiv.
RFC2 — Ohmite Z-460 or equiv.



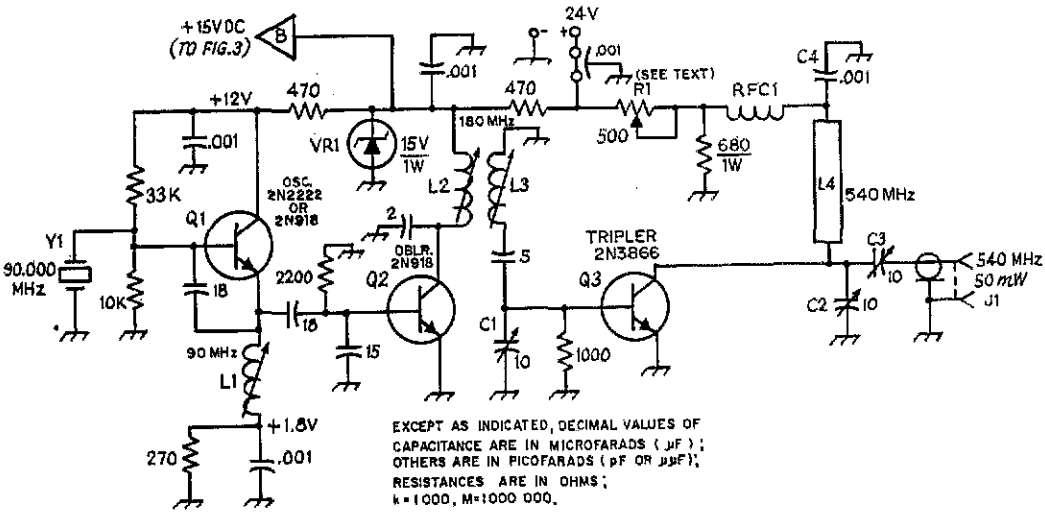


Fig. 4 — Schematic diagram of the oscillator and multiplier for the 2304-MHz converter. As explained in the text and shown in the photographs, a fixed-value resistor may be substituted for R1 after the value that provides proper performance has been found.

C1, C2, C3 — 0.8- to 10-pF glass trimmer, Johanson 2945 or equiv.

C4 — .001-μF button mica.

J1 — Coaxial connector, chassis mount, type BNC or equiv.

L1 — 10 turns No. 24 enam. on 1/4-inch OD slug-tuned form.

L2, L3 — 3 turns like L1.

L4 — Copper strip 1/2-inch wide × 1-1/2 inches (1.27 × 3.81 cm) long. Space 1/8 inch (3.18 mm) from chassis.

RFC1 — 10 turns No. 24 enam. 1/8-inch ID, closewound.

The measured performance of the two converters can be summarized as follows:

	1296 MHz	*2304 MHz*
Noise figure	5.5 dB	6.5 dB
Conversion gain	20 dB	14 dB
3-dB bandwidth	2 MHz	7 MHz
Image rejection	18 dB	30 dB
I-f output	28 MHz	144 MHz

[EDITOR'S NOTE: During conversations with the author, he reported that some constructors of these converters have tried to change the layout in some parts of the circuit. The outcome of such changes has been poor in many instances. It is well to remember that changing the position of one or two components can require a complete redesign of matching networks to obtain proper operation. Therefore, unless the builder is experienced in the design of vhf and uhf solid-state circuitry, the layout given for these converters should be adhered to as close as possible.] QST

Strays

Every once in a while I get a SLOW BURN when I hear hams bragging over the air that they "never belonged to ARRL and never plan to do so." Why a SLOW BURN? Well, anyone has the right to join or not to join an organization — I concede this; but, to brag about this as being a great accomplishment in itself is something else. Listening to these fellows, you would think that this was their greatest contribution to Amateur Radio. What a contribution!

No doubt the ARRL has some faults, but can you show me any large organization that does not have some faults? How about your fire department? Your place of work? Your school? Your government? Your_____ your _____; just name it. And they all are not perfect.

The ARRL, along with promoting interest in Amateur Radio and working for the amateur and helping safeguard the privileges that amateurs enjoy, also provides many services for all hams, such as: QSL service, activities for the DX hounds, net members, Novices, YLs, the experimenter, emergency planning, traffic handling, training, etc. etc.

One of the *new* services largely supported by the ARRL and its members is the use of Oscar for communications. The ARRL authorized an expenditure of $38,000 as a grant for the construction of another Oscar for the use of all hams. Now to hear a brother ham speak with pride of the QSO he had through an Oscar which was supported by the ARRL, and at the next breath to hear the same ham brag that he "never belonged to the ARRL and never will," to me is the height of ingratitude. A SLOW BURN? You better believe it. W9LIG. (*Reprinted from Starved Rock Radio Club's* Static)

— • • • —

The Post Office Department promises faster mail service with Zip codes. Use Zip codes.

• *Beginner and Novice*

The Art of Dipping

Twenty Ways to Use Your Dipper

BY BENJAMIN CLARK,* WB4OBZ

THE GRID-DIP oscillator has long been a standard piece of test equipment in the ham shack. All recent editions of the *Handbook* have carried a circuit or two and discussed its uses. Several articles each year in *QST* treat the dipper, giving new designs or new ways of using this useful instrument. This article is an attempt to summarize uses of the dipper, in the hope that it may serve as a single reference.

To obtain the fullest use of the dipper three accessories are needed, a "standard" capacitor, a "standard" inductor and a calibrated all-band receiver. A capacitor of 100 pF and an inductor of 5 μH are recommended in the measurement section of the *Handbook*, and these values handle most any need.

* Mepkin Abbey, Route 3, Box 357, Moncks Corner, SC 29461.

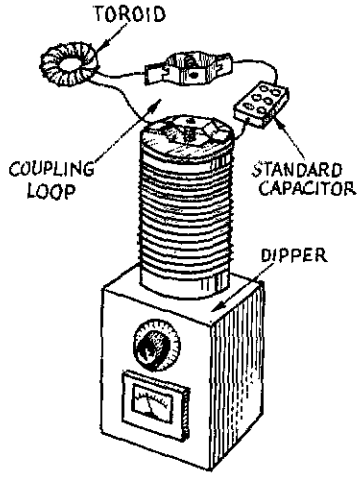


Fig. 1 — One way to measure toroids. The same technique can be used with shielded coils.

Resonant Frequency

The original use of the dipper was to measure the resonant frequency of a tuned circuit, and this use has been sufficiently covered that it merely needs to be mentioned here. One couples the dipper to the circuit to be measured, tunes the dipper until the meter dips, indicating resonance. The only precautions to be observed are to use the loosest coupling that will give a good dip, and to be sure that the dipper is indicating at the resonant frequency of the circuit to be measured and not at the resonant frequency of a circuit within the dipper itself. It's a good idea with any dipper, commercial or homemade, to check all ranges with the unit not coupled to anything and make note of any dips which occur. These are internal resonances within the dipper itself and knowing where they are can save much time and frustration when the unit is in actual use. One expects commercially built dippers to be free of such resonances, but a homemade unit may not be.

The calibration of the ordinary dipper is only approximate, close enough for most practical purposes, but not for all. Furthermore hand capacitance and the effect of the circuit to which the dipper is coupled will detune the oscillator somewhat. When greater accuracy is needed, one can make use of a frequency counter, or if this is not available, a calibrated frequency meter or receiver.

All dippers can be used as absorption frequency meters, for an absorption frequency meter is nothing more than a calibrated tuned circuit with some sort of resonance indicator. In every dipper, the current that passes through the meter is rectified rf from the tuned circuit, whether rectified by the grid circuit of a vacuum tube, by the gate junction of a JFET, or by a separate rectifier connected across the tuned circuit. It will rectify equally well whether the rf is generated by the dipper oscillator or is picked up from outside. With tube-type dippers, the plate voltage must be removed without cutting the heater or filament supply, to allow the grid-cathode circuit to act as a diode rectifier. An adjustable plate voltage is even

more helpful, as this will permit the oscillator circuit to act as a Q multiplier when the voltage is adjusted to just below the point of oscillation, giving a sharper and more sensitive peak when the tuned circuit picks up rf to which it is resonant.

Inductance

With a capacitor standard it becomes easy to measure the inductance of a coil. Simply connect the coil in parallel with the capacitor and measure the resonant frequency. Then if you feel like doing some figuring, you can use the formula for finding resonant frequencies to determine the inductance, or you can do it the easy way by using an L/C/F calculator.[1]

The usual way of coupling to a coil inductively will not work as well when the coil to be tested is a toroid or is shielded, precisely because these types of coils are intended to have as little external field as possible. There are three ways that one can couple them to the dipper for measurement, however. If the dipper has the hot end of the coil connected to an external terminal, a small capacitor, say 5 pF, can be connected between that terminal and one side of the coil and capacitor standard combination, the other side being connected to the dipper chassis.

Another method for coupling to toroids and shielded coils makes use of the fact that the loop formed by the leads from the capacitor standard to the coil forms one turn of the coil, and can be coupled inductively to the dipper. The coupling is quite loose, but the high Q of the unloaded coil will usually make it adequate to get a good dip at resonance. See Fig. 1.

A third method for toroids is to wind links around the toroid coil and the dipper coil and connect them together as described in the April, 1973 issue of *QST* page 60, and shown in Fig. 2.

In the design of inductively coupled bandpass filters, one often needs to know the mutual inductance or coefficient of coupling of a pair of coils. The *Handbook* gives the following method: measure the inductance of one of the coils with the other first open, then shorted. The coefficient of coupling, (k) is found from the formula:

[1] LaPlaca, "Using the ARRL L/C/F Calculator," *QST*, December, 1973.

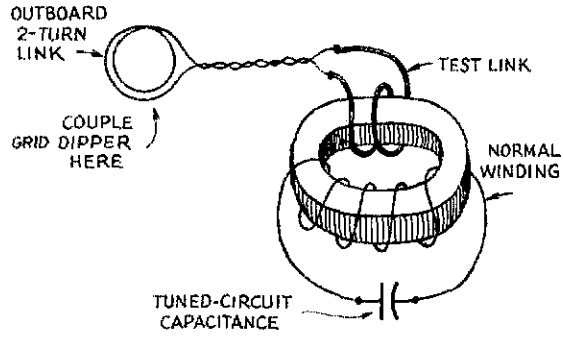


Fig. 2 — Another method for testing toroids.

$$k = \sqrt{1 - \frac{Ls}{Lo}}$$

where Ls is the inductance measured with the other coil shorted, Lo is the value measured when the short is removed. See Fig. 3 a and b. With known capacitors in use, measuring the frequency will enable you to determine the inductance.

Mutual inductance can be measured by finding the inductance of the two coils connected in series, noting the value, then reversing the connection to one of the coils and measuring the inductance again. Half the difference between the two measurements is the mutual inductance. Mutual inductance (M) and coefficient of coupling (k) are related by the formula:

$$k = \frac{M}{\sqrt{L1L2}}$$

For accurate measurement of mutual inductance or coefficient of coupling, something better than the dipper calibration may be needed, and may be obtained by using the frequency counter method described earlier. If one has a counter, or a receiver covering the required range, fine. But if your receiver is of the amateur-bands-only variety, your capacitor standard may not be able to tune the coil within your receiver's range. In that case, use any capacitor that will do

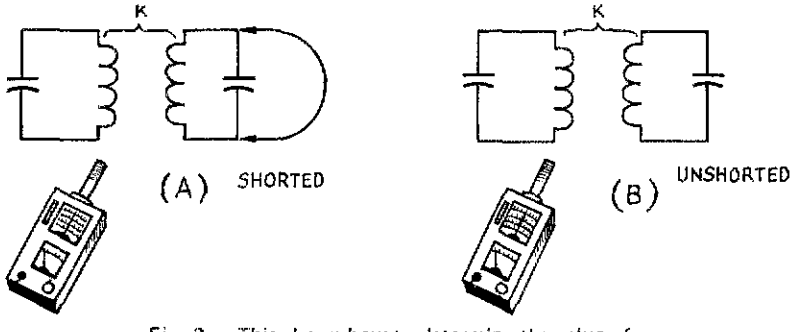


Fig. 3 — This shows how to determine the value of an unknown inductance as described in the text.

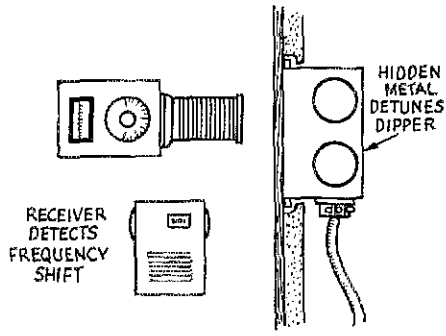


Fig. 4 — Locating hidden metals with a dipper.

so, and compute the coefficient of coupling as shown above, but using another formula that does not require that one determine the actual value of the inductance:

$$k = \sqrt{1 - \frac{fo^2}{fs}}$$

where *fo* and *fs* are the frequencies measured with the other coil open and shorted respectively.

Capacitance

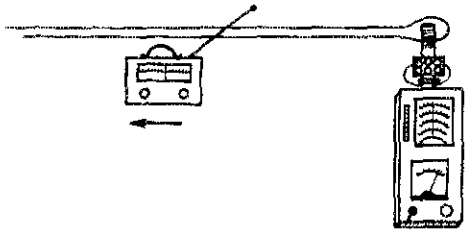
Capacitance is measured just like inductance except, of course, that you connect the inductance standard in parallel with the capacitor to be measured.

Transmission Lines

In constructing antennas, a quarter-wave section of line at the operating frequency is often needed. If one-fourth the wavelength in free space were required, the length could simply be computed by formula. But the electrical length of a line is always greater than the measured length; therefore the velocity factor of the coax should be taken into account. This will assure your getting the proper line length to within a few inches. To get a quarter-wave line, attach a loop to one end, leave the other end open, and dip. Trim until the dip is at the desired frequency. When the dip is where you want it, you have your quarter-wave line (or any odd multiple of a quarter wave, for that matter).

For a half-wave line, do the same as described above, except that the far end should be shorted, and a small coupling loop for the dipper should be used at the near end of the line. If the line is of reasonably good quality, the dip should be quite sharp in both cases.

Fig. 5 — A method for tracing hidden pipes or wiring using a bc receiver and a dipper.



To measure the velocity factor of a line, simply reverse the procedure: find the frequency at which the length of line is resonant (far end open), measure the length, and use the formula:

$$V = \frac{fl}{246}$$

where *f* is the resonant frequency, *l* is the length in feet, and *V* is the velocity factor. For long lines, greater than a quarter wavelength at the lowest frequency reached by the dipper (rarely the case in an amateur installation), a line terminated in an open circuit will be resonant at any odd multiple of a quarter wavelength. In this case, however, it may be necessary to check at several frequencies to be sure that one has the correct number of quarter wavelengths.

Miscellaneous

Simply because it is an oscillator with a wide tuning range, the dipper can serve as a signal generator, both for approximate alignment of receivers and for supplying rf for antenna measurements.

A dipper can also act as a neutralization indicator. When the dipper is coupled to the plate tank of a transmitter stage, tuning the grid tank through resonance will cause a dip if the stage is not neutralized. This method has the advantage of not requiring that the transmitter be turned on to make the check. A dipper can also be used in the absorption-frequency-meter mode to detect rf in the plate circuit when the grid is driven.

A troublesome problem in transmitters, both tube and solid state, is that of parasitic oscillations. The dipper can often be most helpful in determining the frequency of the parasitics and in identifying the resonances responsible.

In the oscillating mode of the dipper, particularly if regeneration is adjustable, a dipper can serve as a field-strength indicator. A short antenna, about 20 inches of stiff wire connected to the hot end of the dipper coil will serve to pick up the signal.

A dipper, when its signal is picked up on a communications receiver, can be used to locate metal. As the coil is brought close to the metal, the dipper oscillator will be detuned, and the change in pitch of the beat note in the receiver will enable one to locate the metal easily. See Fig. 4.

Hidden wiring or metal piping can also be traced by inducing an rf current in the metal, and following it while monitoring the dipper's signal in a bc receiver. (see Fig. 5.) In this case, however, use the weakest signal that will give adequate response, both to secure more accurate locations and to cut down on the interference possibilities to broadcast reception in your neighborhood. Whenever a small bc receiver is used for tests like these, it is best to try the techniques first on a piece of wire you can see and become familiar with the method and the behavior of the equipment, as otherwise one can be misled by the avc action of the receiver.

(Continued on page 33)

A Crystal-Controlled Converter and Simple Transmitter for 1750-Meter Operation

BY JAMES V. HAGAN,* WA4GHK

IN RECENT YEARS, a small but ever-growing group of dedicated amateurs have been experimenting with communications in a 30-kHz section of the long-wave spectrum. Dubbed the 1750-meter band, the use of this region is outlined in FCC regulations, Part 15.203. Amateur communications have spanned distances approaching 300 miles in spite of the very low power transmitters and inefficient antennas permitted under the present regulation.

There are many receivers, both new and surplus, that tune this range. An optimum receiver should have high sensitivity, a bandwidth of 100 Hz or less, a good frequency readout, and be capable of battery operation to get away from noisy ac-distribution lines. Since most amateurs already have hf equipment meeting most of these requirements, a good converter would be all that is needed to solve the receiving problem. One purpose of this article is to describe such a converter.

Receiving-antenna requirements are a major drawback to many otherwise good receivers in this part of the spectrum. We need to get rid of the notion that the receiving antenna for these frequencies must necessarily be several hundred feet long. A properly matched antenna need only be as long as half a dozen feet or so. The input of this converter is designed to tune and match any wire from 5 to 150 feet long (1.5 to 46 m). It will also work with loop and low-impedance antennas as well.

Circuit Description

A schematic diagram of the converter is shown in Fig. 1. L2 and C1, in conjunction with only the capacitance of the 62-inch (1.6 m) whip, or any wire up to 25 feet (8 m) long, forms a pi network which couples the antenna to the emitter of the rf-amplifier transistor, Q1. Similarly, antennas from 25 to 150 feet (8 to 46 m) long can be tuned when connected to L1. L1 and L2 are inductively coupled and both must be tuned to the operating frequency when using long antennas. C2 is switched in parallel with L2 to allow it to resonate in the band now that the capacitance of the short antenna is no longer present. Tuning is accomplished by adjustment of the position of ferrite slugs in the coils.

Loop, or other low-impedance antennas, are connected to J1. L2 is then adjusted to resonance with C2 across it.

Transistor Q1 provides 10 to 15 dB of gain. The collector of Q1 is tuned to resonance by L3 and C6. A low L to C ratio is used here to keep the gain of Q1 low and to increase the selectivity provided by the circuit.

The signal is coupled through C7 to gate 1 of the mixer Q2. The LO is injected at gate 2. The i-f output circuit L4, C9 and C11 can be tuned to either 1515 kHz or 3515 kHz, depending on the position of S2, to permit the converter to be used with amateur-band-only receivers or bc sets. R12 and C17 prevent vhf parasitic oscillation of the mixer. The output link on L4 is left floating with respect to ground. This allows the option of separate grounding of the converter, if necessary, to improve noise reduction and isolation from the ac line. The link may be grounded to the chassis at the i-f output terminal strip (if line noise coupled through the hf receiver and conducted to the converter over the coaxial-cable shield to the converter is not a problem).

Q3, the local oscillator, operates on 3340 or 1340 kHz, as selected by S2, depending on the desired i-f output tuning range.

Construction

The converter is built on a printed-circuit board. The pc-board layout and the parts layout is shown in Fig. 2. All parts except C17 and R12 are mounted on the top side of the board (not foil side). C17 is soldered directly between C12 and the source of Q2 using very short leads on the foil side of the board. R12 is a 1/4-watt composition resistor soldered across a break, cut in the drain

* 896 Port Malabar Blvd., Palm Bay, FL 32901.

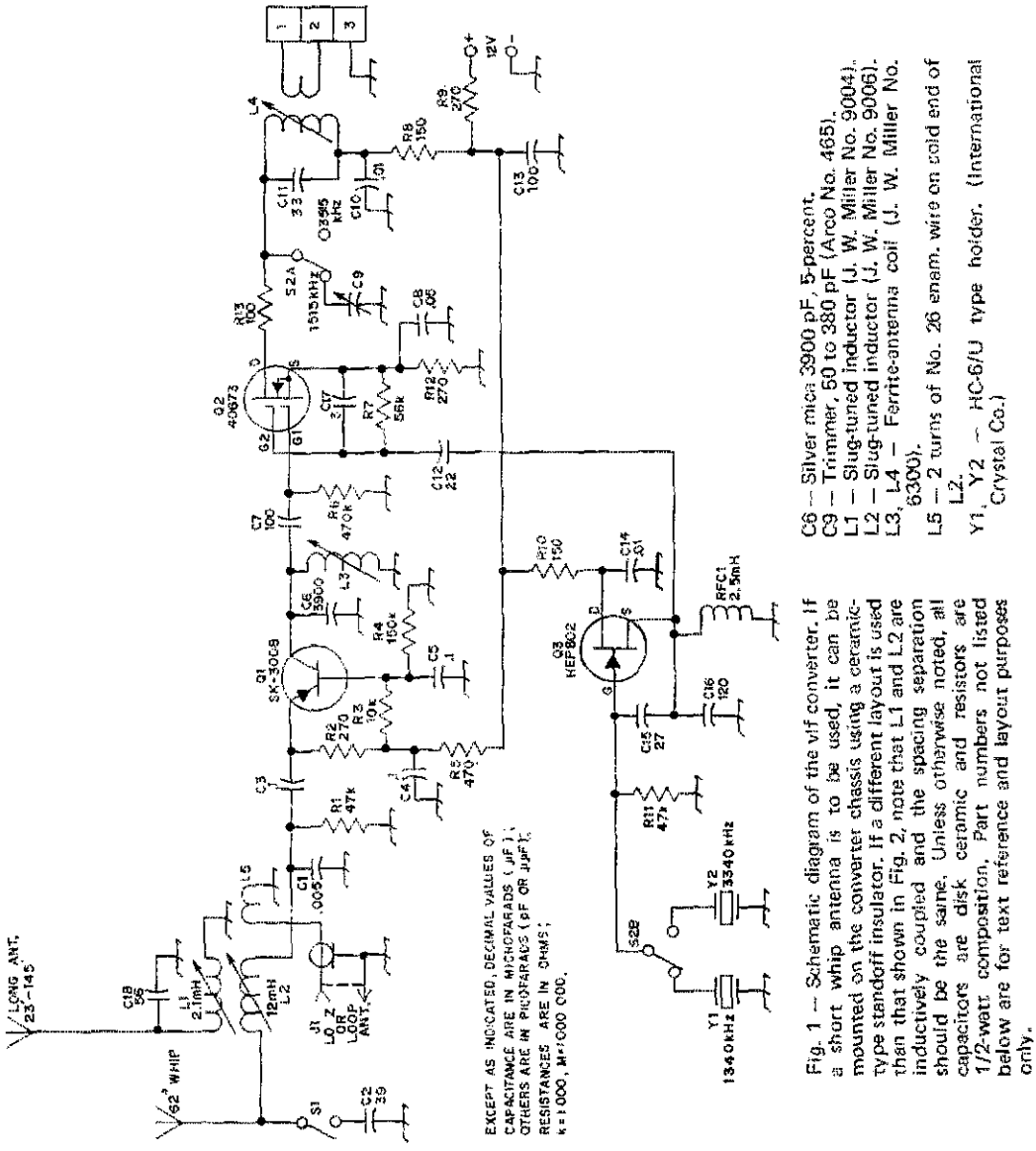


Fig. 1 — Schematic diagram of the vlf converter. If a short whip antenna is to be used, it can be mounted on the converter chassis using a ceramic-type standoff insulator. If a different layout is used than that shown in Fig. 2, note that L1 and L2 are inductively coupled and the spacing separation should be the same. Unless otherwise noted, all capacitors are disk ceramic and resistors are 1/2-watt composition. Part numbers not listed below are for text reference and layout purposes only.

C6 — Silver mica 3900 pF, 5-percent.
C9 — Trimmer, 50 to 380 pF (Arco No. 465).
L1 — Slug-tuned inductor (J. W. Miller No. 9004).
L2 — Slug-tuned inductor (J. W. Miller No. 9006).
L3, L4 — Ferrite-antenna coil (J. W. Miller No. 6300).
L5 — 2 turns of No. 26 enam. wire on cold end of L2.
Y1, Y2 — HC-6/U type holder. (International Crystal Co.)

foil lead of Q2. A link consisting of two turns of No. 22 insulated wire is wound directly over the windings of L2 and L4. The shield for the rf stage is cut from a piece of brass or copper sheet. It is 2-1/4 inches (5.7 cm) high and extends the width of the board. Three 1-inch (2.5 cm) lengths of No. 18 bus wire are pushed through holes in the board and soldered to the foil at the shield location. The shield stands vertically on the board between the antenna coils and L3 and is soldered to the three bus wires extending up from the board. The terminals of S1, S2, Y1, and Y2 extend through the board and are soldered to the foil. C9 is prepared for mounting by cutting off the original mounting tabs with diagonal cutters and carefully filing down the remaining stubs. The terminals of C9 extend through slotted holes in the board and are soldered to the foil. A round hole between the slotted holes provides clearance for the end of the tuning screw and allows C9 to rest flat on the board. The polarity of C9, should be observed, the rotor going to ground. The polarity of L2 and L3 must be observed, the winding start of L2 goes to C2, and the winding start of L3 goes to ground.

The circuit board was mounted in a box measuring 6 × 5 × 2-5/8 inches (15 × 13 × 7 cm) and was a modified 6 × 5× 4-inch minibox. Four 3/16-inch (4.76 mm) holes are drilled in the chassis to pass the tuning screws of L1, L2, L3 and L4. The tuning screw of L4 is cut off slightly above the chassis and slotted with a fine hacksaw blade. This is done after alignment of the circuit is completed. The tuning screws of L1, L2, and L3 must be fairly loose and should turn freely and smoothly or they will wear out. With care, enlarge the holes in the coil-mounting clips by means of a small, round jeweler's file and lubricate the screws with light machine oil if necessary. Tuning knobs to fit 1/8-inch shafts may be used; however, some shims may be necessary when the knobs are fastened to the tuning screws of L1, L2, and L3.

Alignment

Connect a general-coverage receiver to the i-f output terminals with a length of coaxial cable. Apply power to the converter, set S2 to the 3515-kHz position and tune the receiver to 3340 kHz. A strong signal will be heard here if the LO is working. Then, retune to 3515 kHz and feed in a signal at 175 kHz. With S1 in the C2 position, adjust the tuning knobs on L2 and L3 for maximum output from the receiver (reducing the level of the signal as necessary). Next, adjust L1 for a peak. This will be a rather broad peak. Make no further adjustment of L4.

Tune the receiver to 1340 kHz, place S2 in the 1515-kHz position and check the 1340-kHz LO. Retune to 1515 kHz and adjust C9 for a peak. Make no further adjustment of C9. At this point, if everything is working properly, with no signal into the converter and no antenna connected, a very definite increase in noise level should be heard in the receiver when power is applied to the converter and L3 is tuned through resonance.

If oscillation of the rf amplifier is experienced, the phasing of L2 and L3 is wrong. Reverse the leads on L3 only. If the mixer is extremely noisy, increase the value of R9 slightly.[1]

When using the whip antenna, select the proper i-f output range with S2 and tune the receiver to the desired frequency. The frequencies between 3500 and 3530 kHz, or between 1500 and 1530 kHz correspond to frequencies from 160 to 190 kHz. Adjust the tuning knobs on L2 and L3 for maximum signal. L1 will have no effect unless a long-wire antenna is connected to it. Tuning of L2 and L3 will be quite sharp. L2 especially must be "right on the nose" for weak-signal reception with the whip and short antennas. The tuning range of L3 can be limited to 160 to 190 kHz by removing its slug and placing a 3/8- to 1/2-inch length (9.5 to 12.7 mm) of 1/8-inch (3 mm) plastic tubing down over the screw before reassembling the slug into the coil. This will make converter tuning easier and less confusing.

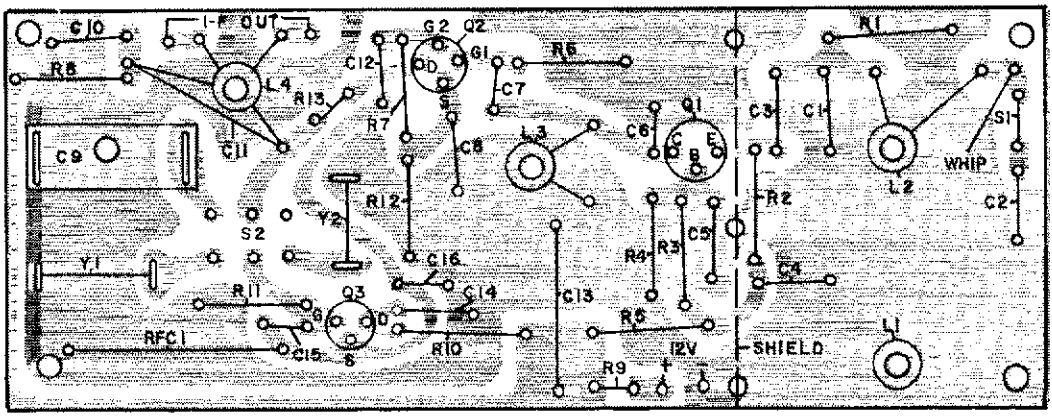
A Companion Transmitter

Shown in Fig. 3 is the schematic diagram of a simple but effective one-watt cw transmitter and power supply. More efficient designs have been built but this is one of the simplest that will give acceptable results. The antenna is a 50-foot (15.2 m) TV push-up mast guyed with nylon or plastic rope and stands on a large bottle. It makes a very effective antenna for this rig. The transmitter is not designed to feed any sort of transmission line and must therefore be used directly at the base of the antenna, as required by Part 15 rules. Remote keying can be used if desired for greater operating convenience. QST

[1] [EDITOR'S NOTE: It may also be advisable to put a 22-ohm resistor in series with the drain lead of Q3 or ferrite beads over the lead to reduce the possibility of vhf oscillations.]

(Fig. 3 on next page.)

Fig. 2 — Pc-board and parts layout. C17 is soldered directly from gate 2 to the source (Q2) on the foil side of the board. C18 is soldered across the terminals of L1.



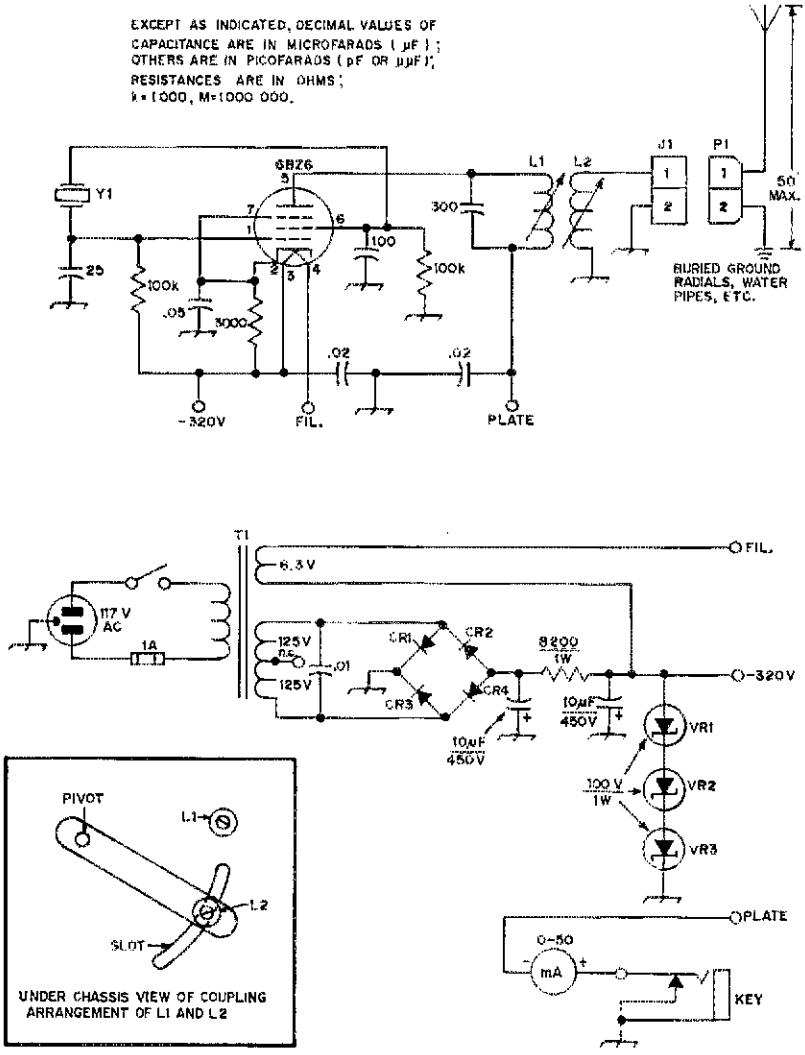


Fig. 3 — Schematic diagram of the 1750-m transmitter and power supply. It is important to remember that the entire length of the antenna plus any feed line must be 50 feet maximum, and that the dc power input to the final stage must not exceed 1 watt. After adjusting L1 and L2 to resonance, the coupling between the two coils is varied until the proper plate current for 1 watt is obtained (see inset). Unless otherwise noted, capacitors are disk ceramic and resistors are 1/2-watt composition.

CR1-CR4, incl. — 400 PRV, 1-A Silicon diode.

L1 — Slug-tuned inductor, 0.5 to 3 mH (J. W. Miller No. 9003).

L2 — Slug-tuned inductor, 2 to 8 mH (J. W. Miller No. 9004).

T1 — Power transformer, 250 V ct and 6.3 V ac (Stancor PS-8416 or equiv.).

VR1, VR2, VR3 — Zener diode, 100 volt.

Y1 — 160 to 190 kHz.

Strays

Radio and TV personality Arthur Godfrey, K4LIB (shown here with W4CAM, XYL of FCC Engineer W4CEM) participated in special ceremonies celebrating the 50th anniversary of commercial broadcasting in Virginia. WTAR, Norfolk, first went on the air in 1923.

Forty-one radio amateurs from nineteen states competed in 1973 for three scholarships awarded by the Foundation for Amateur Radio, Inc., Washington, D.C. The following were the award winners: Robert Glaser, WA3MSW, John Gore Memorial Scholarship — $500; Stuart Oserman, WA9ZPL, Richard G. Chichester Scholarship — $250; Ronald D. Welch, WA9ZLN, Edwin S. Van Deusen Scholarship — $200. The Foundation is a non-profit organization devoted exclusively to promoting the interests of amateur radio and to scientific literary and educational pursuits that advance the purposes of amateur radio. It is composed of trustees representing thirty-nine radio clubs in Maryland, Northern Virginia and the District of Columbia.

Negative and High Voltages from a Positive Supply

BY JULIAN M. PIKE,* WAØTCU

OCCASIONALLY a negative voltage may be needed when only a positive supply is available. This may be necessary, for example, when using op amps. These are very useful devices, but suffer setbacks without a dual-polarity supply. Negative and positive voltages equal to and higher than the dc supply can be easily obtained without a transformer by using an *RC* oscillator and rectifying to the desired polarity. Such an oscillator is shown in Fig. 1. It operates at approximately 1200 Hz with added "totem pole" output transistors driven in complementary fashion. One output transistor is off when the *other is on, and vice versa, which alternately* connects the output load to the positive supply or ground. This gives much better efficiency than direct coupling to the oscillator. While a discrete-component oscillator is shown, it could be built with a digital-logic IC as discussed later.

Three rectifiers are shown in Fig. 2. The one shown in Fig. 2A is a voltage doubler with positive output. The output voltage will not quite reach *twice that of the supply, and will drop under load.* The circuit shown in Fig. 2B is for a negative supply. Its output voltage will be somewhat less than the positive supply voltage. However, many times an op amp will ignore such an imbalance.

* Research Systems Facility, National Center for Atmospheric Research, P. O. Box 1470, Boulder, CO 80302.

The circuit shown in Fig. 2C is a negative doubler which requires some additional switching in conjunction to that provided by the oscillator. When the input is switched to the positive supply, C1 will be charged to the supply voltage with the polarity shown. The 2N3906 will be turned on by its base-bias resistors permitting C2 to charge to the supply voltage also. The 2N3904 will be slightly reverse biased by the forward-voltage drop across CR1, and therefore will be turned off. When the input is switched to ground, C1 makes the emitter of the 2N3904 negative which turns it on (but reverse biases CR1). The 2N3906 has no bias *and is off. Therefore C1 and C2 are connected in* series across the output (CR2 also being reverse biased) and a negative voltage doubler is implemented. The advantage of these circuits, being driven by the oscillator against ground, is that they provide a common ground from supply to output. The actual output voltage of the negative doubler will be somewhat less than twice the positive supply voltage, of course. It could be used with a voltage regulator such as a Zener diode to obtain a negative voltage under load equal to the positive supply. Indeed, there are dual-tracking regulator ICs available such as the Silicon General SG3501, the Raytheon RC4194 and the Motorola MC1486 *which will keep the positive and negative voltages* identical.

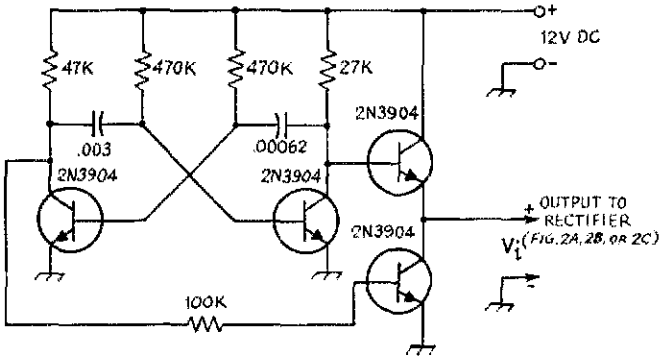


Fig. 1 — Schematic diagram of the discrete oscillator. Resistors are 1/2-watt composition and capacitors are disk ceramic.

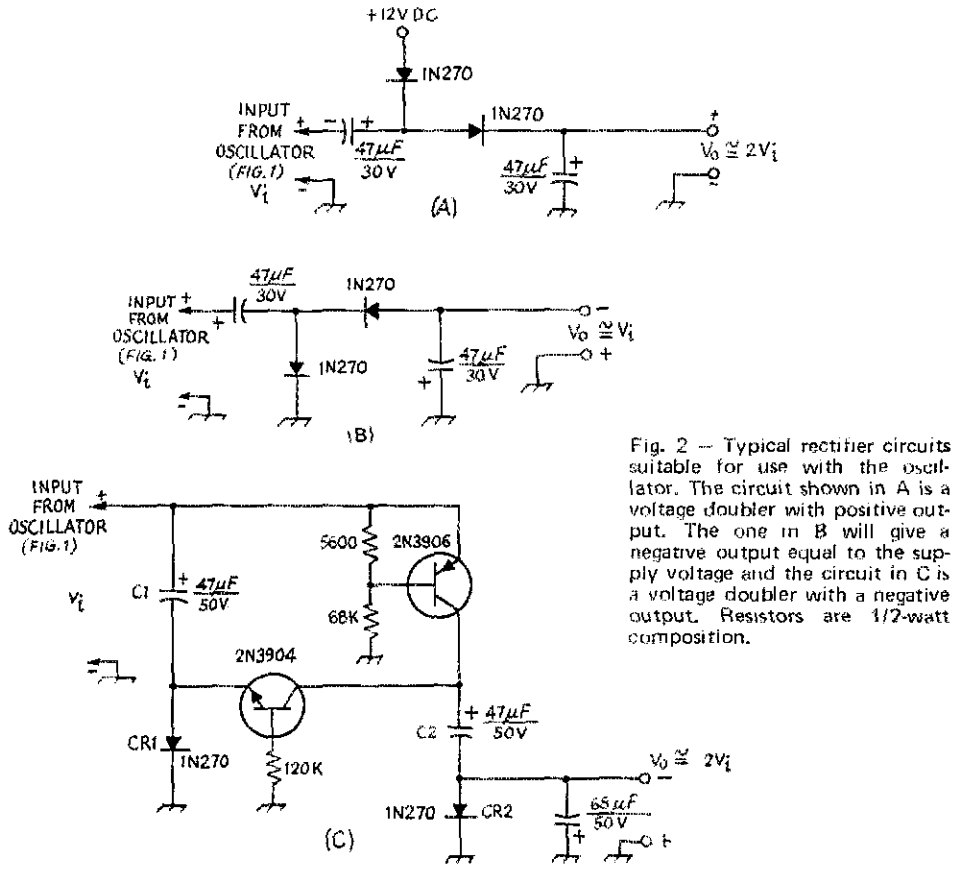


Fig. 2 — Typical rectifier circuits suitable for use with the oscillator. The circuit shown in A is a voltage doubler with positive output. The one in B will give a negative output equal to the supply voltage and the circuit in C is a voltage doubler with a negative output. Resistors are 1/2-watt composition.

The circuit values shown were for a very low current-drain supply for a low-power op amp. As an example of performance, the circuit in Fig. 2C yielded −23.5 volts no load from a +12.6-volt supply with an input current drain of 0.57 mA. At an output current of 1 mA, the voltage dropped to −21.1 volts with an input current of 2.45 mA, and an efficiency of 68 percent. Ripple was 15 mV pk-pk. The output dropped to the supply voltage at 1.6 mA drain, however.

IC-Oscillator Substitute

The circuit in Fig. 3 shows how a complementary MOS digital IC can be used as an oscillator in place of the circuit in Fig. 1, yielding the same efficiencies with fewer parts. Either output A or B can be used with the circuits of Fig. 2; the arrangement will have common ground, and will be essentially identical to the discrete circuit since the IC has complementary MOS outputs. The RCA CD4001AE and Motorola MC14001CL as well as similar chips of other makers are a good choice here.

The circuit in Fig. 3 has greater capability than the discrete-component circuit since the two outputs A and B are exactly out of phase, or complementary, allowing us to implement higher multiplication. The quadrupler in Fig. 4 is found in *The Radio Amateur's Handbook* and can be used by connecting to both outputs A and B of Fig. 3. This arrangement yielded 40.5 volts at 0.5 mA with an efficiency of 62 percent with 12-V input. The circuit shown in Fig. 5 is an octupler and could, of course, be extended to many more multiplications. The disadvantages of these circuits are that they do not have a common ground between supply and output. Also, the power available is small since the IC should really not be called on for more than 3 to 4 mA per gate output. The supply voltage can vary from 3 or 5 volts at the low end to 15 or 18 volts at the high end depending on the manufacturer.

One can easily exchange pnp with npn transistors reverse the diodes and electrolytic capacitors to obtain positive voltages from a negative supply. The IC oscillator can also be used in a positive ground arrangement. It is also possible to run the oscillator at much higher frequencies than those used in the previous circuits, thus reducing the necessary size of filter capacitors. Harmonic output at communications frequencies could be a problem, however.

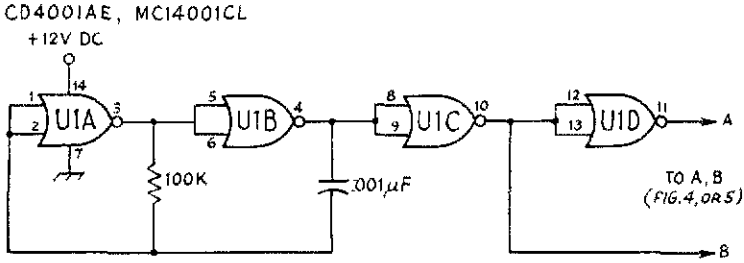


Fig. 3 — Schematic diagram of an IC oscillator. The outputs at A and B give equal amplitude voltages of opposite phase.

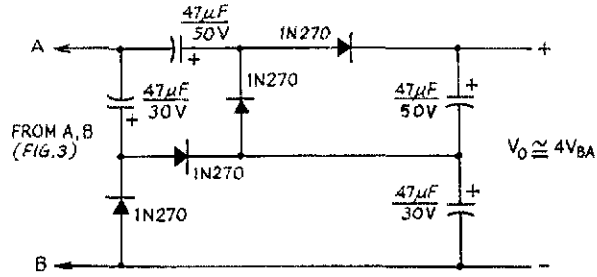


Fig. 4 — Schematic diagram of a quadrupler circuit suitable for use with the IC oscillator. The disadvantage of this circuit is that there is no common ground with respect to the initial voltage source.

All rectifier circuits are generally capable of quite high power levels if high-current rectifiers and switching transistors are used. The 1N270 has low forward voltage drop up to currents of approximately 60 mA. At higher currents, the new hot carrier rectifiers could be employed to keep the forward drop low and the efficiency high. High-current switching may best be done by using the oscillator as a wave-form source at low power, then switch with power transistors driven by it. *The IC oscillator of Fig. 3 can produce base drive* sufficient to switch respectable currents if high-gain output transistors are used. The complementary outputs A and B can be used to drive a totem-pole switch similar to the one used with the discrete-component oscillator, or complementary transistors (pnp and npn) could be used with a single driving waveform. Most likely, the simplest way to achieve high power would be with the very high-gain Darlington power transistors made by Motorola and others. Thus, there are many possibilities with regard to the voltages, polarities, *and currents obtainable from a single dc supply* without adding a transformer. QST

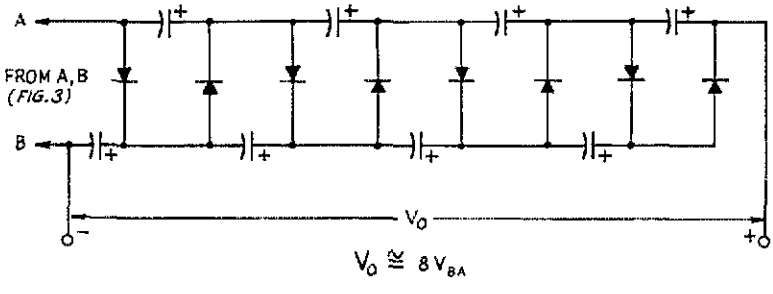
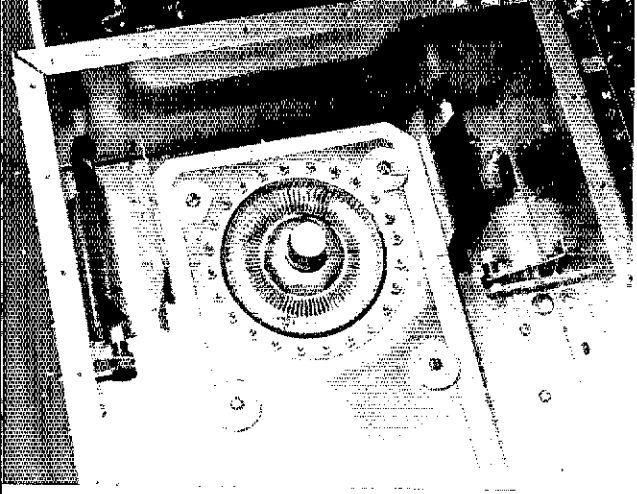


Fig. 5 — Schematic diagram of a voltage octupler.



A 2-KW Amplifier for 144 MHz

Part II

BY EDWARD L. MEADE, JR.,* K1AGB

Plate Tank Assembly

THE STRIP-LINE plate tank is fabricated from two pieces of 1/16-inch thick brass sheet, with dimensions and hole-center positions as shown in Fig. 2. Once the sheets have been cut to size, the center points of all holes in both sheets are marked and checked for positioning accuracy. A small pilot hole (No. 28 bit to pass a 6-32 bolt) is drilled in the center of the large tube clearance holes on both sheets. Then both sheets are aligned as they would be for final assembly, and are bolted together through the two pilot holes and clamped together at the shorted end of the line. The dc-isolation bushing-hole centers are drilled through both sheets, using a small pilot bit (No. 55 or so). Doing this provides reasonable assurance of concentricity of common holes in the two sections of the plate line when the time comes to assemble the tank circuit. Burrs are removed from all holes before continuing, to prevent scratching or gouging the lines.

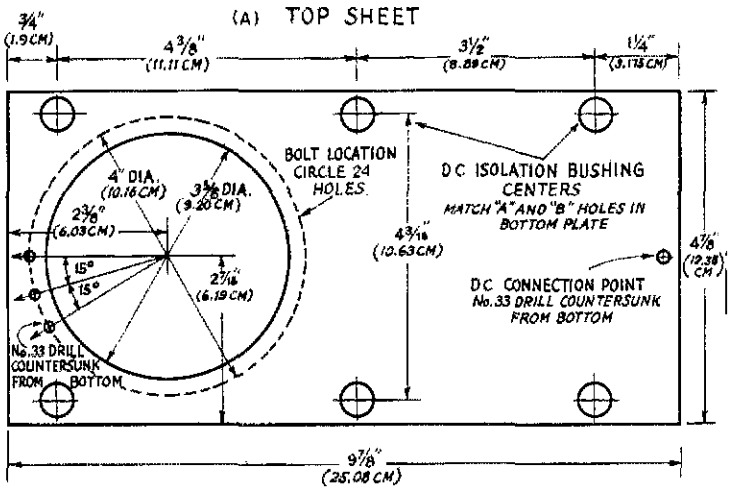
Holes for mounting the capacitor stator plates and the line-shorting bar are now cut in the bottom sheet, in accordance with Fig. 2B. At this point, consideration should be given to mounting-position requirements of the line on the chassis top. If skewing of the tube in the socket and attendant tube-seating difficulty is to be avoided, careful attention must be given to assuring concentricity of the tube-clearance hole in the plate line and the socket-mounting hole in the chassis. The tube socket is centered in the plate compartment, 3-9/16-inch back from the front edge of the chassis. The bottom half of the plate line is placed flat on the chassis, with the tube-socket hole and the plate-line tube-clearance holes aligned. Using the line as a template, the position of the hole centers for the supporting insulators and the line-shorting-bar drilling points can be marked on the chassis.

The large tube-clearance holes are cut in each plate-line sheet independently, as they are of different diameters. A circle or fly cutter will work, but better accuracy will be obtained if a series of small, very closely spaced, holes are drilled inside the desired hole circumference and the center removed by cutting away the small bits of brass holding the center to the edges. A medium-grade, half-round file will finish off the hole. This may sound like a lot of work, but it is far easier than trying to control a circle or fly cutter in a hand-held drill.

Holes for the dc isolation bushings are now cut in the top sheet. These holes can be moved somewhat closer to the center of the line if desired. The diameter of these holes will be dependent on what the builder uses for bushings. The author had some surplus Teflon bushings on hand, so they were used. Suitable substitutes are available in the form of one half of a ceramic feedthrough insulator. Shape and size of the insulator is not overly important, but the clearance-hole diameter should be on the order of 1/2 inch or greater. The four outer holes in the bottom sheet should be drilled and tapped to fit the screws available with the insulating bushings. Similarly, the fit of these screws to the ceramic pillar insulators should be checked.

High voltage is fed to the upper sheet, near the shorted end of the line, through RFC1. A countersunk No. 4-40 flathead bolt and a short piece of tapped 1/4-inch brass bar stock facilitate this connection. The common dc and rf connection to the tube anode is made via this top sheet. To eliminate some expensive finger stock and the difficulty of soldering it into a large hole, I decided to try a little different mechanical method of connecting this sheet to the anode cooler. This connection is accomplished by twenty-four strips of thin (.010-inch) springy brass or beryllium copper, about 13/32-inch wide and 3/4-inch long. A No. 33 hole is drilled in each "finger" about 3/16-inch from one end, to match the holes in the upper plate line around the circumference of the tube-clearance hole. The fingers are bent in the middle and about 3/8-inch of each strip protrudes

* 92 Grove St., Plainville, MA 02762.



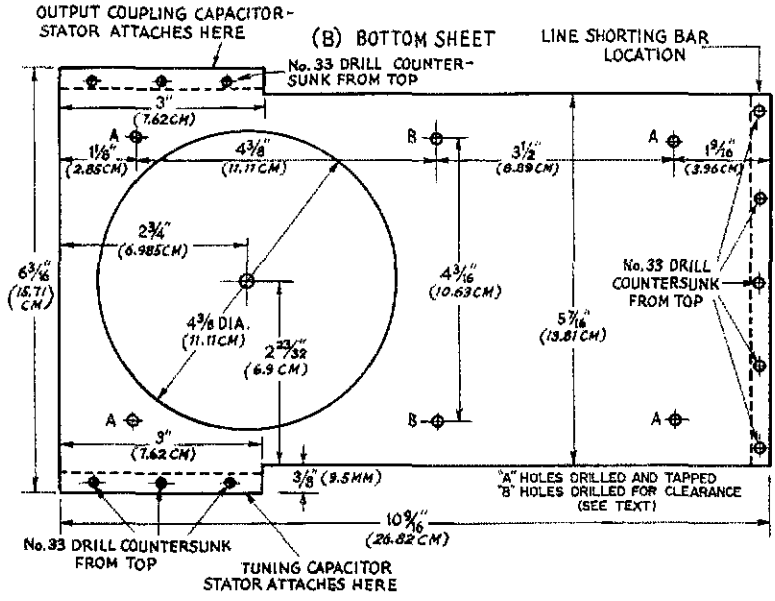
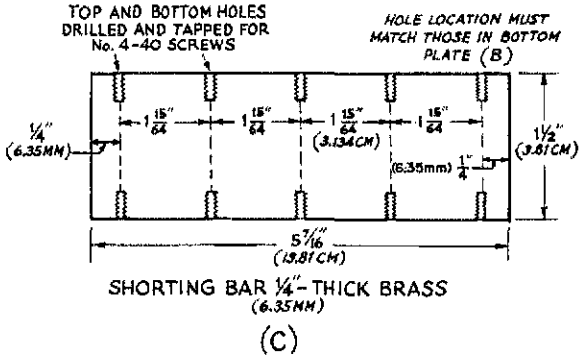


Fig. 2 – Dimensions and layout information for the plate line. The two brass plates and a Teflon sheet form a sandwich with the plate nearest the chassis being at dc ground potential. The top plate carries high voltage and is connected to the tube anode. The shorting bar (C) is permanently attached between the bottom plate and the chassis, replacing the sliding short that is visible in the photographs.



through the tube-clearance hole in the upper sheet, downward toward the chassis. The 4-3/8-inch diameter hole in the lower sheet of the plate line assembly provides ample clearance for the tube and the anode contact fingers. No. 4-40 × 1/4-inch flathead brass bolts and nuts attach these fingers to the top of the upper sheet. A copper ring was used to cover the junction of these fingers with the upper sheet, but small brass washers will serve as well.

Four of the six holes previously drilled in the lower sheet – those concentric with the holes for the upper sheet dc isolation bushings – are tapped for ease of line assembly. The two holes near the middle of the plate line are not tapped, so that screws from the top can be run through the dc isolation bushings and into the 1-1/2-inch ceramic line supports.

The stators of both the tuning- and output-coupling capacitors are attached to the lower sheet, at the tube end of the line, with brass bar stock and countersunk flathead 4-40 × 1/4-inch brass screws. Using the bar stock and countersunk screws eliminates the need for silver soldering these stators to the tank circuit. Variable capacitor dimensions and assembly information are given in Fig. 3 and 4. The movable vanes of the tuning (C8) and output coupling (C9) capacitors are made of 1/32-inch thick brass sheet, formed as specified. The flexible portion of both capacitors is made of .005-inch thick brass shim stock. The grounded end of the tuning capacitor (C8) movable vane is fastened to the chassis by a length of square brass bar stock pinned to the chassis with No. 4-40 screws entering the plate-tank area from the bottom of the chassis. The junction between the shim stock and the capacitor vanes is soft soldered to provide solid rf contact. Both movable vanes are secured to 1/4-inch diameter Teflon-rod drive shafts with No. 4-40 binder-head screws. A small hole is cut in the shim stock end of the output-coupling capacitor movable vane to accept the centerpin of the type N output connector. A Teflon bushing, made of two or three small pieces of scrap Teflon sheet placed on the center pin of the output connector between the shim-stock portion of the output capacitor and the chassis, serves as insulation "insurance" for the shim stock in the unlikely event the solder at this joint should soften.

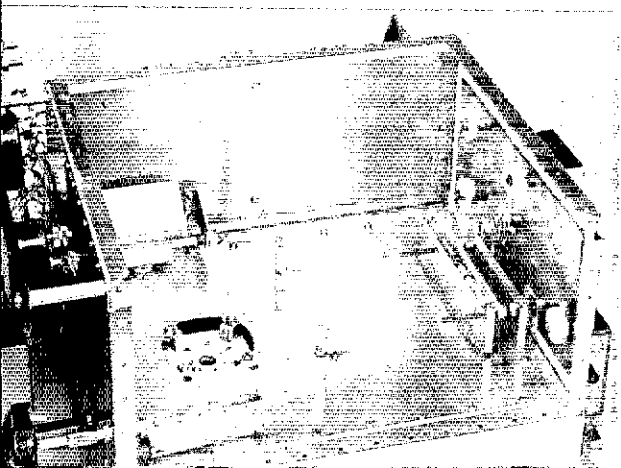
Small brackets are attached inside the plate-circuit enclosure, on the right and left hand walls, to serve as bearing points for the Teflon drive shafts of both capacitors. These shafts are about 6-inches long, and go through bushings in the front wall of the plate-tank enclosure. They are directly coupled to planetary-drive knobs. Planetary drives are necessary in this application to provide positioning tension for the shafts as well as a smooth tuning ratio.

Because the entire lower plate-line sheet, including the stator of both capacitors, is at dc ground there is no chance of damaging the power supply or having a high dc potential appear across the output connector if one of the movable vanes touches a stator while tuning. Of course, the travel of the movable vanes should be restricted to prevent rf breakdown. This is accomplished by the end stop in the planetary-drive knob.

The insulation between the lower and upper sheets of the plate line is a piece of 1/32-inch thick Teflon sheet. This forms the dielectric of a sandwich capacitor with a value of about 450 pF. It has been tested to 5500 V dc, but will go much higher. The large hole in this Teflon sheet was cut while using the hole in the upper brass sheet as a template. The smaller holes were marked, using the same template, and punched with a small diameter paper-hole punch. Note that the holes in the Teflon sheet for the dc isolation-bushing bolts are small – just large enough to pass the bolts used to hold the bushings in place. The insulation overlaps the "hot" side of the plate line by at least 3/8-inch on all edges.

Prior to assembly, all plate-tank components, including the movable capacitor vanes, can be silver plated, using Cool Amp silver salts.[5] Brass accepts plating quite readily. Before plating, inspect the plate-line sheets for burrs or metal chips. All edges should be smoothed and the countersunk flathead screws used in line assembly should be free of burrs and sharp edges. A little fine grade sand paper will do the job nicely. Inspect the Teflon sheet for metal chips. If there are any metal chips in this sheet, disaster will surely result. The same procedure applies to the high-voltage decoupling capac-

[5] This and all subsequent references appear later in this section.



The plate compartment with the tube and plate line removed. Note that the grid clips are on the socket side of the chassis, attached to tabs formed for that purpose when cutting the hole. The output-coupling capacitor (C9) movable vane may be seen to the upper left. The sliding short (right, with finger stock) should be replaced with a fixed short as described in the text. The insulating washers on the rear wall of the enclosure are to secure the "hot" plate of the high-voltage bypass capacitor.

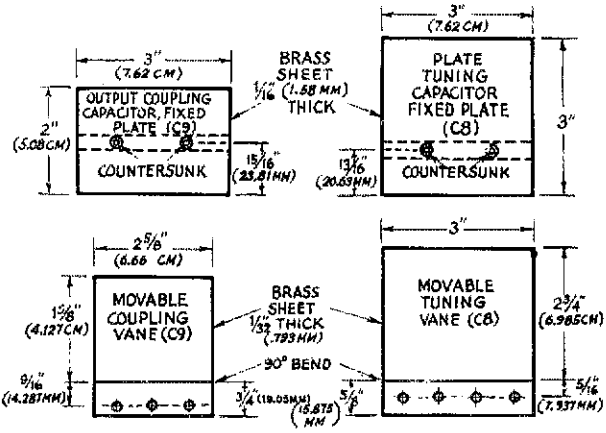


Fig. 3 — The fixed and movable portions of C8 and C9 are fabricated from brass sheet to the sizes indicated. Parts should be free of burrs and corners should be slightly rounded.

itor on the rear wall of the plate tank enclosure. All these components should be cleaned thoroughly with isopropyl or rubbing alcohol and reinspected before final assembly.

The sliding short, although still installed in this amplifier, is not recommended for duplication. I have had no cause to use it since setting up the amplifier for high power operation. It represents a "moving contact surface," ultimately subject to galvanic action. The line dimensions given in Fig. 2 do not include the distance between the sliding and fixed shorts. The line is 15/16-inch shorter than is apparent in the photographs.

For tube cooling, the Eimac SK-2216 chimney is recommended, as it is made of low-loss Teflon. The SK-2216 is held in place with four toe clamps which are supplied with the chimney. The plate-line to anode-cooler contact fingers may protrude a bit too low (1/32-inch or so for the SK-2216). However, a sharp knife will pare down the soft Teflon chimney with ease if height problems develop. Drilling points for the chimney toe clamps are best marked with the chimney in place around the tube seated in the socket. Holding the chimney in place with the toe clamps makes tube removal and subsequent reinsertion in the socket much easier than if the chimney were "floating."

Input Circuit Construction

The input circuit, by definition, includes the tube socket assembly. An E. F. Johnson 122-247-202 ceramic wafer socket is centered 3-9/16 inch from the front edge of the chasis, on a line dividing the plate compartment in half. The position of the plate line in the upper compartment is dependent on accurate location of the socket, so reasonable care should be exercised in socket positioning. Using the socket itself as a template, the location of the four mounting holes can be marked. These holes can be scribed on the chassis through the socket holes when any flat side of the socket is on a line parallel with the front of the chassis. With the center located and the mounting holes marked, two concentric circles are drawn on the chassis, using the socket center point as a reference. The smaller circle, 2-1/4 inches in diameter, will fit entirely within the confines of the already scribed mounting holes. A second circle, 2-5/8 inches in diameter, is drawn around the first. This circle will intersect the socket mounting holes. Four 7/16-inch wide "tabs," encompassing each of the socket mounting holes, are then drawn between the inner and outer circle. When the metal is finally cut, the result will be a hole, 2-5/8 inches in diameter, with four tabs protruding into the center, toward the tube stem. These tabs serve as mounting points for the socket and the grid-grounding clips[6]. When the hole is finished, the socket, with grid-grounding clips and the bracket for C2, can be mounted 7/16-inch below the chassis plate on metal spacers trimmed to accommodate this depth. Socket pin No. 4 (large pin) is positioned toward the front of the chassis. The spacers on the front mounting bolts should be shorter than those on the rear if the mounting feet of the bracket for C2 are attached to these points. The vertical portion of this bracket is spaced 1/4-inch from the tube socket, toward the front edge of the chassis. A 1-1/4-inch wide 1/2-inch high section is removed from this bracket, near the chassis, to provide proper air flow.

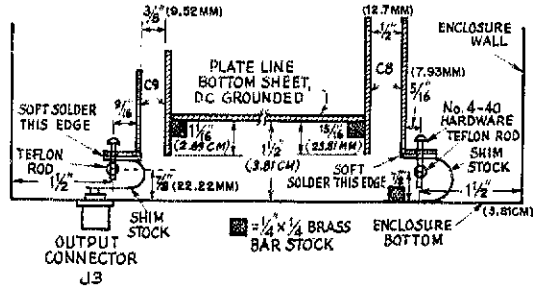


Fig. 4 — Relative positions and assembly information for the output coupling capacitor (C9) and the plate tuning (C8). Note that the shim stock is soldered to the movable vanes, and that the assembly is fastened to the Teflon shafts with No. 4 screws. The brass bar stock helps to provide a good ground connection between the shim stock of C8 and the chassis.

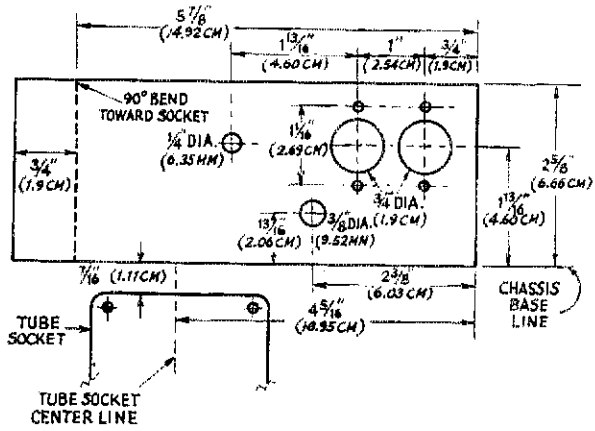


Fig. 5 — A sheet-aluminum bracket is used to mount components for the input circuit. The position relative to the tube socket is shown. The bracket may be fastened to the chassis by pieces of angle stock, or a lip may be formed along the bottom if the material is cut slightly larger in height.

The grid-grounding clips are mounted between the spacers and the bottom side of the chassis. Although placing the clips on the plate tank side of the chassis is easier and provides proper mechanical contact with the grid ring, an undesirable coupling loop is created between input and output. This causes circuit instability which cannot be cured except by moving the clips to the socket side of the chassis. One-inch long, 8-32 bolts are used to fasten the socket and associated components to the chassis. Tapped spacers may be used to hold the bolts and grid-grounding clips captive. Do not use excessive torque on the nuts, or damage to the socket may result.

Once the socket is mounted, pins 2 through 7 are connected together, with pin 4 forward, the free heater pin (No. 1) and one end of the cathode/heater bus (pin No. 7) will be available on the side of the socket facing the rear of the chassis. Holes in the tabs on pins 1 and 7 are enlarged slightly to accept the heater choke leads. A 1000-pF silver-mica capacitor is soldered between pins 1 and 7 with short leads. It is wise at this time to check the tube for proper seating and for even ground-clip contact with the grid ring.

All of the input circuit components except C2 are assembled on a separate sub-panel attached to the chassis near the tube socket. The button-mica bypass capacitors and high-current feedthrough capacitors supporting the cold end of the heater chokes are visible in the left corner of the photograph. Number ten solder lugs extend from the feedthrough capacitors to the button-mica capacitors. No. 3-48 × 1/4-inch bolts passing through one flange-mounting hole of each high current feedthrough capacitor secure the button mica capacitors to the panel. A 6-32 bolt secures the other side of the flange. The button mica capacitors are oriented to provide a very short lead length when solder connections are made to the lugs and choke leads. Insulated No. 12 wire, run through a length of sheild braid, is used to connect the outer end of the feedthrough capacitors to the heater transformer. The shield is solder-tacked to ground at several points. A second pair of high-current feedthrough capacitors is mounted in the vicinity of the heater transformer. If the builder desires, the heater transformer may be placed under the chassis and lower current feedthrough capacitors may be used to apply primary voltage to the transformer.

Rf input is via a BNC jack, below and just to the left of the input coupling capacitor, C1. L3 is mounted just to the right of C1. The connection between C1 and L3 (not visible in the photograph) is made to the coil-form lug nearest the sub-assembly plate. The junction of L3, C2 and L4 is visible. One end of L4 is connected to the cathode/heater bus under C2, near pin 5 (heater pin). The extension shaft from the rotor of C2 through the chassis and front panel is a length of bakelite rod. Component positioning and dimensions for the input circuit sub-assembly are given in Fig. 5.

Input Circuit Tuning

Initial "cold tube" input tuning was done with the tube in the socket, grid grounded and the cathode-matching network completely installed (including heater chokes and bypass capacitors). The tube heater remains off. A 55-ohm load, consisting of four 220-ohm 2-watt resistors in parallel, is connected with nearly zero lead length between the cathode bus and a ground lug temporarily installed on one of the tube mounting studs. The ARRL *VHF Manual*[7] describes satisfactory methods of attaining nearly zero lead length with carbon resistors for low-power dummy loads. A fairly sensitive VSWR indicator (or the reflectometer described in this article) and an exciter of 5-watts output can be used to perform the "cold tube" check of the input circuit. If the coil dimensions and positions given in the text and drawings are followed, you should have no trouble tuning the input circuit. Be sure to remove the resistors when you finish.

The objective in tuning the cathode circuit is not to couple maximum drive power to the amplifier, but to provide a relatively constant load

to the exciter. Therefore, tuning in the cathode circuit should be done for best VSWR when the amplifier is operating at the desired power level. For this reason, C2 was made adjustable from the front panel. This capacitor has sufficient latitude to cover a wide range of match conditions. Power transfer to the cathode is only slightly degraded, if grid current is any indication, when VSWR is optimized and everything behaves nicely.

Plate-Line Enclosure Assembly

The plate-line enclosure, 6-inches high, 11-1/4-inches wide and 13-inches deep, is made of sheet aluminum and aluminum angle stock. A standard 13 × 17 × 3-inch aluminum chassis serves as a base and the enclosure is positioned all the way to the right side, when viewing the amplifier from the front panel. Although I bent the aluminum sheet to form some of the enclosure corners, the angle stock will serve nicely. Copious amounts of No. 6-32 bolts, nuts and lockwashers are used to assure mechanical and electrical integrity of the enclosure. Do not skimp on the bolts or you may have electrical problems.

High voltage for the tube is fed through the rear wall of the enclosure via a bolt and one half of a ceramic feedthrough insulator. A bypass capacitor, similar in construction to the plate-line sandwich capacitor, is employed to decouple the high-voltage line. A piece of 1/16-inch thick brass sheet, 4-5/8 × 9-1/8-inches, is used to form the "hot" side of the capacitor. Teflon sheet is used as the capacitor dielectric and the enclosure rear wall serves as the grounded side of this bypass capacitor. The dielectric extends beyond the "hot" capacitor plate by at least 3/8-inch in all dimensions. High-voltage connections outside the enclosure are covered by a small Minibox. Additional rf decoupling and the plate-voltage meter-multiplier resistors are enclosed in this box. A Millen high-voltage chassis connector is included, to mate with the power-supply output cable.

Most readers will notice that there is another metal sheet on the chassis in the plate-compartment enclosure. This is quite evident when inspecting the input-circuit area. This sheet was used as a portable base in development of the amplifier, and was simply transferred to the final constructional layout. This sheet is not necessary for successful duplication of the amplifier.

The enclosure top cover is made of perforated aluminum sheet of moderate rigidity. If the cover sheet is flexed when the amplifier is in operation, a decrease in power output will result. However, if the cover is left alone, no problems are encountered.

The front panel of the amplifier, 10-1/2 inches high, is supported by four metal spacers extending forward two inches from the top edge of the plate-line enclosure and the bottom edge of the chassis. This spacing provides ample clearance for meters and switches behind the panel. The metal spacers are not designed to support the weight of the amplifier. A special mounting plate is installed in the cabinet for this purpose.

Support Electronics

The grid- and cathode-metering circuits employed are conventional for cathode-driven amplifiers. The multimeter, a basic 0-1 mA movement, is switched to appropriate monitoring points.

An rf-output monitor is a virtual necessity in vhf amplifiers to assure maximum power transfer to the load while tuning. Most capacitive-probe output coupling schemes presented to date do not lend themselves to built-in relative-output monitoring circuits. In this amplifier, one of these built-in circuits is achieved quite handily. The circuit consists of a 10:1 resistive voltage divider, diode rectifier, filter and adjustable indicating instrument. Two 7500-ohm, 2-watt carbon resistors are located in the plate compartment, connected between the type N rf-output connector and a BNC connector. A small wire was soldered to the center pin of the BNC connector, inside a Minibox, with the 1500-ohm, 1-watt composition resistor and the rectifier diode joined at this point. Relative output voltage is fed, via feedthrough capacitors, to the level-setting potentiometer and multimeter switch.

A calibrated string of 2-watt composition resistors, totaling 5 megohms, was installed to facilitate "on-the-spot" determination of power input, and to attest to the presence or absence of high voltage in the plate tank circuit. A full-scale range of 5000 volts is obtained with the 0-1 mA meter. If desired, the builder may use ten 500-K-Ω, 2-watt, 1-percent resistors for the string and reasonable accuracy will be obtained. Of course this monitor feature may be eliminated if other means are used to measure and monitor plate voltage.

Rather than tie up a portable VSWR indicator, I decided to build an inexpensive reflectometer and install it permanently in the rf-input line to the amplifier. The reflectometer was designed using air strip-line techniques similar to those employed for the plate circuit. One position of the multimeter serves as an indicator, with meter sensitivity set by a potentiometer in the reflectometer. This potentiometer could be brought to the front panel if desired and placed to the left of the multimeter switch. The reflectometer strip-line center conductor (L1) is made of double-sided copper-clad G-10 fiberglass pc board, 1/16-inch thick, 1-1/4-inch wide and 4-7/16-inches long. Line length is not critical and will depend on the type of input and output connector used in construction of the unit. Line width and thickness should not change, as this will change the line impedance. Other material, such as brass or copper can be used for the center conductor. Notches are cut in the center of each end of the line, of sufficient width and depth to fit tightly on the center pin of a BNC (or N, or UHF) coaxial connector. This line is then soldered between the center pins of the connectors. Be sure to solder both sides of the double-sided pc board to each center pin. These centerpins serve as the physical support for the line. The stripline is spaced equidistant between two ground planes. Wall-to-wall spacing of these planes is 1-1/16 inch in this unit. The enclosure side cover

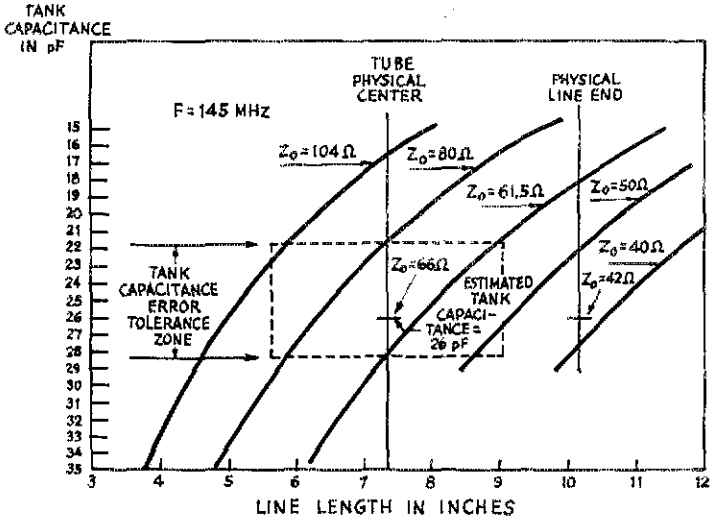
serves as one of the ground planes, while a second plane, 2 inches high, extending the full length of the box, is set up inside. The voltage sampling loop, terminating resistor, diode and bypass components are mounted on the internal plane. A small hole, about 1/4-inch in diameter, was cut in the inner plane at each end of the voltage sampling loop, to pass the diode and loop-terminating-resistor leads. Small ceramic or Teflon standoff insulators were used to support the sampling loop (L2). This loop consists of 4-1/4 inches of No. 18 solid wire run on a straight line parallel to, and spaced 1/8-inch from, the stripline center conductor. With five watts applied, this length and spacing results in an instrument sensitivity on the order of 20 dB, or a capability of sensing a VSWR as low as about 1.2:1. For this application, 20-dB sensitivity was considered adequate. Power levels up to about 70 watts have been run through this reflectometer with no problems. It has not been tested at higher power levels. The unit is self contained, with the exception of the meter, in a small aluminum Minibox (Bud CU-2106A). If this box is used, be sure to remove the paint from around the edge of the side of the cover serving as one of the strip line ground planes; better electrical contact will result. A plain aluminum box of similar dimensions is a better choice.

To facilitate amplifier testing, as much of the support electronics as possible was kept above the chassis, outside the pressurized compartment. A 24-volt supply is built in, to power a VOX-controlled relay and a small coaxial relay used in the input line. A standard Dow Key relay with a high isolation receiver port is used to transfer the antenna. It is keyed by a spare set of contacts on the VOX-controlled relay. Troubles were encountered with the Dow Key relay until a sequential relay-keying system was set up to avoid "hot switching" during fast-break-in cw operation. Now everything transfers smoothly -- without fireworks.

Cooling Requirements

The manufacturer specifies 38 ft³/min of air at a back pressure of 0.60 inches of water for the full 1500-watt dissipation rating at 30 MHz. This air flow rating should be increased for operation at 144 MHz. Representative conditions would be 30 ft³/min at a back pressure of 0.34 inches of water for 1000 watts dissipation and 55 ft³/min. at a back pressure of 0.88 inches of water for 1500 watts anode dissipation. Don't skimp on the blower for this one. The blower employed in the amplifier is designed for mounting in any plane. Air is pulled upward through a screened hole cut in the bottom plate, pressurizing the entire under-chassis area. If the blower is mounted as shown, be certain to allow a free space under the amplifier when it is mounted in the rack or cabinet, to accommodate unrestricted air input. Cooling air is thus forced through the tube socket hole and anode cooler, venting through the perforated top cover. The blower motor itself requires draft cooling, which is provided by air passing through four 5/8-inch holes in the chassis base, directly below the blower motor, and in line with the air-passage holes in the motor frame. Similar cooling is provided with the blower in its normal housing. The holes in the chassis base are hidden from view by the blower wheel. The blower motor frame is grounded to the chassis base with a short length of flexible braid. A slight turbulence is apparent with the blower mounted in this manner, but it does not greatly reduce blower effectiveness. Perhaps some appropriately placed baffles would reduce this turbulence.

Fig. 6 — Graph used by the author as an aid to finding plate line length and the position of the tube. Curves are for shorted quarter-wave lines of the five listed impedances.



Testing and Operation

The amplifier is unconditionally stable, with no parasitics. To verify this, a zero bias check for stability was made. This involved shorting out the Zener diode in the cathode return lead, reducing bias to essentially zero volts. Plate voltage was applied, allowing the tube to dissipate about 885 watts. The input and output circuits were then tuned through their ranges with no loads attached. There was no sign of output on the relative output meter and no change in the plate and grid currents. As with most cathode-driven amplifiers, there is a slight interaction between grid and plate currents during normal tune-up under rf-applied conditions. This should not be misconstrued as amplifier instability.

Tolerances of the Zener diode used in the cathode return line will result in values of bias voltage and idling plate currents other than those listed in Table I. The 1N3311, a 20-percent tolerance unit, is rated at 12 volts nominal but actually operates at 10 volts in this amplifier (within the 20-percent tolerance).

All testing and actual operation of this amplifier was conducted with a Raytrack high-voltage power supply used in conjunction with the authors 6-meter amplifier. The power supply control and output cable harness was moved from one amplifier to the other, depending on the desired frequency of operation.

Drive requirements were measured for plate power-input levels of 1000 and 1600 watts with a Bird model 43 Thru Line Wattmeter and a plug of known accuracy. Output power was measured simultaneously with drive requirements at the 1000 and 1600 watt plate power input levels. A second Bird model 43 with a 1000-watt plug was used to measure amplifier output into a Bird 1000-watt Termaline load. A 2500-watt plug would be necessary to determine output power at the 2-kW input level, so I stopped at the 1000-watt output point and worked backwards to calculate apparent stage gain and efficiency.

Efficiency measurements also were made employing the "tube air-stream heat-differential" method. Several runs were made at 885 watts static dc and normal rf input. Apparent efficiencies of 62 to 67 percent were noted. These values were about 5-percent higher than the actual power output values given in Table I. Both efficiency measurement schemes serve to confirm that the amplifier is operating at the upper limit of the theoretical 50-60-percent efficiency range for typical Class AB2 amplifiers.

To commence routine operation, the variable capacitor in the input circuit should be set at the point where lowest input VSWR was obtained during the "cold tube" initial tube-up. The ability of the plate tank to resonate at 144-145 MHz with the top cover in place should be verified with a grid-dip meter, via a one-turn link attached to the rf output connector. Top and bottom covers are then secured. **As with all cathode driven amplifiers, excitation should never be applied when the tube heater is activated and plate voltage is removed.**

Table I

Performance Data

Power input, watts	1000	1600
Plate voltage	2600	2450
Plate current (single tone)	385 mA	660 mA
Plate current (idling)	50 mA	50 mA
Grid bias	-10 V	-10 V
Grid current (single tone)	35 mA	54 mA
Drive power, watts	18	41
Efficiency (apparent)	59.5 %	61.8 %
Power gain (apparent)	15.2 dB	13.9 dB
Power output, watts	595	1000

Next, turn on the tube heater and blower simultaneously, allowing 90 seconds for warm-up. Plate potential between 2400-3000 volts then may be applied and its presence verified on the multimeter. The power supply should be able to deliver 800 mA or so. With the VOX relay actuated, resting current should be indicated on the cathode meter. A small amount of drive is applied and the plate tank circuit tuned for an indication of maximum relative power output. The cathode circuit can now be resonated, tuning for minimum reflected power on the reflectometer, and not for maximum drive power transfer. Tuning and loading of the plate-tank circuit follows the standard sequence for any cathode driven amplifier. Resonance is accompanied by a moderate dip in plate/cathode current, a rise in grid current and a considerable increase in relative power output. Plate-current dip is not absolutely coincident with maximum power output but it is very close. Tuning and output-loading adjustments should be for maximum efficiency and output as indicated on the output meter. Final adjustment for lowest VSWR at amplifier input should be done when the desired plate input-power level has been reached.

Acknowledgements

I would like to express my gratitude to my colleagues at MIT Lincoln Laboratory for their assistance in this project. Special thanks go to Ted Simmington, W1JOT; Lew Collins, K4GGI and Leo Wilber, W1MV, for their excellent comments on the construction portion of this article, and to Mr. Eino O. Gronroos, for his objective review of the technical manuscript. QST

References

5) Cool Amp Silver Plating Powder, part No. 1233-500, available from The Cool Amp Co., 8603 S. W. 17th Ave., Portland, OR 97219.

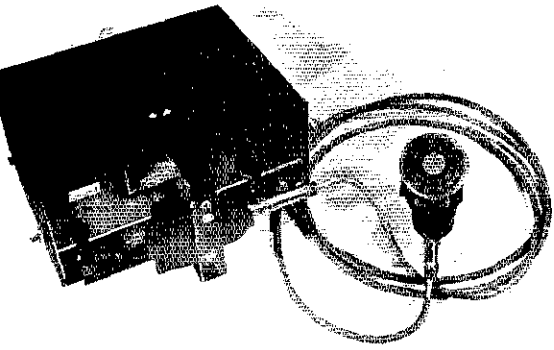
6) Tube socket grid clips, part No. 149-842, and Teflon chimney, part No. SK-2216, available from Eimac Division of Varian, 301 Industrial Way, San Carlos, CA 94070.

7) *The Radio Amateur's VHF Manual*, 2nd Edition, p. 288. (This Edition was erroneously labeled as the 11th at the time of printing.)

The Art of Dipping

(Continued from page 18)

These twenty reasons are not all the possibilities, but seem to be among the most important, and illustrate why a dipper is a handy thing to have around the ham workshop. QST



Remote Control for a Mobile Transceiver

BY GEORGE TAMER,* W4BAD

WHY CLUTTER UP the front seat of your car with mobile gear? It can be installed easily back in the trunk compartment, out of the way, and still be controlled from the dashboard. Running the speaker, volume control, and mic leads up front is relatively simple, but frequency control is more difficult. This article shows one method of how the latter can be done with a Swan Cygnet 260.

Two surplus-type CRV-23253 receiver-tuning controls are needed, with 12 feet (4.6 m) of flexible control cable, type MC215. These can be obtained from Fair Radio Sales in Lima, Ohio. Other components necessary are a flexible coupling to fit a 1/4-inch shaft and hardware to mount one of the receiver heads on the transceiver.

Construction

The dial assembly from one of the receiver heads is removed and the head is mounted on front of the transceiver as shown in the photograph. The author drilled a hole in the front panel of the 260 and fastened a flange directly to the transceiver dial, as shown in Fig. 1. This was necessary since the dial drive on this transceiver was of the friction type and some slippage occurred. Only minor modifications may be necessary with transceivers that use other types of drives.

* 304 Chestnut St., Norton, VA 24273.

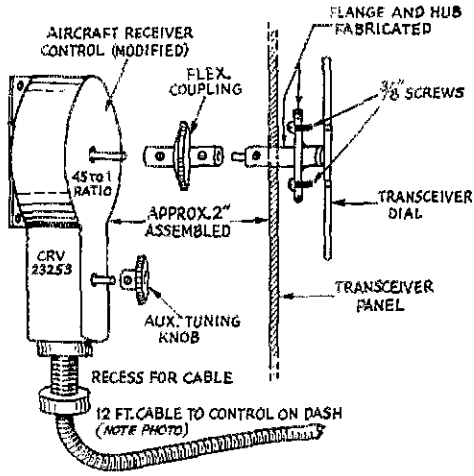
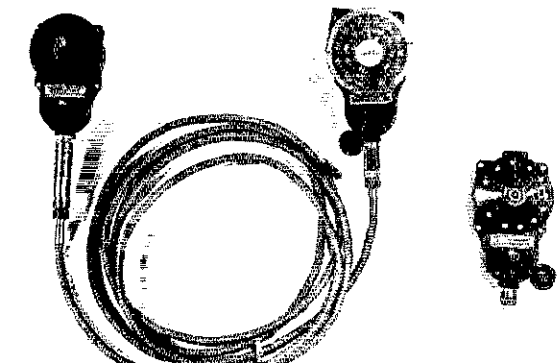
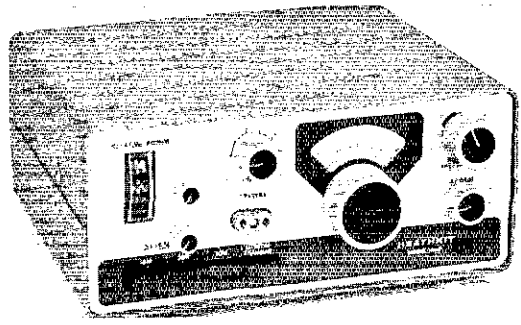


Fig. 1 — Detailed drawing showing how the receiver head is coupled to the transceiver dial.

The flexible cable is then run up to the dash where the other receiver head is mounted. Before the setup is installed, the calibration on the dashboard head should be changed so that it matches up with the one on the transceiver. A new one was made up by the author and consisted of a plastic base with a shoulder and a dust cover. Sandwiched in between is an opaque dial with the new calibration marks. These can be of the builder's choice and decal-type numbers were used in the unit shown. QST



Modified drive head and remote tuning control. The head at the right was simply calibrated by drilling holes in the original dial plate at the calibration points and pasting numbers on the back of the plate.



Exterior view of the modified HW-7. The two small controls at the left are the rf-gain and keyer-speed adjustments. A switch (upper right) is used in place of the front-end-peaking variable capacitor. Large Kurz-Kasch aluminum knobs have been added to provide greater purchase when adjusting the controls.

HW-7 QRP Transceiver Modifications

BY DOUG DE MAW,* WICER

QRP OPERATION is again coming into focus for experimenting amateurs. The QRP-interest pendulum has gone through its arc a number of times over the years, and peak activity by low-power enthusiasts resulted from some stimulus which fired their imaginations. In bygone days, the motivation to try flea power came generally from construction articles in ham radio journals and handbooks. More recently, the manufacturers have provided part of the incentive to pursue awards such as WAS and DXCC while using only a few watts of rf power. Certainly, the availability of Heath and Ten Tec QRP transceivers has done much toward encouraging QRP operation. But, there are a great many technically oriented amateurs who welcome the challenge of designing and building their own low-power gear, having been "turned on" by the availability and reasonable cost of modern solid-state devices. To those of us who subscribe to the doctrine of low-power operation, there is considerable satisfaction in being able to effect world-wide communication with ten watts or less of output power. The result of marketing and selling several thousand QRP transceivers illustrated in a rather paradoxical manner that not everyone wants or needs a 1-kW station.

This article offers information that should be of technical interest to the builders of homemade gear. To those who do not design equipment, but own and operate HW-7 transceivers, a kit-form approach is given for assembling a new receiver front-end section. The circuit described here will cure the case-history ailments common to the equipment under discussion. The problems of overloading, cross modulation, low sensitivity, and poor selectivity can be resolved by substituting the circuit of Fig. 1 for the somewhat basic 40673 detector in the original design. Elimination of the oft-encountered ac hum is another benefit which will result from the modification suggested here. Some additional circuit changes are included to provide improved performance in other parts of the overall circuit.

Comparing the Circuits

A single tuned circuit is used to establish the existing front-end selectivity in the unmodified receiver. The designers used a high-capacitance/low-inductance tuned circuit at the input to the 40673 detector. A single-section 393-pF variable (panel mounted) tunes the 1.6-μH inductor to resonance on 40, 20 and 15 meters, thereby requiring that the operator exercise care in selecting the correct peak response when changing bands. It is possible to find more than one peak, owing to the harmonic currents in the VFO output, and some responses will occur on out-of-band commercial signals.

The circuit of Fig. 1 eliminates the basic problem because of increased front-end selectivity, which is established by use of two fixed-tuned resonant circuits. Toroidal inductors are employed at L2 and L3, and the Q_u (unloaded Q) is fairly high, being approximately 180 on each band. Band selection is accomplished by switching in a separate pair of trimmers for each range of interest. The overall bandwidth of the fixed-tuned front end is

* *QST* Technical Editor.

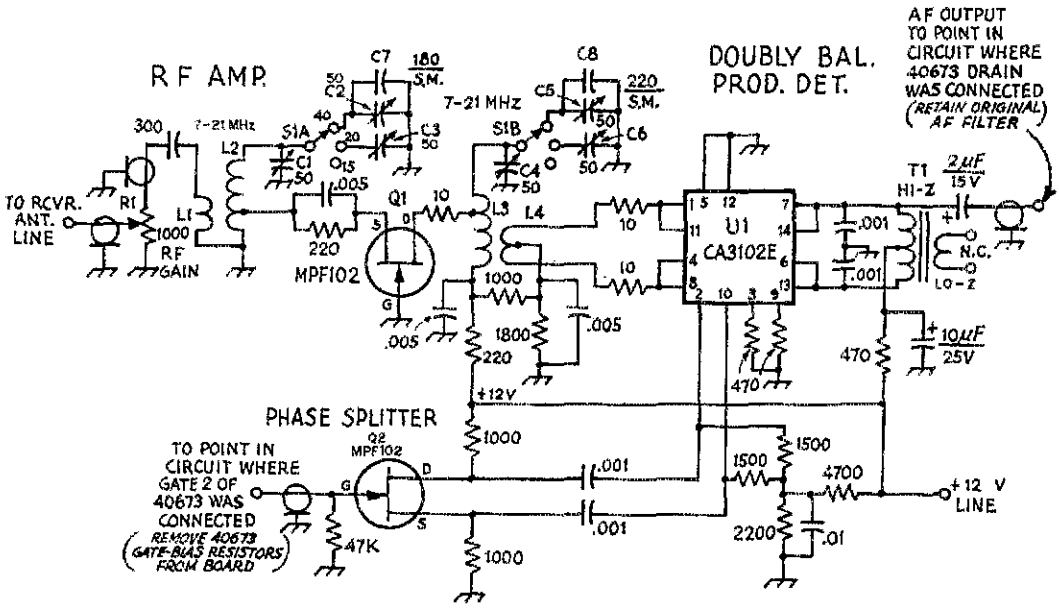
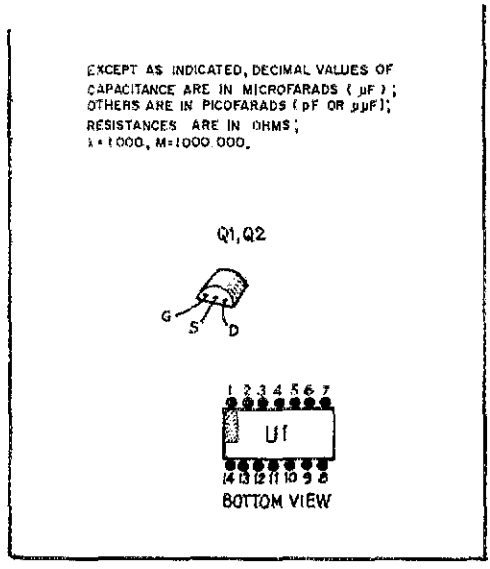


Fig. 1 — Schematic diagram of the new front end for the HW-7 receiver. Fixed-value capacitors are disk ceramic unless indicated otherwise. Polarized capacitors are electrolytic. Fixed-value resistors are 1/2-W composition.

C1-C6, incl. — Miniature 50-pF ceramic trimmer (Erie 557-006-8-50 or equiv.).
L1 — 2 turns No. 24 enam. over L2 winding.
L2 — 21 turns No. 24 enam. on Amidon T-50-6 toroid core (2 μH). Tap 7 turns up from ground.
L3 — Same as L2 except tap at 5 turns from C4/S1B end.
L4 — 6 turns No. 24 enam., center tapped.
Q1, Q2 — Motorola MPF102 or HEP802.
R1 — 1000-ohm linear-taper miniature carbon control (Mallory 13L or equivalent).
S1 — Two-pole, 3-position rotary wafer switch, miniature type, phenolic or ceramic.
T1 — Subminiature transistor output transformer, 1000- or 500-ohm ct primary to 8-ohm sec. Sec. not used.
U1 — RCA integrated circuit. Check Yellow Pages in phone book for address of nearest RCA distributor.



ample for the cw portions of 40, 20, and 15 meters, thereby eliminating the need for a peaking control on the front panel.

A grounded-gate JFET, Q1, is used as an rf amplifier. This provides approximately 10 dB of gain while establishing a low noise figure. Performance on 20 and 15 meters is greatly enhanced as a result. A simple rf-gain control is shown at the input to L1. It can be used to reduce overloading effects from the guy down the street who runs a high-power station. It need not be included if you do not live in close proximity to other stations.

A doubly balanced product detector, U1, replaces the 40673 circuit. An RCA CA3102E was selected for the job because of its high f_T and low noise figure. It contains two differential bipolar pairs, and two current sources. The differential pairs are cross-connected to provide the doubly balanced configuration (Fig. 2). It is necessary to supply the rf and local-oscillator energies in push pull. L4 serves in that manner, and Q2 is used as a phase splitter to convert the existing single-ended local oscillator output to the push-pull format. Output from U1 is taken in push-pull by means of T1, which is center tapped. Af voltage is sampled at one end of the transformer only, to assure compatibility with the single-ended audio amplifier which follows.

Obtaining CW Selectivity

Single-signal reception is not possible with the original direct-conversion receiver in the unit under discussion, nor is it with the new circuit. This means that QRM can exist from stations that might otherwise not be heard in a more sophisticated receiver. Therefore, it is advantageous to provide as much selectivity as practical to lessen the effects of QRM. In the HW-7, a passive m-derived low-pass audio filter is employed. The constants used provide suitable passband characteristics for ssb reception, but miss the target completely for cw operation, the mode for which the equipment was designed. Thus, a marked improvement can be realized by adding an *RC* active audio filter, peaked at, say, 750 Hz. Fig. 3 shows the two-pole filter used by the writer. U2 is a dual op-amp IC which is available from most Radio Shack stores. The circuit is patterned after the MFJ Enterprises CWF-3 filter, available in kit form or wired.[1] Those wishing to purchase the kit may do so, for it will provide identical performance to the circuit of Fig. 3. As the diagram illustrates, the filter is inserted between the first and second sections of the cascaded audio amplifier contained in the RCA CA3035V1. Most op amps are inherently noisy, generating approximately 5 mV of peak-to-peak random hash. If the filter were connected directly at the detector output, the noise would be amplified by the 120-dB-gain CA3035V1 and would always appear in the headphones, thereby impairing weak-signal reception. When installed as shown in Fig. 3, the first section of the CA3035V1 establishes the noise figure (low) of the audio channel, and no hash is discernable in the headset.

Construction

The new receiver front end is contained on one pc board. Double-clad board is used to provide a ground plane on the component side of the module. Capacitance exists between the etched foils and the ground-plane side of the board. The capacitance is beneficial in reducing the possibility of hf and vhf parasitic oscillations and also discourages problems brought about by ground loops on a pc board. After the board is etched, holes are drilled for mounting the parts, then the copper around each hole (ground-plane side of board) is cut away by applying the point of a sharp 1/4-inch drill bit. The bit can be spun by hand, and

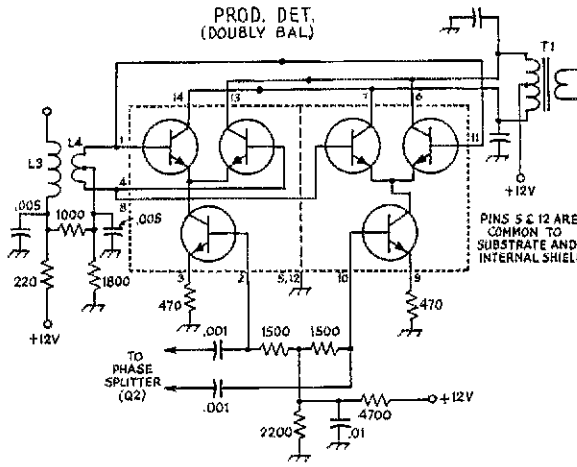


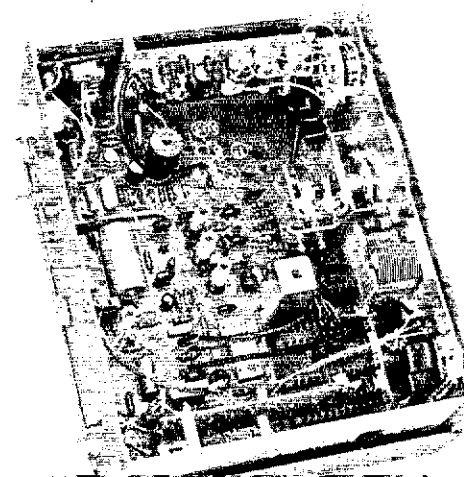
Fig. 2 – Schematic diagram in internal portion of the CA3021E transistor-array IC, illustrating how the sections are connected for doubly balanced detector service. The CA3049T is the same electrically, but does not have the built-in shield between the differential pairs. The latter is housed in a TO-5 package.

a few revolutions will remove the unwanted copper which would otherwise cause short circuits as the pigtails came in contact with it. It is possible that single-clad pc board could be used without bad effects. It was not tried with this circuit.

The completed board should be mounted near the band-change switch which is used in place of the front-end tuning capacitor. All rf signal leads should be kept short, but audio leads can be long if shielded wire is used for them. The new assembly should be mounted in the HW-7 as shown in the photograph.

There is little to do concerning tuneup of the completed circuit. One trimmer for each tuned circuit is always in parallel with its respective coil. Those trimmers are peaked for maximum signal response on 21 MHz. They are not to be adjusted again. The remaining bands are selected one at a time and the related trimmers are adjusted for peak signal level. Adjust each set of trimmers for the center of the cw band in which they are used.

[1] MFJ Enterprises, Box 494Q, Mississippi State, MS 39762 (see *QST* advertisement, p. 168, Sept. 1973).



The new receiver section is visible at the upper right, just to the left of the band switch. A MFJ Enterprises cw filter is mounted left of the receiver board, with leads going to a rear-panel switch which cuts the filter out of the circuit when desired. The circuit of Fig. 3 can be used in place of the MFJ filter and will fit into the same area. At the lower center is the W7ZOI keyer module mounted on standoff posts. The toggle switch at the lower left is for transmitter tuneup, as mentioned in the text.

Some Other Modifications

This writer was never pleased with the side-tone and muting characteristics of the HW-7. Therefore, two simple changes were made to remedy the problem. A bipolar switch was added to the audio line for muting (Fig. 3), and the side-tone output was routed directly to the headphone jack. The W7ZOI QRP keyer was added to the HW-7 as an operating convenience.[2] The speed control is mounted on the front panel, just above the rf gain control. A miniature toggle switch was installed on the rear panel to lock the transmitter in the OPERATE position during tuneup. Kurz-Kasch aluminum knobs were installed to dress up the appearance, though the original knobs are entirely suitable.

The 2N2222 muting transistor, Q3 of Fig. 3, is saturated when the antenna relay of the break-in delay circuit is energized, thereby blanking out the receiver audio during transmit periods. Any npn switching transistor with electrical characteristics similar to the 2N2222 will be suitable at Q3. The writer mounted Q3 by its leads, directly across the pc-board foils near the af gain control. A knife was used to cut an isolating pad in the ground foil near Q3. The base lead, associated 22,000-ohm resistor, and .005-μF capacitor were connected to the pad after drilling a small hole through it for the base lead. A similar pad was cut approximately 0.5 inch (1.27 cm) away from the first one to provide an anchor point for the remaining lead of the base resistor, and for attaching the wire which connects to the hot side of RL1.

[2] Hayward, "An Integrated-Circuit QRP Keyer," *QST* for November, 1971. Circuit board and layout information available from W7ZOI for $3. Write to W. Hayward, 7700 S.W. Danielle Ave., Beaverton, OR 97005.

The *RC* active filter is mounted adjacent to the new front end assembly, near the rear panel of the HW-7. Those wishing to make their own pc boards can combine the two circuits on a single board if desired.[3]

All unused components from the original detector circuit (L1, C1, C2, C3, C4, R1-R5, incl., Q1, and jumper X-U) are removed from the pc board. Replace C13 with a 0.33-μF unit. The additional capacitance at C13 knocks down the unwanted high-frequency response in the audio channel (hiss noise and high-pitched heterodynes) to improve the overall selectivity and noise figure.

Performance Notes

Prior to modification a discernable cw note could be heard when applying a 0.8-μV signal at the receiver input (15 meters). Slightly greater sensitivity was observed on 20 and 40 meters (approximately 0.6 μV). Response with the new front end is just under 0.1 μV on all three bands for the same level of af output.

Cross-modulation characteristics were measured at 7 MHz, before and after modification, by inserting and listening to a 10-μV signal, then applying another signal 25 kHz away from the one being monitored. Before modification, cross modulation occured when the second signal was elevated to 3000 μV. A 40,000-μV signal is required to cause cross modulation in the new front end. The unmodified receiver was subject to strong-signal

[3] Check suppliers of pc board for availability and price of the boards used in this project: D.L. McClaren, W8URX, 19721 Maplewood Avenue, Cleveland, OH 44135; Charles R. Sempirek, K8WDC, Rt. 3, Box 1, Bellaire, OH 43906; Spectrum Research Laboratory, Inc., P.O. Box 5824, Tucson, AZ 85703.

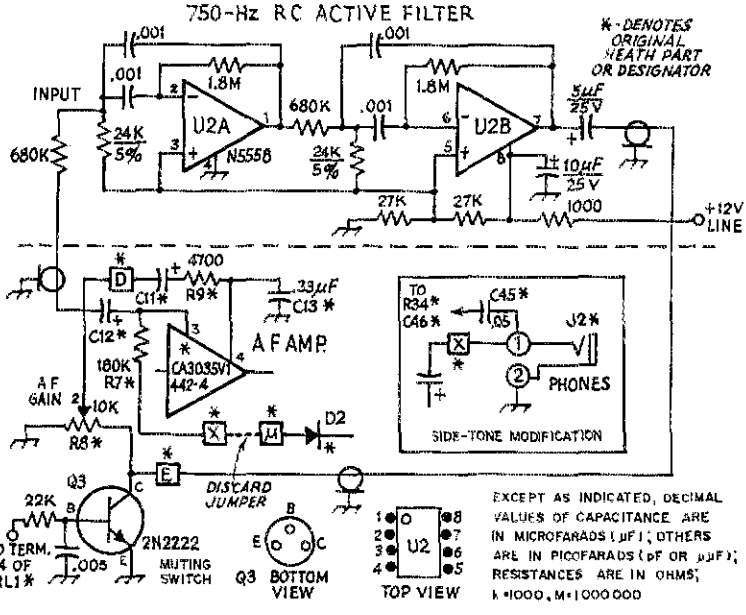


Fig. 3 — The diagram above the dashed lines shows the electrical circuit for the N5558 *RC* active cw filter. The .001-μF capacitors should be the close-tolerance, temperature-stable type. Silver micas are suitable. Polystyrene capacitors were used in writer's model. Resistors should be 5-percent, 1/4-W composition units. The circuits below the dashed line illustrate modifications to the original HW-7 circuit. The inset drawing shows the change made in the side-tone circuit.

desensitization (25-kHz signal separation) when 2000 μV of signal was supplied. The new receiver does not begin to show evidence of desensing until 10,000 μV of signal is applied. As the operating frequency is increased the before-and-after characteristics just listed deteriorate slightly. Although the figures given for the new circuit are not spectacular as compared to those of many modern-day superheterodyne receivers, the writer considers them suitable for such a simple circuit. Certainly the performance is much better than it was before the modifications were made.

Future Changes?

Basically, the VFO and transmitter sections of the HW-7 are quite good from a design and performance point of view. Only two areas need improvement: The frequency offset between transmit and receive leaves much to be desired. The output wave form has sufficient harmonic energy in it to cause TVI in fringe areas.

These offset amounts were measured with a frequency counter in the ARRL lab, and were the same before and after modification: (1) 7 MHz = 36 Hz. (2) 14 MHz = 380 Hz. (3) 21 MHz = 575 Hz. Ideally, an offset between 600 Hz and 1 kHz would make the transceiver compatible with most other transceivers on the market. The narrow offset will prevent the signal from being heard in many instances, and especially on 40 meters. Stations which use separate transmitters and receivers can manage the HW-7 situation without difficulty, provided the operator at the other end does a bit of receiver tuning after he calls CQ.

The unfortunate fact of the matter is that the HW-7 designers relied upon the difference in VFO output loading between the transmit and receive modes to shift the operating frequency. The loading (or pulling) effect becomes less pronounced as the operating frequency is lowered. No doubt an offset circuit that could be controlled from the front panel, during receive periods only, would be the expedient needed to solve the problem. Such a circuit could be patterned after those applied in many of the commercially made transceivers being used today. Addition of an RIT (receiver incremental tuning) circuit would be advantageous even if the HW-7 were equipped for a specific fixed-value offset for each band, as is the case with the more elaborate transceivers.

In treating the TVI matter the practical approach would be to install a high-quality low-pass filter at the antenna jack of the HW-7. Half-wave low-pass filters such as those described by McCoy in *QST* for April, 1968, page 26, would be suitable for minimizing TVI caused by harmonic energy. Those wishing to design their own filters can use toroidal inductors and thereby make the filter assembly relatively compact. By designing for a loaded Q (Q_L) of 1, and a bilateral impedance of 50 ohms, the X_C and X_L will be 50. A cascaded two-section pi network of that type (half-wave filter) will provide ample bandwidth and should clean up all but the most stubborn cases of TVI. Three half-wave filters (40, 20, and 15 meters) could be installed inside the HW-7 and switched for the appropriate band, or they could be constructed in a Minibox (with band switch) and used outboard.

Summarization

Constructors who are interested in laying out a pc-board pattern of their own can probably make the module smaller than the one described here.[4] There is no reason why 1/4-watt resistors can't be used in most sections of the circuit. Also, the RCA CA3049T can be used in place of the CA3021E with good results. The former comes in a TO-5 package and has identical characteristics to the '3021E.

This article was not meant to imply that the HW-7 in its original form is of poor quality. It is, in the writer's opinion, a fine bargain in terms of cost *versus* portability and performance. However, there are few commercial or homemade amateur products that can't be improved in some manner, and that was the object of this exercise in circuit development. Meanwhile, if some reader discovers a simple way to convert the HW-7 direct-conversion receiver to a superheterodyne, let's hear from you! QST

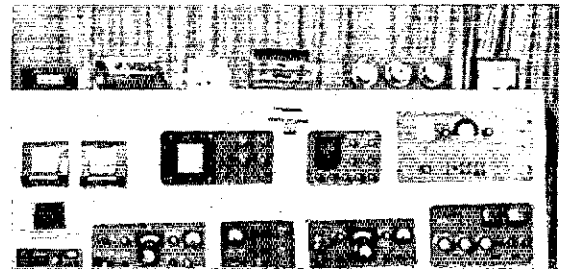
[4] Scale templates and parts layout for the pc boards are available from ARRL for 50 cents and a large s.a.s.e.

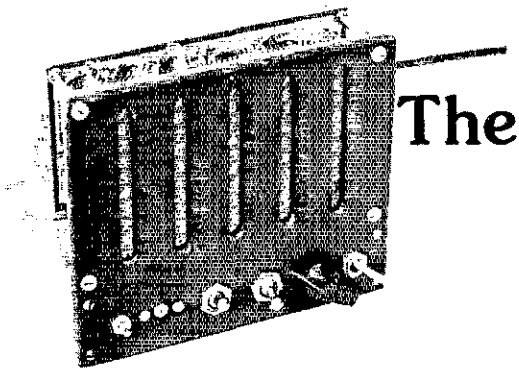
Strays

The comet Kohoutek is providing amateur radio with a unique opportunity to help improve communications between people around the world. The Kohoutek Intergalactic Net (KIN) is linking together comet watchers, celebrations, observatories, scientists, and comet cruises and flights in those countries permitting third-party communications. The Earth Society, which is sponsoring the "Kohoutek Comet Watch" cruises, sees KIN as an excellent way to tie together comet observers.

If you can set up an exhibit at a comet event, or handle phone patch traffic (or for any other reason), you are invited to join KIN on 14,300 kHz at 0000 GMT (7 P.M. EST) daily and on 3900 kHz (and 146.94 MHz locally) during hours of comet visbility (early evening). For more information, contact: Wes Thomas, W2IKQ, 606 5th Ave., E. Northport, NY 11731.

When I visited League headquarters, I noticed the Collins console that you were using at W1AW. I liked the idea and the color so I came home and built one. I am a long way from being a carpenter, but with vinyl tile and white filler you can hide a lot of mistakes. — *WA4ZRX*





The Thirty Dollar Counter

BY RALPH V. ANDERSON,* KØNL

EVERY AMATEUR wants a frequency counter, but the cost of a modern one is quite high. The counter shown in Fig. 1 is the result of an effort to determine just how inexpensively an accurate frequency counter could be made by the average constructor. If one has a junk box that will furnish a few items, and if the constructor is willing to expend a little work, this counter can be made for around thirty dollars. If the ready-made printed-circuit board, neon holder and mask† are purchased, the cost might run a little over this figure. On the other hand, if one uses perforated board and builds the neon board and mask himself, the cost will be much less.

In the initial design, the first consideration was the minimum number of components necessary to assure accuracy. Two items in particular were studied – the readout system and the desirability of using latches. Before the use of Nixie tubes and other modern methods, virtually all counters were equipped with rows of ten neon lamps (NE-2 type) for readout purposes. They worked quite well even though not as convenient as the more modern types. Since the NE-2 is readily available at very low cost, this method of readout was used. However, if one wishes to use Nixie tubes, no change in the circuit is required.

Modern counters use a quad latch, or other type of storage unit. This permits storing and displaying an indicated count during the next period, while the counter is counting. When the count is completed, the new reading is transferred to the readout and another count is initiated. This prevents blinking of the readout while the count is progressing. The old tube-type counters using neon tubes blinked or "ran up" while the count was being made. In consideration of the cost of quad latches and associated circuitry, the blinking was not deemed that inconvenient or undesirable.

*528 Montana Ave., Holton, KS 66436.

† Printed circuit boards may be obtained from Circuit Board Specialists, 3011 Norwich Ave., Pueblo, CO 81008. The prices: circuit board — $6.50, neon board — $4.50, negative mask — $1.50. All three — $10.

In determining the minimum number of display places required, the optimum number appeared to be five. While four could be used with less cost, it was felt that the extra small cost was justified. The final design provides a MHz/kHz switch on the front panel. In the kHz position, the reading is the right five digits of the frequency. In the MHz position of the switch, the count indicates the left five digits of an eight-digit figure. As an example if the frequency were 12,345,678 Hz, in the MHz position the reading would be 12345, and in the kHz position the reading would be 45678. The 4 and 5 are used to bridge the two groups of figures for full frequency information.

The time base starts with a 1000-kHz frequency which is divided by a counter chain to one pulse per second. When using an inexpensive crystal, a trimmer (C7), mounted on the front panel, is used to set the frequency. When making a measurement where utmost accuracy is required, the crystal frequency is compared constantly with a standard-frequency station such as WWV. Where an error of a few hertz can be tolerated, the trimmer can be set (after warm-up) and the frequency will remain fairly steady (at a constant room temperature). Of course, more expensive crystals and ovens can be used, but this raises the cost.

Design Considerations and Construction

The theory of the counter is quite simple. The time base supplies a pulse each second which is used to operate a flip-flop, which, in turn, controls a gate. The gate is turned on for one second, and off for one second. When on the count is made and when off the count is read. Just as the gate is turned on, a pulse from the flip-flop resets the counter to zero. In the MHz position of the switch, a bypass circuit resets the flip-flop, turning the gate off after one millisecond, and the display is made for 999 milliseconds.

The input circuit consists of a bias control on the front panel, working in conjunction with four sections of an SN7400 IC (U19) operating as a modified Schmitt Trigger circuit. The SN7400 is a

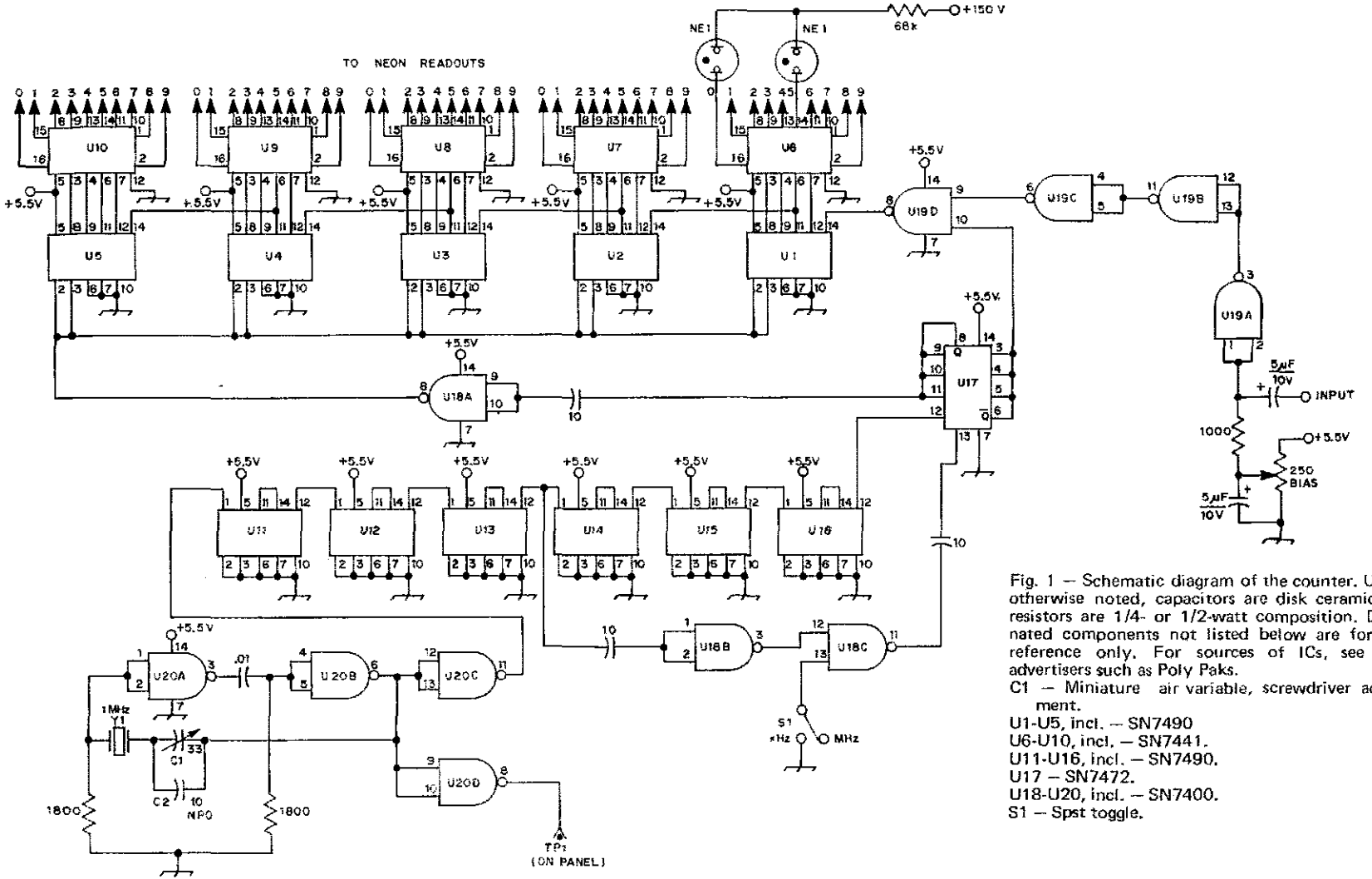


Fig. 1 — Schematic diagram of the counter. Unless otherwise noted, capacitors are disk ceramic and resistors are 1/4- or 1/2-watt composition. Designated components not listed below are for text reference only. For sources of ICs, see *QST* advertisers such as Poly Paks.

C1 — Miniature air variable, screwdriver adjustment.

U1-U5, incl. — SN7490

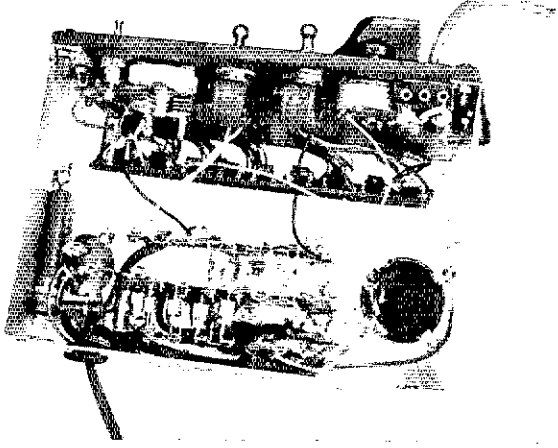
U6-U10, incl. — SN7441.

U11-U16, incl. — SN7490.

U17 — SN7472.

U18-U20, incl. — SN7400.

S1 — Spst toggle.



General layout of the power supply.

quadruple 2-input positive NAND gate. Normally, only three sections would be required but since the fourth is there, and not otherwise used, it was wired into the circuit. The control on the panel is used to adjust the bias for the first section. A slightly different setting may be required when changing from a low to a high frequency, but the change is easily made. Since there is no amplification provided, a fairly high input-signal level is required. Most rf test generators will provide sufficient signal. If the counter is to be used with lower input levels, the input circuit described in *QST*, June 1972, page 32 may be used.

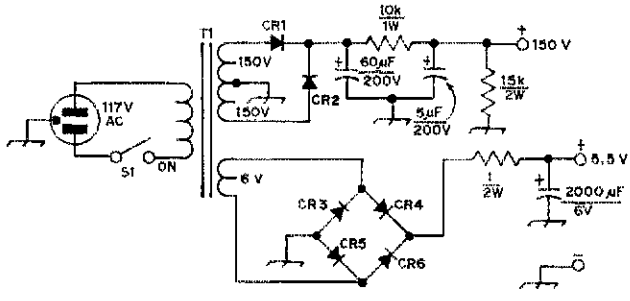
A simple power supply (Fig. 2) providing 5.5 volts at approximately 500 mA, and 150 volts (negligible current) is required. A voltage regulator was found unnecessary. A 6.3-volt ac heater winding with a dropping resistor of 2 ohms (approximately) is used for the 5.5 volts. The 5.5-volt supply must be well filtered. The high voltage for the neon lamps should be reduced to the lowest value consistent with good readability. This protects the 7441 readout ICs.

A problem was encountered with the enclosure. Advertised cabinets did not seem to be provided in any suitable dimensions. Those which would accept a panel of the proper size were far too deep. Since it is recommended that the panel be home constructed, no cabinet is suggested – the panel can be built to any size necessary to fit the desired enclosure. The power supply can thus be mounted in a convenient location, or on a chassis bent from sheet metal and attached to the panel. All components of the counter proper are mounted on the front panel and chassis dimensions are unimportant.

The front panel is made from tempered hardboard 1/8-inch (3.175 mm) thick and the minimum dimensions for the panel are 6 × 5 inches (15.2 × 12.7 cm). Five slots for the neon lamps can be cut into the panel using a woodrouter bit and a high-speed drill press. Alternatively a rectangular hole can be cut in the panel for the neon display.

While a printed circuit board is available for the neon display, one can be made easily from a piece of tempered hardboard 5-3/4 × 3-1/2 inches (14.6 × 8.9 cm) using eyelets for soldering and mounting points. The eyelets can be any convenient size, but many stores sell 1/16 inch (1.59 mm) in diameter and 3/16 inch (4.76 mm) long at a cost of about a penny per eyelet. These are ideal. The total number required is 110. The holes for the eyelets are easily drilled with a hand drill. The neon lamps should be mounted in five sets of columns one inch (2.54 cm) apart, and in rows separated 0.3 inch (7.62 mm). Note that the lamps are mounted such that the two wires are in a plane vertical to the board and not parallel. Only the outermost element lights and running the wires this way brings the light closer to the mask. Before mounting the lamps, a strip of aluminum foil 1/2 × 3 inches (1.27 × 7.62 cm) is cemented under each row of lamps for better reflection. Finally, after the board is completed and ready to mount, strips of heavy paper 1/4 × 6 inches (.64 × 15.2 cm) are cemented between the lamps to prevent light from illuminating an adjacent number. In wiring the neon-lamp circuit board, mount each NE-2 on the reverse of the foil side first. Then insert a piece of hook-up wire in the hole on the foil side and solder each connection. Ideal wire for this purpose is telephone switchboard wire which is color coded, small, and has excellent insulation. Almost any switchboard technician will give you enough for a small job such as this one. To complete the wiring, lay the display and counter boards on an old wooden board and fasten them about a half inch apart with four nails. After completing the wiring and removing the nails, bend all the wires so that the two boards face each other for mounting.

Fig. 2 – Schematic diagram of a power supply suitable for use with the counter.
CR1, CR2 – Silicon diode, 500 mA at 200 PRV.
CR3-CR6, incl. – Silicon diode, 1 A at 200 PRV.
T1 – Power transformer (Thordarson 22R39 or equiv.).

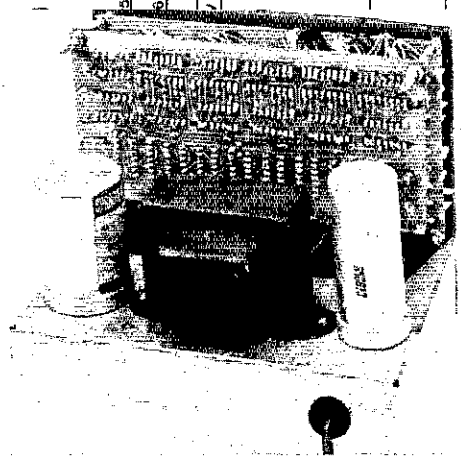


While a mask is available, many photographers, novice as well as professionals, can make one. Numbers taken from a calendar can be used to set up five rows of numbers in the proper ratio for direct reduction. Since the lamps are 0.3 inch (7.62 mm) apart in the rows, and since the columns are 1 inch (2.54 cm) apart, the proper ratio can be determined and the mock-up reduced accordingly. Offset print shops can handle such a job for a very nominal fee since only the negative is desired. If plates had to be made, the cost would be much higher.

ICs U1 to U5 (SN7490 decade counters) comprise the frequency-counter portion and U6 to U10 (*SN7441 BCD-to-decimal decoder/drivers*) comprise the readout drivers for the respective decade tubes. ICs U11 to U16 comprise the divider chain for the crystal oscillator. U17 (7472 flip-flop) is the flip-flop controlling the gate of U19 (7400), the remaining three sections of which are used as a shaper. U18 (7400) serves the dual purpose of resetting the counter to zero just before the count and providing a switching circuit, controlled by a switch on the panel, to change the count from one second to one millisecond. U20 (7400) is used for the crystal oscillator. One remaining section is used to isolate the oscillator from the input to the divider chain, and the other section is used to provide a 1000-kHz test point on the front panel. The crystal, if it is of the small HC-6U size, is mounted directly on the circuit board. Bare wire is soldered to the board, the crystal is inserted, and the wire wound around the pins of the crystal holder. A heat sink can then be applied to the wire while it is soldered to prevent possible damage to the crystal.

Using the Counter

To test the counter, connect the input lead to the 1000-kHz test point on the front panel. With the switch set to MHz the count should be 01000. With the switch set to kHz the count should be 00000 (the right five digits of one million). Careful adjustment of the bias is required for the higher frequencies. When adjusting the bias, it is usual to set the switch to MHz and a spot is found where the same reading is repeated. The switch is then set to kHz for the final reading. Unless the frequency being measured is crystal controlled, do not be disturbed by a change in the reading on the units digit. This is the fault of the frequency source, and *not the counter.*



Rear view of the counter. The pc boards are mounted parallel to the front panel with approximately 1-inch (2.54-cm) spacing.

At slight additional cost, Molex connectors can be used. No reduction in speed was noted when using them. These connectors permit selection of the first decade in the counter chain (U1) in order to obtain the highest count from the decades available. Then too, if by chance one of the decades is defective, or if one fails, these connectors will be especially appreciated.

All counters have operated well in excess of 20 MHz. One builder reports that a speed of 32 MHz was reached, using a preselector and selected ICs. The scaler described in the June, 1972, issue of *QST*, page 32, works well with this counter if it is desired to extend the measuring capability into the vhf region. If a scaler is not available, it is often possible to check the frequency of a 144-MHz transmitter by measuring the frequency of the crystal oscillator or a multiplier stage which is within the range of the counter and then calculate the output frequency. Coupling is made as lightly to the crystal-oscillator circuit as possible to avoid causing changes in oscillator frequency. Normally a 5-pF (or less) capacitor is sufficient. QST

Strays

Recently, at the Gibson General Hospital in Princeton, Indiana, K9RFW and WA9UGG found themselves sharing a room. K9PNP was the emergency ambulance medical technician who brought K9RFW in following an auto accident. WA9UGG was recovering from an appendectomy. Happily, both are now reported in fine shape. — *W9HWR*

— • • • —

Apologies to Bob Ellis (Strays, page 19, June *QST*), whose call was inadvertently listed as WA4UUQ. Bob's correct call is WA4UQQ.

How many hams have their own personal Zip code? G2MI, RSGB QSL Bureau Manager, receives so much mail that the British Post Office assigned *him his own postal code — BR2 7NH. Art's full* address is listed in this month's "IARU News," along with the addresses of all overseas QSL bureaus.

— • • • —

FEEDBACK

In the "TTL Message Generator for RTTY and CW," Bell and Schmidt, *QST* for November, 1973, a typographical error appears in the specification for data selector U6, Fig. 5, page 28. The IC should be shown as a type 74151. In the block diagram of Fig. 4 the IC type is shown correctly.

Hints and Kinks For the Experimenter

A LOCK FOR THE COLLINS KWM-2 MOBILE MOUNT

The Collins KWM-2 transceiver represents a rather large financial investment for most hams and also a considerable temptation for any would-be thief who sees it mounted in a car. Rather than sacrifice the utility of the rig by always removing it from the car whenever I parked, I decided to add a simple locking adapter to the mount. In addition to the necessity of making the locking adapter rugged enough, a secondary consideration was that the unit not require the drilling of any holes in the KWM-2, which might detract from its resale value.

My solution was to buy a common hasp which was modified as shown in Fig. 1. The hasp was then bolted to the KWM-2 mount by means of 6-32 screws.

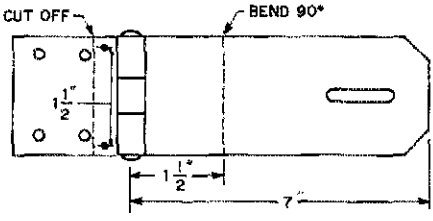
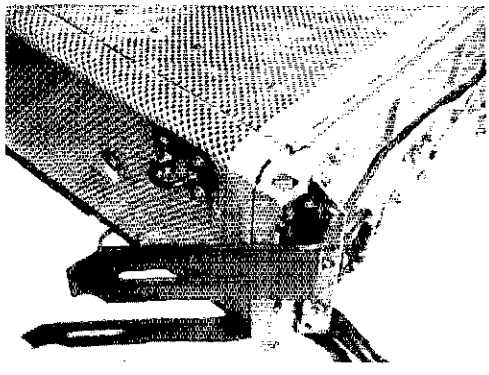


Fig. 1 — Recommended modifications of a standard hasp.

The other part of the hasp was screwed to the right side of the KWM-2 with four No. 4-40 screws. These screws pass through the existing holes in the transceiver case without any additional drilling. They are secured by means of nuts and lockwashers on the inside of the case. The nuts are inaccessible to a potential thief because of the position of the final-amplifier rf shield. The transceiver must, of course, be removed from its case in order to attach the locking adapter. — *Thomas Biddle Perera, K2DCY*



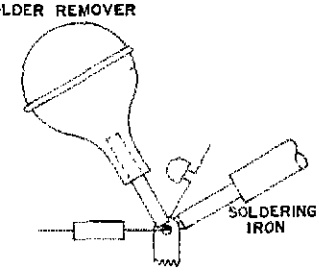
DEACTIVATED-VOX CW OPERATION WITH THE HW-100

Many operators do not desire break-in operation on cw, especially when slower speeds are being used. Having the relays drop out between characters because of short delay times can be quite annoying and increased delay may be unsuitable for ssb operation.

A simple method of overriding relay break-in during cw operation of the HW-100 is to utilize the lever-type switch found on most desk-type microphones. With the microphone connected and its switch activated, all relays remain energized and a carrier will be transmitted only when the key is depressed. — *Roy J. Durso, K4DJN*

REMOVING SOLDER FROM TERMINAL STRIPS AND PC BOARDS

Although commercially manufactured tools are available for the purpose, the method shown is handy when removing components from either pc boards or terminal strips. Cut the tip off of a small



syringe and insert a short length of Teflon tubing into the end. It should be approximately 2 inches long and 1/16-inch OD. If Teflon tubing is unavailable, the metal insert from a ball-point pen could be substituted. Wrap the metal part that goes into the syringe with masking tape to prevent burning. The only difficulty with using a metal tube is that solder tends to stick to the walls and will have to be drilled out after a few operations.

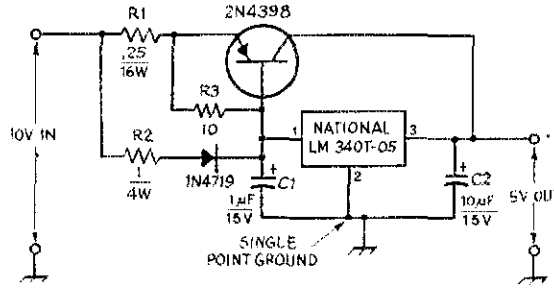
Heat the terminal strip and squeeze the syringe before the solder starts to melt. When the solder starts to flow, bring the tip of the tube up to the joint and release the pressure on the bulb quickly. The molten solder will flow up into the bulb, leaving the terminal relatively free. — *W1NPG*

IMPROVED REGULATOR CIRCUIT

While many amateurs are now using integrated-circuit voltage regulators, an external current-boosting transistor is usually required to increase the regulator current capacity. Normal current-boosting schemes, however, require additional active devices to duplicate some of the worthwhile regulator safety features (short-circuit protection, safe-operating area protection, and thermal shutdown). Here is a regulator circuit which retains these safety features through a current-sharing design. This regulator, intended for TTL circuits, has an output of 5 volts at 5 amperes, and a typical load regulation of 1.4 percent.

R1 and R2 provide the necessary current division (assuming the transistor base-emitter voltage equals the diode drop). The voltage drops across R1 and R2 are equal, and the currents through R1 and R2 are inversely proportional to their resistances. In this circuit, R1 has four times the current flow of R2. For reasonable values of beta, the transistor emitter current will approximately equal its collector current, while the current through R2 will equal the current through the regulator. Under overload or short-circuit conditions, the protection circuitry of the regulator not only limits its own output current, but that of the external pass transistor too.

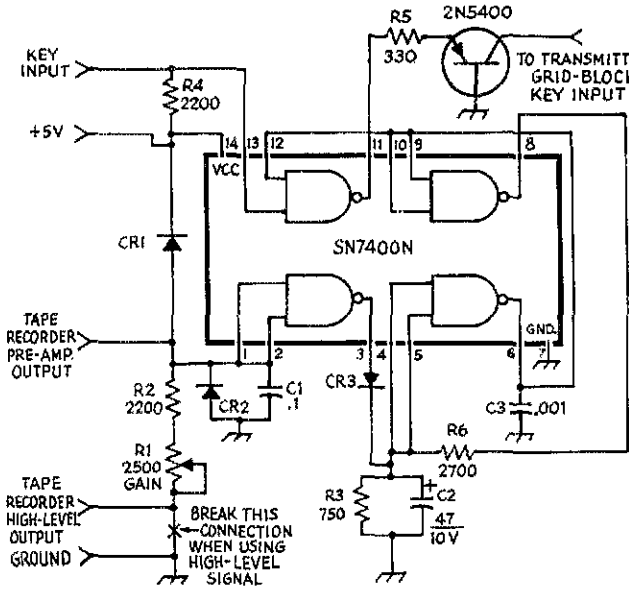
Thermal overload protection is extended to the external pass transistor when its heat sink has at least four times the capacity of the regulator (this is because both devices have almost the same input and output voltage and share the load current in a 4:1 ratio). For optimum current sharing between the regulator and transistor as temperature changes, the diode should be located physically near the pass transistor so its heat-sinking arrangement keeps it at the same temperature.



If the National LM340T regulator is used and mounted on the same heat sink as the transistor, the regulator should be electrically isolated from the heat sink as its case (pin 3) is grounded while the case (collector) of the transistor is at the regulator output potential. C1 prevents unwanted oscillations, while C2 improves the output impedance of the overall circuit. R3 is used to unload the excessive charge in the base region of the pass transistor when the regulator suddenly goes from full load to no load. The single-point ground system allows the regulator sense terminals (pins 2 and 3) to monitor load voltage directly rather than at some point along a possibly resistive ground-return path carrying up to 5 A of load current. – *William R. Clabo, K9ASL/8*

KEYING A TRANSMITTER WITH A TAPE RECORDER

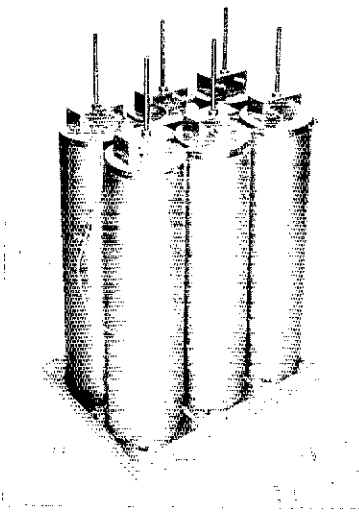
This simple envelope detector and wave-shaping circuit uses a low-cost quad-NAND gate module to enable "instant replay" of recorded cw transmissions. Diodes CR1 and CR2 protect the gate from excessive input voltage swings. (Type 1N270 diodes were used, although any small-signal switching or general-purpose diode should be suitable.) R3, C2, and CR3 provide envelope detection of the amplified and clipped audio input. R6 provides positive feedback to suppress output oscillations which can occur when TTL gates are subjected to slow rise- and fall-time signals. R1 is used to lower the "floating" input threshold to the gate and increase circuit sensitivity.



For low-impedance recorder outputs or high-level audio outputs, the low side of R1 should be disconnected from ground and used as the audio input point; the value of R2 should be increased if amplifier hum or background noise is still sufficient to trigger the circuit falsely. Of course, an audio-filtered and impedance-matched input to the tape recorder greatly assists in generating a perfect noise-free output replica of the original input signal. – *Andrew H. Kilpatrick, K4YKZ*

Recent Equipment

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



North Shore RF Technology Duplexer Kits

REPEATERS that are used on vhf and uhf bands for fm communications have introduced some new technical problems to the amateur fraternity. One of the most basic questions encountered is how to keep the transmitter from interfering with the receiver when both are active. Some installations use separate antennas for transmitting and receiving. This approach works in some instances, but the amount of physical separation necessary for isolation between the two antennas often is difficult to obtain. Another bugaboo in this method is that the coverage of both antennas is seldom identical, with the result that a mobile station can transmit through the repeater but cannot hear the answer – in other cases, the opposite may be true.

A system that uses one antenna for both functions would assure that the coverage was identical for both modes, as well as eliminate the antenna-spacing problem. A duplexer is generally the answer. One form of duplexer is a set of tuned cavity filters that can be connected between the antenna and the equipment in such a manner as to permit the transmitter and receiver both to be operational at the same time. Cavities connected to the receiver reject the transmitter energy, and other cavities connected to the transmitter will reject signals that are intended for the receiver. Some duplexers are quite complex, and most are expensive. Many of the more common duplexers cannot be tuned up by any but the most expert in the field.

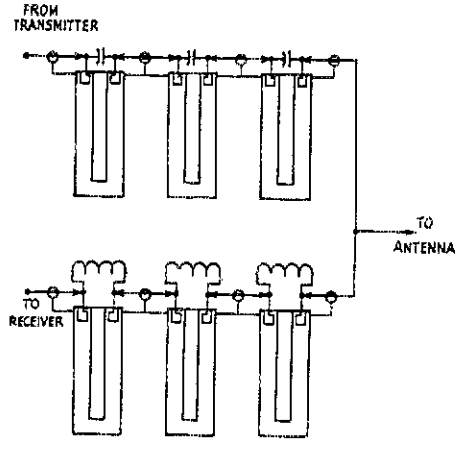


Fig. 1 – Diagram of the six cavity duplexer.

A Duplexer in Kit Form

As a direct result of the interest shown in an article describing a do-it-yourself duplexer,[1] WIGAN decided to market a duplexer kit under the business heading of North Shore RF Technology. Now it is possible to obtain from one source all of the parts needed to assemble a duplexer that will meet the needs of a majority of repeater operators. Anyone who has tried to accumulate all of the hardware to complete six identical cavities can appreciate the time and effort that this will save. Everything is supplied except a piece of plywood (or other material) to serve as a mounting base. In consideration of the high (and increasing) cost of copper, and the additional high cost of shipping such weighty material, another approach was used – silver-plated aluminum.

Before the eyebrows lift too high, this writer would like to point out that several segments of the electronics industry have been using silver-plated aluminum for many years. When properly treated, this material will stand up quite well over long periods of time. The appearance of the plating

[1] Bilodeau, "A Homemade Duplexer for 2-Meter Repeaters," *QST*, July, 1972. *FM and Repeaters for the Radio Amateur*, page 106.

in this duplexer indicates that it was done by someone who knows his business and does it well. The center conductor, tuning plunger, and end (top) cap all have a heavy silver coating that provides excellent conductivity for rf. The finger stock has been soldered to the center conductor and the center conductor welded to the end plate *before plating*, thus eliminating possible trouble spots. An iridite coating is applied to the outer conductor. Since the surface area of this 6-inch-diameter tubing is quite large, the high current-handling capacity of a silver-plated conductor is not necessary.

The outer conductor is supplied, precut, with the top slotted and the bottom welded to a plate that also serves to mount the cavity to a base of the builder's choice. Other parts supplied with the kit include the Miniboxes (predrilled), BNC fittings for both the boxes and the interconnecting cables, Teflon bushings, threaded rod for the tuning plunger, assembly hardware, and the coaxial cable needed to connect the cavities together. To further assure the success of the builder, sample shunt inductors are supplied in the proper shape to serve as models from which to form the finished product. Three cavities will require an inductive shunt element and three will need a capacitor between input and output. These capacitors and copper strips for connecting them are also supplied.

Assembly

Considering the instructions supplied and the number of things that are already put together in the kit, two or three amateurs should be able to complete and test the duplexer with time left over for the usual evening gabfest if they desire. In fact, it would be a good guess that an individual can put it all together, tune it up, and still catch the late movie.

To check out the instructions, the cavities were assembled in the ARRL lab by W1NPG who had no previous exposure to repeaters or duplexers. Everything went together smoothly. The only area of concern was in forming the inductors for the shunt elements. After the point was made, that "close enough" or "almost like" did not apply at vhf and uhf, the elements were made "as close as possible" to the sample, which is what the instructions mean. It is a point worth remembering by any prospective builder of duplexers (or any other vhf equipment).

Tune-up and Performance

Two methods of tuning the cavities are given in the instructions, one with laboratory equipment and one with a low-power transmitter. Both methods were tried, and each worked well. It takes longer to read the instructions for tuning than it does to perform the task. Borrowing a signal generator and a calibrated detector should be no problem for an enterprising technical committee. If the more exotic equipment cannot be found, the results that can be obtained from the simple-equipment approach will be entirely satisfactory.

North Shore RF Technology Duplexer Kits

Dimensions (HWD) and Weight:
25-1/2 × 6-1/4 × 6-1/4 inches, 4-3/4 pounds for a single 2-meter cavity.† Height does not include tuning shaft which may extend 2 to 6 inches higher.*

Power handling capability: 250 watts.

System impedance: 50 ohms.

Insertion loss: less than 0.5 dB per cavity.*

Rejection notch attenuation: 35 to 38 dB per cavity, 110 to 120 dB for 3 cavities on 146 MHz at 600 kHz spacing. On 220 MHz, 55 to 58 dB per cavity, better than 110 dB for two cavities at 1600-kHz spacing.*

Temperature stability: 35°F decrease in temperature produced 2 dB change in rejection.*

Price class: $300 for 6-cavity, 2-meter kit. $220 for 4-cavity, 220-MHz kit.

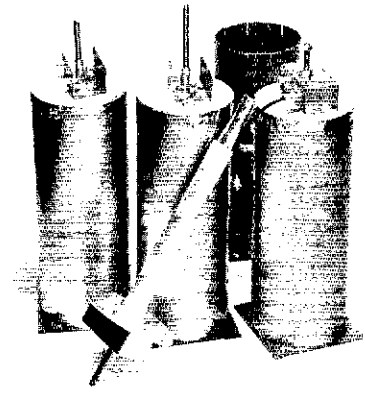
Manufacturer: North Shore RF Technology, 4 Ord St. Ct., Salem, MA 01970. (617) 745-4177.

†Later production duplexers will have tubing wall thickness slightly greater than those reviewed, therefore weights will be increased.

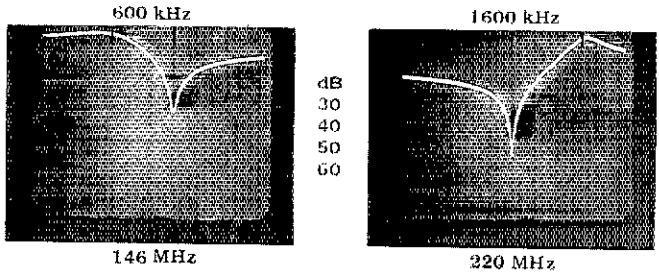
* Measurements made in ARRL lab.

Any transmitter that is used to align the duplexer must be very "clean." White noise or spurious output energy can completely mask a rejection notch that is better than −35 dB — a figure that was exceeded by the cavities tested here.

The cavities were tuned individually, then connected as a duplexer and checked again. Only a minimal amount of tweaking was needed in the completed unit. A word of advice to the tune-up



The 220-MHz duplexer kit is similar to that for 146 MHz, except in height. Here three cavities are shown complete. One end plate and center-conductor assembly provides a view of the coupling loops. Note the inductor and capacitor in the Miniboxes on top of the finished cavities.



Measured response for two of the cavities assembled from the kit. The curve at the left is from a 2-meter cavity with the rejection notch 600 kHz higher than the pass frequency. A 220-MHz cavity response (right) shows a rejection notch 1600 kHz below the pass frequency.

crew: check and calibrate the test equipment so that you can believe the results, then tune up the duplexer and leave it alone. It can spoil your whole day if someone decides that the desensing can be cured by tuning the cavities "just a wee bit."

Other Bands and Spacing

There is a need for duplexers for the 220-MHz band to help in the repeater occupancy of that part of the spectrum. North Shore RF Technology offers such duplexers. Judging from the results of tests made in the ARRL lab, a 4-cavity unit should be adequate for most 220 systems. Except for the height, the cavities are identical to those for two meters. The feasibility of producing a duplexer for six meters is also being studied.

The kits tested here were for the current standard spacing of 600 kHz for two meters and 1600 kHz for the 220-MHz band. For information about nonstandard repeater spacing and for other bands, write to the manufacturer. – *WISL*

QST —— QST —— QST

The Drake R-4C Communications Receiver

PREPARING AN equipment review for a product which results from updating an earlier version can be an interesting task since the evaluation philosophy can be based on the differences which make the newer model more desirable. So it was with the new C-line recently announced by the R. L. Drake Company. At a glance one might think the R-4C is simply an improved version of the older R-4 family of receivers. In fact, careful inspection of the front panel gives only a small clue as to what circuitry has been actually reworked. Comparing the schematic diagrams of the new and older models reveals that the change is more than trivial, to say the least.

Determining which of the many changes to the basic receiver design is the most significant can be purely subjective. This writer suggests that the major change to the circuit involves the inclusion of eight-pole crystal filters at the second i-f range to establish the operating bandwidth of the receiver. A few other substantial changes include a new frequency indicating dial, all solid-state audio channel, electrical (instead of mechanical) bandpass tuning, provision for external carrier-oscillator injection and a third rf conversion stage. The selectivity improvement will be discussed first.

Crystal Filters at the Second I-F

The new filters placed at the second i-f point in the receiver system have caused a large change in the basic receiver circuit. With the earlier R-4 receivers, the width of the passband characteristics is determined by an 8-kHz-wide filter at 5.645 MHz and a series of tuned circuits a 50 kHz. Selecting a portion of the 8-kHz band is accomplished by adjusting the mechanical passband tuner which actually moves slugs in or out of the 50-kHz i-f coils. Fig. 2 gives the *approximate* selectivity curves of both the R-4B and R-4C (with each filter).

To incorporate the new filters, Drake decided to add another i-f range 50 kHz above the existing i-f of 5645 kHz. The passband center of the filters is set at the midpoint of the range. When the mode switch is placed in either the SSB, CW1 or CW2 positions, the signal passes from the 5.645 MHz i-f to the second mixer where it is combined with some energy from the 50-kHz BFO and converted to 5.695 MHz. The signal position with respect to the sharp crystal filters is dependent on the setting of the variable BFO which converts the signal to slightly above or below the 5.695 MHz filter center frequency. The setting of the BFO determines which sideband is selected. Since a single oscillator,

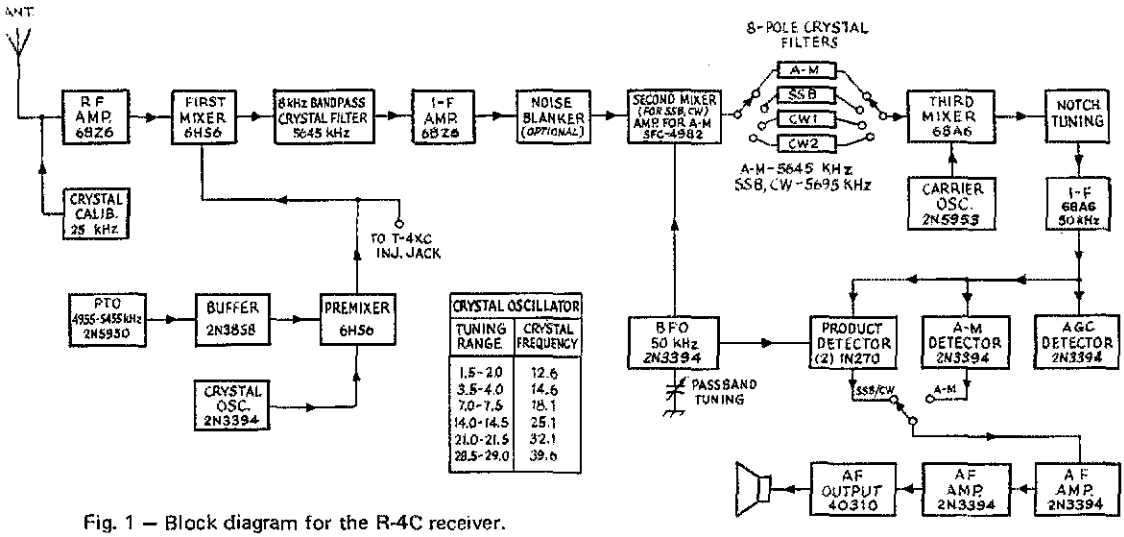


Fig. 1 — Block diagram for the R-4C receiver.

the BFO, provides the frequency offset at the second i-f up-conversion as well as the injection voltage for the product detector, a BFO frequency change results in a change in the passband characteristics of the receiver without an associated change in the received signal frequency.

Once the signal passes through the crystal filters, it enters another mixer stage where it is combined with energy from the carrier oscillator set at 50-kHz below the second i-f of 5.695 MHz. The difference between the two produces a signal at the third i-f, 50 kHz.

The basic R-4C receiver comes with an 8-kHz-wide filter at the first i-f and an ssb filter (2.4 kHz) at the second i-f as standard equipment. Optional filters are available for 4.0 kHz, 1.5 kHz, 0.5 kHz and 0.25 kHz. The front-panel MODE switch allows any of four filters to be selected. Two cw type filters and the a-m (4.0 kHz) filter may be installed in sockets mounted on the rear panel of the receiver. A-m operation will be discussed later.

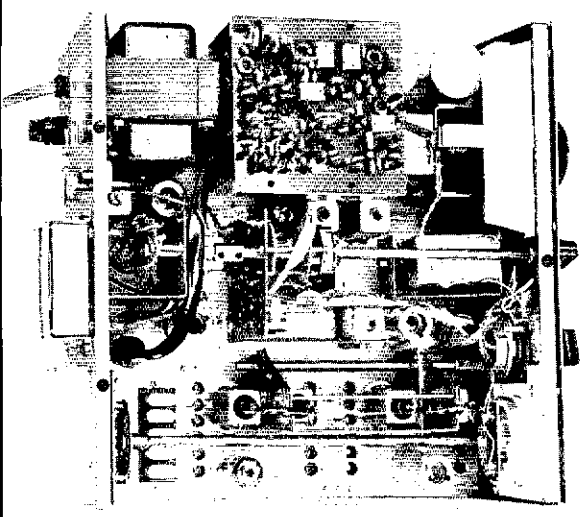
A logical question one might raise is which of the filters, if any, are needed for typical operation. This writer contacted the Drake Company to obtain their "standard" recommendation for prospective filter purchasers. Their advice seemed quite good: If the operator is accustomed to a 200-Hz unit with very steep skirts, then the Drake 0.25-kHz filter is a good choice. If, on the other hand, the operator is used to the broad chacteristics of the older Drake models, then the 0.5-kHz filter will be quite adequate. Of course, one solution to the problem is to purchase both filters and use the one most appropriate for the need at the time. For most operating conditions the 0.5-kHz filter is desirable. Only during extremely heavy QRM from strong signals is the sharper 0.25-Hz filter needed (or desirable).

The R-4C tested in the ARRL lab came equipped with each of the cw filters and a separate 1.5-kHz filter which can be installed in place of one of the cw filters. When the 1.5-kHz filter is used in conjunction with the *proper* setting of the passband tuner, extremely sharp ssb reception is possible. The filter is designed for RTTY use. Although the quality of the ssb signal is somewhat degraded by the increased selectivity, it allows otherwise unreadable signals in QRM to be understood. For the operator who operates predominantly ssb, consideration of the 1.5-kHz filter should be an order of business. It should be pointed out, however, that the slightly broader 2.4-kHz filter which comes with the receiver is adequate for all but the heaviest QRM situations. The key to using the sharper filter is the ability to shift the passband characteristics to take advantage of the particular voice being received. Without the passband tuner, the RTTY filter would not be usable on ssb.

Mechanical Changes

Inspection of the receiver front panel reveals the most striking change. The tuning dial readout has been changed from a technique requiring mental addition of the dial frequency and the kilohertz indication on the knob skirt to one which provides direct readout in 1-kHz increments. Concentric dials display the hundreds on one dial and the one-kilohertz markers on the other.

A new knob has been employed by Drake for the main tuning. The ridges of the plastic portion of the knob are somewhat sharp but certainly not offensive. A new finger socket is also included to allow the operator to tune briskly from one end to the other end of the range. The receiver, now mostly solid state, is a bit light in weight to allow the dial to be spun quickly since the pressure on the spinner would cause the receiver to move on the desk. Of course, one can place one hand on top of the R-4C to add stability when making large (and quick) transverses across the spectrum.



Top view of the R-4C receiver. The noise blanker is mounted on plastic studs shown at the upper center of the photograph. The crystal filters are mounted in sockets attached to the rear of the cabinet.

The internal mechanical layout of the R-4C is very different from the R-4B. In fact, under-the-chassis inspection reveals the R-4C to be a completely new receiver. The side-mounted headphone jack common to the earlier model has been moved to the front panel. The NOTCH PRESET control is now internally mounted and cannot be adjusted from outside the cabinet.

A few other mechanical features are noteworthy. The chassis is no longer copper plated. It has a new iridite finish which is very resistant to fingerprints. The crystal socket assembly is mounted on the rear of the cabinet and is enclosed in a shield.

Table I — Stability Measurements of the R-4C receiver.

Minutes	*Frequency*	*Minutes*	*Frequency**
0	399	35	205
1	379	40	196
2	362	45	189
3	346	45	174
4	332	55	160
5	320	60	151
6	308		
7	300		
8	290		
9	282		
10	276		
15	254		
20	238		
25	224		
30	214		

*Frequency in hertz to be added to 14.2 MHz as measured from the cold start.

A switch has been included on the rear panel for the selection of either 117- or 220-volt operation. A locking tab is included to prevent the switch from being inadvertently bumped into the incorrect position.

The front-panel layout of the R-4C is somewhat different than that of the older model. The audio gain control has been moved from the lower right-hand corner and is now concentrically mounted with the rf gain control. The passband tuner is in a different position to allow the filter switch to be included on the front panel. The auxiliary crystal selector has 15 positions, an increase from the earlier receivers.

Circuit Particulars

A block diagram is given in Fig. 1. The front end, mixer and PTO circuits are relatively unchanged. All of the Drake 4-Line systems use a premixing scheme whereby energy from the PTO is mixed with the HFO *before* reaching the signal chain in frequency conversion. This technique allows for the use of only one cable between the transmitter and receiver for transceive operation. A second cable is needed for carrier-oscillator injection energy, however. The output of the first mixer passes through the 8-kHz filter mentioned earlier and then to the noise blanker circuit (if the accessory noise blanker is included). The blanker will be discussed later. The signal is then routed to a second mixer where it is combined with energy from the BFO and converted to the frequency of the sharper crystal filters. The signal is then passed through one of the filters (selectable from the front panel) and combined with energy from the carrier oscillator at 5.645 MHz, producing a signal at 50 kHz. When a-m operation is chosen, the second mixer operates as an amplifier, the BFO is disabled, and the signal is directed to a 4-kHz-wide filter (or a resistor jumper installed across the rear-panel filter socket designated for a-m operation) at 5.645 MHz. The carrier oscillator frequency is changed to 5.695 MHz to produce an output at 50 kHz. The signal at 50 kHz then follows a path through the notch filter and to a vacuum tube i-f amplifier. The product detector, a-m detector, age amplifier, BFO, and three stages of audio are all solid state.

A nifty feature of the R-4C is provision for allowing the transmitter (T-4XC only) carrier oscillator to control the final receiver conversion. This provides perfect transceive operation during ssb operation without the need for zeroing the receiver carrier oscillator to the frequency of the transmitter (C61 adjustment for the R-4B receiver). A partial circuit diagram of the switching process is given in Fig. 3. When the R-4C is not interconnected to a T-4XC (such as when a T-4XB is used), the receiver carrier oscillator remains operational and must be zeroed to the transmitter frequency (C59 in the R-4C), as was the case with the older Drake systems. Q4 is normally used as an oscillator unless a cable is interconnected between the R-4C and the T-4XC. In the latter case, a 15-volt bias is provided by the transmitter to

disable the receiver oscillator and changes the operation to that of an amplifier. This happens only during ssb conditions as set by the T-4XC mode switch. When cw operation is selected for the T-4XC, the R-4C carrier oscillator is operational and determines the cw-offset transmit frequency. The transmitter carrier frequency is also shifted to give the proper offset operation. For a-m operation, the carrier oscillator in the T-4XC is placed at 5.645 MHz but a voltage is routed from the transmitter to the receiver via the anti-vox cable to prevent 5.645-MHz energy from returning to the receiver. The receiver BFO is shut off as explained earlier and the receiver carrier oscillator is set at 5.695 for conversion to the last i-f.

The Noise Blanker

The noise blanker for the R-4C is an optional item. Although the earlier series of R-4 receivers had a limiter, one should be cautioned against thinking this optional item is just a plug-in version of the older unit. It certainly is not. The model 4-NB is an adaptation of the blanker developed by Drake for use with the TR-6 six-meter transceiver. It is a sophisticated unit employing 16 transistors and two diodes mounted on a single circuit board about four inches square. The assembly mounts on two plastic standoffs located on the top side of the chassis and simply plugs into a socket for all of the interconnections.

The circuit consists of an amplifier at the receiver first i-f and a delay circuit followed by a balanced gate. The delay is required to compensate for the inherent delay of the noise processing portion of the system. The balanced gate operates as a series switch for the duration of impulse noise. Energy entering the blanker circuit follows two paths. First, it follows the amplifier and delay sections as mentioned above. Additionally, a sample of the signal is mixed with energy from an oscillator at 7.795 MHz to produce a new i-f of 2.15 MHz. The energy is amplified and applied to a pulse detector and an agc circuit. This portion of the device is able to detect impulse noise peaks which are used to activate the balanced gate.

Operation

A basically new receiver design, such as the R-4C, can be viewed in many ways. Certainly many questions arise which need to be answered, especially if the interested person owns one of the previous models. In terms of performance, is the difference worth the additional investment? The answer to this question is dependent upon the needs and desires of the operator. Certainly increased selectivity for ssb operation is desirable if

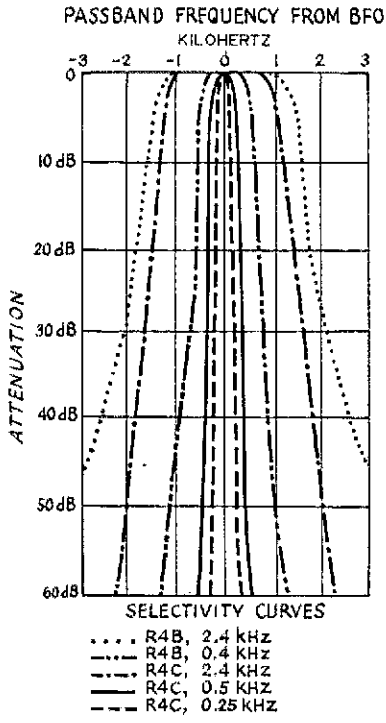
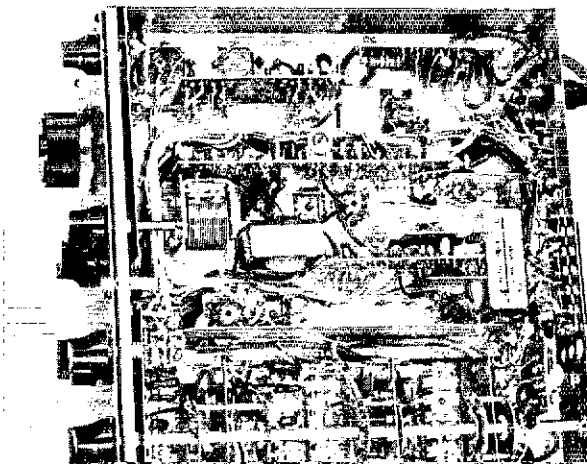


Fig. 2 — Selectivity curves for the R-4C receiver.

operation takes place in the crowded portions of the hf bands. For occasional cw operation, a separate filter is probably not needed; for the cw contest or DX operator, the addition of the cw filters adds *greatly* to the performance of the receiver. If the operator likes to work weak DX on the low end of 80 and 40 meters among all the foreign broadcast stations and the many loud stateside stations, the 0.25-kHz filter is recommended. For normal cw operation (rag chewing, net operation, or things of that nature), the 0.5-kHz filter is the one to install. Of course, both filters have their purpose, and an amateur desiring the maximum flexibility should consider both.

The noise blanker came with the review model and was tested under various operating conditions.



Bottom view of the receiver. The ssb crystal filter is shown at the left center. The "clean" layout is a result of printed-circuit construction and wiring harnesses.

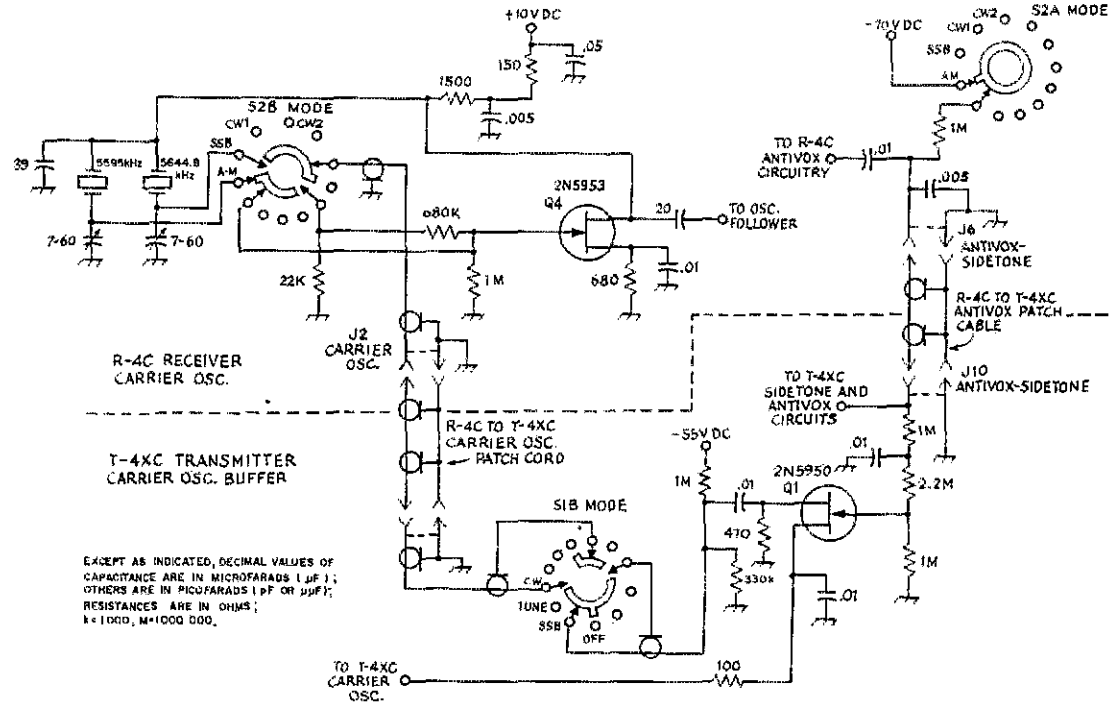


Fig. 3 — Circuit diagram for oscillator switching during ssb operation. See text for details.

The blanker does not appear to overload (cause increased intermodulation responses) with relatively strong signals on the band. The blanker is very effective with automobile ignition noise, some motor hash, some furnace noise, and works well with some types of precipitation static. It does not appear to function very well on power-line hash or interference developed by some TV sets (which, by the way, is not impulse noise and cannot be eliminated by any blanker known to this writer).

Three agc time-constant values, along with an off position, are given with the new receiver. The F position is indeed very fast in release time. The M (or medium) is a bit slower than the faster position, but is still what most operators would identify as fast. The S position is noticeably slower than the M setting and is somewhat slower in release than the counterpart setting in the earlier R-4B. With signals above about S 7, the age tends to pop when activated, indicating the attack time to be a bit slow. Reducing the rf gain-control setting seems to reduce the popping, and since the receiver has more than enough gain, this presents no real problems.

Table II — R-4C Sensitivity

Frequency, MHz	*Signal for 10-dB signal-plus-noise to noise ratio*
1.8	0.12 μV
3.5	0.1 μV
7.0	less than 0.1 μV
14.0	less than 0.1 μV
21.0	less than 0.1 μV
28.5	less than 0.1 μV

The inclusion of provisions for interconnecting the transmitter carrier oscillator to the receiver assures there is no difference between transmit and receive during transceive operating conditions on ssb. This feature is only available when both the T-4XC and R-4C are used. The transmitter instruction booklet gives directions for interconnecting an R-4B (or earlier model) with the T-4XC but no instructions are given in the R-4C manual, leaving the impression that the R-4C cannot be used with the earlier T-4XB (or earlier model). This is untrue, of course, and the C receiver may be interconnected for transceive operation with the B transmitter. The only apparent problem is that of setting the transmitter to the receiver frequency for ssb transceive. The R-4C does not have a C61 adjustment as outlined in the T-4XB manual for use with the R-4B. All one needs to do is follow the transmitter instructions and substitute C59 for C61 with the later model receiver. The capacitor is located on the top of the chassis and is easily identified by referring to the top view photograph in the receiver manual. It is necessary to remove the receiver top cover to make the adjustment.

A feature of this receiver of considerable worth is the ability to be used on any 500-kHz range between 1.5 and 30 MHz (except for five to six megahertz) with the inclusion of appropriate extra crystals. This means that segments can be added

for SWLing, WWV, 160 meters, or even CB (if one has the desire!).

During the six-month testing period during which every type of operating condition could be duplicated, one problem developed — the VFO became unstable. A phone call to the factory produced an instruction sheet and a special tool to make the tuning-dial adjustment. Apparently the normal wearing of the dial parts sometimes causes the pressure on the PTO shaft to become loose. The adjustment takes just a few minutes and can be accomplished by anyone. No special talent is needed! A few spurious birdies are evident. This writer counted six of them: 28.228 MHz, 21.163 MHz, 14.330 MHz, 4.013 MHz, 3.894 MHz, and 3.817 MHz. The loudest is found on ten meters; the others are below an equivalent signal input of approximately a microvolt. These types of spurious responses can be found in many of todays receivers and caused no problems with the operation of the set. An item worthy of mention is the tendency of the af-gain control to mechanically brush against the rf-gain control mounted concentrically with it. This condition caused the rf-gain control to become reduced without an awareness on behalf of the operator. It was a simple matter to slide the knob back on the shaft a bit to correct the condition. The rubbing knobs was no doubt a result of rough handling during shipping.

Table I gives stability measurements of the R-4C from a cold start. Sensitivity measurements are given in Table II. Intermodulation distortion products for the receiver were measured at 60 dB below the desired signal strength. IMD causes an unwanted product at the receiver output when two strong signals appear near the operating frequency.

— *W1FBY*

Drake R-4C Receiver

Sensitivity: See Table II.*
Selectivity: Ssb — 2.4 kHz; RTTY (optional) — 1.5 kHz; cw (optional) — 0.5 kHz and 0.25 kHz at 6 dB; a-m (optional) — 6.0 kHz.
Stability: See Fig. 1.*
Dial calibration: Every kilohertz; 500 kHz per dial traverse.*
Dial backlash: Unnoticeable.*
Spurious responses. All, except one, less than the equivalent of a one-microvolt signal input.*
Audio-output impedance: 3.2 ohms for both the speaker and headphones.*
Frequency coverage: 1.5 to 30 MHz (except 5 MHz to 6 MHz).*
Dimensions (HWD) and Weight: 5-1/2 × 10-3/4 × 12-1/4 inches; 17 pounds.
Price class: $500.
Manufacturer: R. L. Drake Company, Miamisburg, OH 45342.

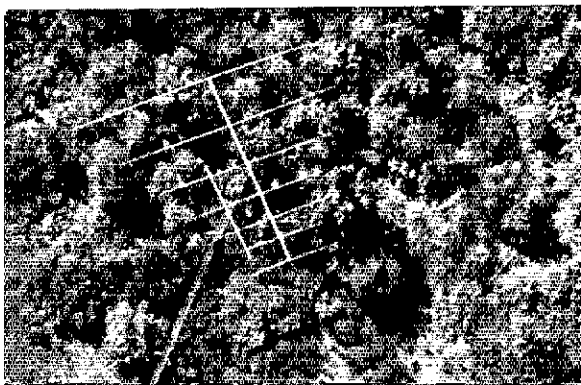
* Measured in the ARRL lab.

QST — QST — QST

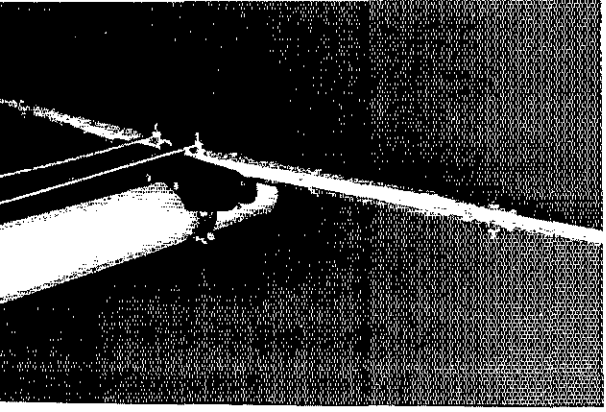
The KLM Log-Periodic Antenna

THREE-BAND antennas have captured amateur popularity over the years for several good reasons. Their desirable features include the use of only one feed line for 20-, 15-, and 10-meter operation, and of course a need for only one support in the backyard. There are, however, many styles of three-band systems ranging from interlaced trap Yagi types to the three-dimensional multiloop quad. Presented here is an antenna design which has not gained too much popularity with the amateur fraternity mostly because of the inherent mechanical problems relating to the electrical design. The array developed by KLM has overcome the mechanical inconveniences of an all-driven array with the Model KLM13-30 system. The photograph shows the element-support detail used with each boom connection. Silicone sealer has been used to prevent water from entering the element tubing as well as to hold the hardware tight. Phasing bars crisscross the boom to make connections to each of the driven six elements. The seventh element is a parasitic one and is not directly connected to the feed system.

Some of the electrical properties of the log-periodic array are very desirable. First, bandwidth of the antenna allows the use of only one section of coaxial cable for operation on any frequency within the design range between 13.7 MHz and 30 MHz. A balun transformer is included at the feed point to give balance to the system. The element dimensions given by the designer appear to be classical in nature (they appear to be identical to



The LPA mounted 120 feet high.



Since each of the six elements is driven, insulators are needed at the center. A three-inch hose clamp is used to hold the hardware in place.

those derived from formula given in several reference texts on the subject). For more information on log-periodic antenna design, the reader is referred to a recent *QST* article on the matter.[1]

As with any three-band antenna system, a few compromises are necessary. But they should be viewed as trade-offs to accomplish some other requirement. First, the antenna described here has a boom length of 30 feet, which is a bit longer than that of a large six-element tribander. This boom, however, is three inches in diameter and provides unusually good stability to the system when it encounters high winds. Since each element is driven (with one exception), there is no reflector to provide the excellent front-to-back ratios found at one end of the band with some triband Yagis. This log-periodic antenna displayed figures of approximately 15 dB front-to-back ratio (as measured with an attenuator pad and a communications receiver on both ground-wave and sky-wave signals). The key feature to be emphasized here is that the front-to-back ratio is the same on each end of each amateur band (or anywhere within the design frequency span) which is not always the case with triband Yagis.

[1] Rhodes, "The Log-Periodic Dipole Array," *QST*, November, 1973.

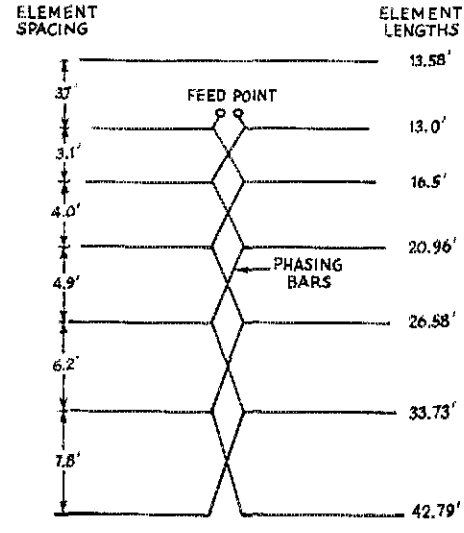


Fig. 1 — Dimensions for the KLM array.

In terms of power gain achievable with a log-periodic array, standard texts indicate this system is capable of between 4.5 and 5 dB over a dipole, which is a bit below that which can be obtained with a monoband three-element Yagi tuned to a specific frequency. Since an antenna test range is not available to the author, no absolute measurements could be made. Some comparisons were made between the log periodic system and a dipole mounted at the same height, however. Normalizing the results (using calculations for feed-line loss), the results indicate the power gain to be approximately 5 dB. Greater accuracy is not possible under the existing test facilities.

The longest element is slightly longer than 42 feet. This is somewhat longer than the reflector of a Yagi adjusted for the same lowest frequency of operation. The shortest element is the second one from the front and is approximately 13 feet in length. The first element is designed for parasitic operation at 10 meters and has been included to improve performance on that band as well as cut off the upper end of the frequency range which otherwise would be 33 or 34 MHz.

Installation of a large array such as this can be difficult at best. For those amateurs fortunate enough to own a crank-up or a tilt-over tower, the difficulties are reduced. The model described here was mounted on a guyed tower by the author using a rope (of good quality!) attached between the top of the tower and a tree which is located a few feet beyond the guy-anchor point. The antenna was pulled up this rope and bolted in position.

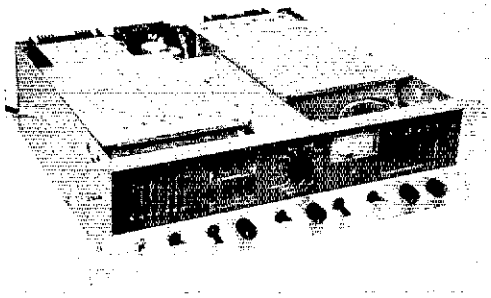
During a test period of four months, no mechanical problems were noted. The elements do not vibrate in gentle wind (sometimes characteristic of long-element Yagis). A CDE Ham-M rotor was used and seemed to hold (and turn) the log periodic without strain.

For the hf-band amateur who likes to operate *both* the cw and ssb ends of 20, 15 and 10 meters, has only one large support in the backyard, and likes the economy of a single feed line without the need for a tower-mounted coaxial switch, the log periodic certainly should be considered. – *W1FBY*

The KLM Log Periodic

Frequency range: 13 to 30 MHz.*
Assembled weight: 70 pounds.*
Boom dimensions: 30-feet long and three inches OD.*
Longest element: 42-1/2 feet.*
Turning radius: 26 feet.*
Wind-load area: 8.25 square feet.
Mast size (recommended): 2 inches.*
Price Class: $290.
Manufacturer: KLM Electronics, San Martin, CA 95046.

* Measured in the ARRL lab.



The ITT Mackay Marine 3020A Receiver

TO FIND WHAT the amateur station of the future will look like, one might best begin by examining trends in present commercially oriented equipment. The Mackay 3020A receiver is a case in point. Except for the detected-audio S meter, it has little in common with predecessors used in marine installations. This modern solid-state general-coverage receiver illustrates many of the factors that are influencing equipment design today.

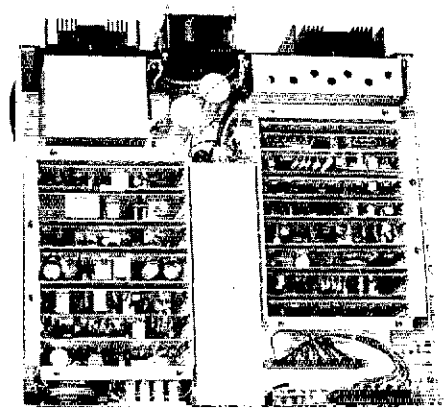
One such factor is the effect that automation is having on function requirements. The possibility for programmable operation is now almost considered a necessity. Few manufacturers would come out with a piece of gear that couldn't be tied in with a computer or other digital device. In a receiver, the most difficult variable to control by digital means is frequency. This is one reason why the 3020A uses a phase-lock digital frequency synthesizer rather than a conventional VFO.

Another view in the modern scene is the trend away from a monolithic single-purpose design and toward a modular approach. Today, most sophisticated electronic equipment is offered as a stripped-down basic unit with various accessories designed for particular applications. This allows the user greater versatility in selecting a new system, or incorporating a unit into an existing one. The only precaution necessary is to ensure that one has all the parts. Features normally considered as standard in older gear may be either missing or reduced in newer designs. For instance, when the 3020A was connected to a random-wire antenna, the entire frequency range was covered with broadcast IMD products. This was somewhat disconcerting in view of the receiver's claimed overload characteristics. After examining the problem, it was determined that the receiver's input-protective circuitry limited peak rf energy at 3 volts. Below this value it worked fine. Since the type or the necessity for traps will vary from installation and application, they are not included in the receiver proper. Space and economic reasons make this a good design practice.

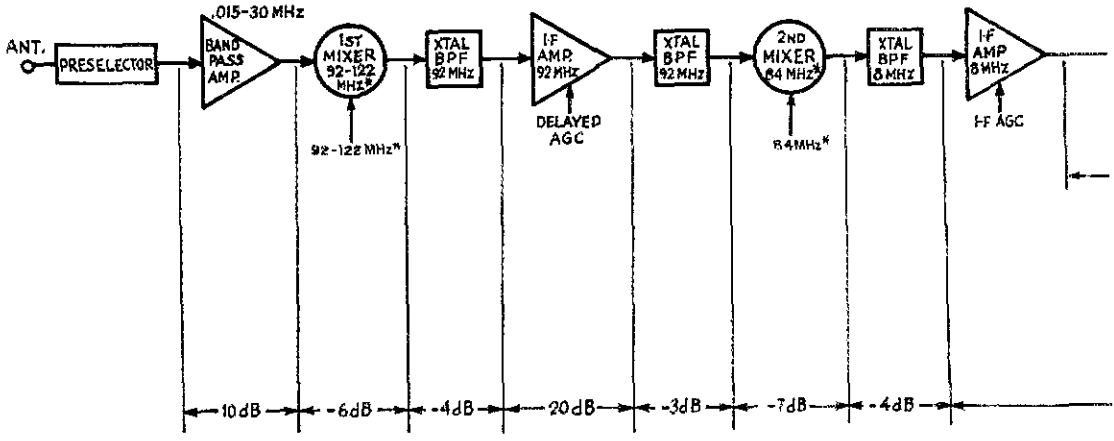
From an operating standpoint, these trends offer some interesting possibilities. For instance, when used in consort with similar gear, such a receiver as the 3020A would allow an operator to copy his traffic on cw, connect up an ssb link for ship-to-shore duplex phone, or have the ball game piped over the ship's PA system – merely by pushing a few buttons. Needless to say, one could build an amateur station which would put present ones into the realm of the spark gap and crystal detector.

Circuit Description

Not only have system design philosophies changed radically in recent years, but so have receiver circuits. A study of the block diagram shown in Fig. 1 may come as a shock to those whose state-of-the-art acquaintance ends with the 455-kHz i-f. The first i-f in the 3020A is at 92 MHz, even though the receiver covers from 15 kHz to 30 MHz! The use of such a high i-f permits



Top view of the receiver. The synthesizer is contained in the compartment on the right and the mixers, detectors, and other rf circuitry are contained in the left compartment. The box in the middle houses the preselector tuned circuits. As can be seen from the photograph, most of the components are mounted on plug-in pc boards.



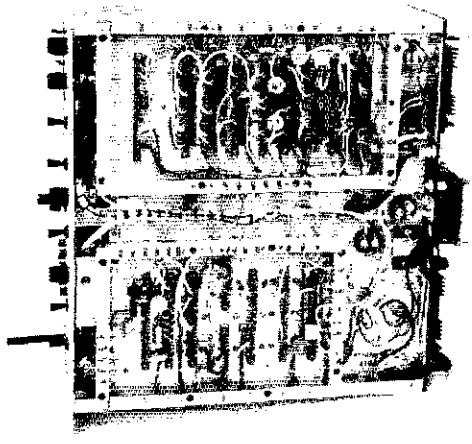
continuous coverage of a large frequency range with good image rejection, IMD and spurious characteristics. Up-converters of this type have been built successfully with an i-f of 4 GHz and coverage from 10 MHz to 3 GHz. The rest of the receiver is more conventional in design, with a second i-f of 8 MHz followed by various filter and detector arrangements.

The three inputs marked "from synthesizer" belie the complexity of the receiver. The synthesizer in the 3020A consists of two programmable phase-locked loops with an 8-MHz temperature-compensated crystal oscillator standard. An 84-MHz conversion oscillator is also used, but since any changes in its frequency appear in both the first and second mixers on a one-for-one basis, no change in actual receiver frequency results.

At this juncture, the inveterate experimenters who may have lamented the price tag on the receiver can take consolation that even minor adjustments are *verboten*. The manual issues a stern warning to twiddlers, lest they succumb to the temptation to touch up the receiver. Since the 3020A is highly modularized with plug-in pc cards, most field repairs can be executed by isolating the faulty card and replacing it. Repairs to individual cards are not recommended except by personnel trained in servicing the 3020A.

A simplified block diagram of the 3020A synthesizer is shown in Fig. 2. Basically, it is the divisor ratios in the variable divider chains that determine the LO frequency. The variable divider in the minor loop is controlled by the switch positions for 0.1, 1, and 10 kHz, and the one in the major loop by the positions for 0.1, 1, and 10 MHz. The phase detector in each loop senses the difference between the outputs from the reference oscillator and the variable divider. If the frequencies are different, an error signal is sent to the VCO which corrects its frequency until the difference is zero.

Since the frequency range of the major loop is greater than the one for the minor loop, additional circuitry not shown is necessary. Actually, there are five VCOs for various portions of the frequency range, and an acquisition circuit which assures that false locks will not occur when the divider output and reference oscillator are harmonically related. The output of the synthesizer is from 92 to 121.999 MHz (exclusive of the small variations caused by the 84-MHz oscillator mentioned earlier).



Bottom view of the 3020A

Operation of the Receiver

Using a digitally controlled receiver for the first time is a novel experience. One merely actuates a lever switch and the stations appear at the designated frequencies on the read out. Another version of the receiver, the 3021A, has a rotatable knob with an LED readout. Both the 3020A and the 3021A use a frequency synthesizer, however.

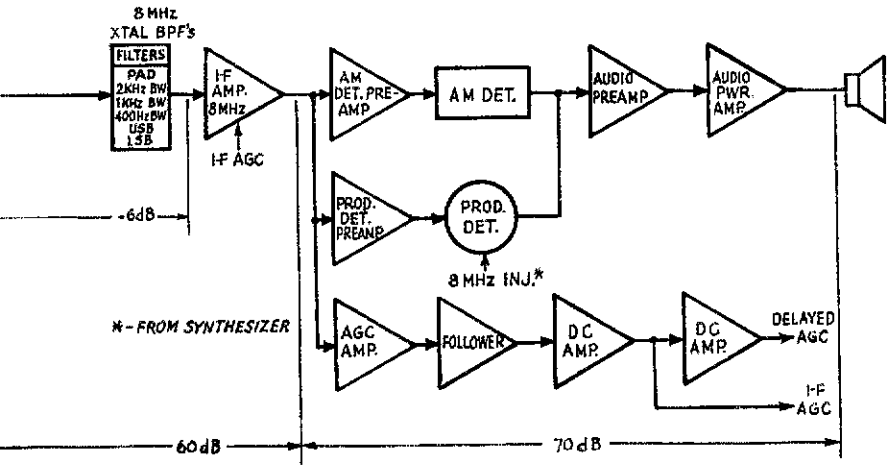


Fig. 1 — Block diagram of the 3020A receiver.

Except for setting the selector switches and perhaps the fine-tuning control, no other adjustments for band-switching are normally necessary above 4 MHz. At lower frequencies, where shipboard antennas tend to be electrically short, the preselecter can be used as a matching network to obtain optimum sensitivity. In other respects, the 3020A is similar to its more conventional counterparts. There is an rf and af gain control and mode and filter selector switches. The latter are of the push-button type. The S meter can be either used to sense the carrier or audio level. Output is selectable for phones or the internal speaker.

It's interesting to compare the present marine and amateur services. For instance, they are perhaps the only remaining two that make extensive use of cw. The writer occasionally likes to listen to the marine-weather forecasts below the broadcast band and the traffic lists before the report would make an amateur NCS turn green with envy. However, no matter where the operation is, the Mackay 3020A would be an impressive addition to any shack. – *W1YNC*

ITT Mackay Marine 3020A Receiver

Sensitivity (for 10 dB signal-to-noise plus noise): 0.3 μV at the center of each hf amateur band.*

Frequency range: 15 kHz to 29.9999 MHz.*

Modes of operation: usb, lsb, a-m, cw, RTTY and FAX.

Frequency selection: Digital in 100-Hz steps, fine tune between 100-Hz steps.*

Audio Output: 3.2 ohms and 600 ohms.

Power Requirements: 115/230 V ac, 80 watts.

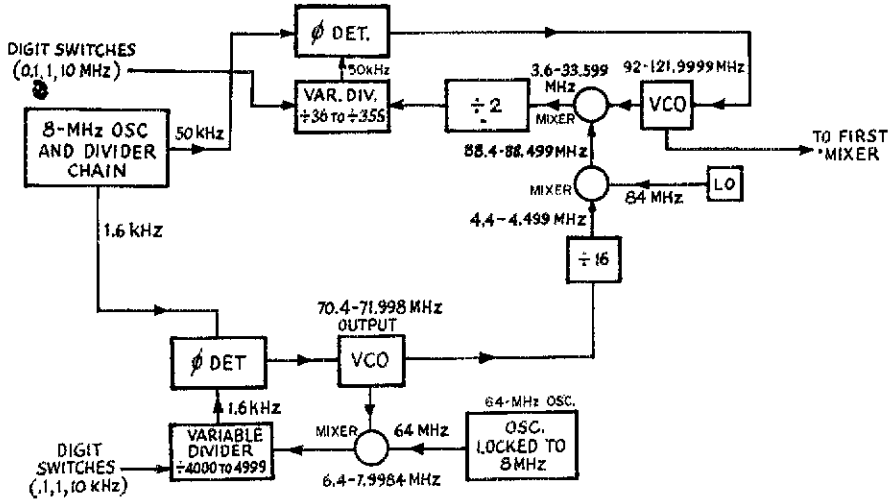
Dimensions (HWD) and Weight: 5-1/2 × 19 × 19-1/8 inches, 35 pounds.*

Price Class: $3700.

Manufacturer: ITT Mackay Marine, Raleigh, NC 28611.

* Test measurements made in the ARRL lab.

Fig. 2 — Partial block diagram of the synthesizer.



Named New England "Hams of the Year," Hans and Roger Strauch, WA1NRV and WA1KZE, received the awards at the 1973 division convention in Hyannis, Mass., where their appearance prompted a standing ovation from the banquet assembly. While the story of their outstanding emergency communications performance during the Managua quake is summarized in April, 1973, *QST*, these acceptance speeches add considerable additional flavor.

"In the Public Interest..."

Teenagers Honored for Managua Emergency Communications

Hans Strauch, WA1NRV:

I simply would like to take this opportunity to thank some fine people and organizations. Firstly, I would like to express my sincere thanks to David Soybel, WA1NIl, who is out in the audience at this very moment. David was the first one who offered his services to Roger and me during the emergency operation. He provided us with his rig and personal assistance – both of which Roger and I could never have done without. I also would like to thank WA1JHQ, Chip, and WA1LKX, Stu; both aided Roger and me generously during the very busy periods of the operation. Next, I am very pleased to thank the American Radio Relay League for making amateur radio what it is today: the finest hobby in the world and the link between all nations. Few people realize how hard the guys in the League work – fighting for amateur radio frequencies and amateur radio itself amost daily. It is they who have spread this wonderful hobby throughout the world, providing a constant and vital addition to a world peace. I think with the continual fighting of the ARRL in behalf of all amateurs and continual operations such as Roger's and mine, the FCC and the better part of American people will finally realize the importance of amateur radio – a service for the people. With that, I thank the FEMARA for organizing this wonderful convention and presenting Roger and me with one of the most respected awards in amateur radio. Thank you very much.

Roger A. Strauch, WA1KZE:

Thank you all so much for this award and the opportunity to speak. We thought it might be nice if we could share some of our experiences with you.

The most valuable type of experience is a learning experience. Our operation during the aftermath of the December 22 Managua, Nicaragua, earthquake provided us with many lessons. The first was the power of the press. After my call to Boston radio station WEEI offering the services of our radio for health and welfare traffic, I expected maybe a dozen local families would hear the offer and call. Instead, my brother and I received fifty phone calls in a matter of 90 minutes. Within a few hours radio stations from all over New England were calling for the latest information on the disaster and on our operation. They publicized our availability as an emergency communications system and in addition broadcasted our phone number. The situation soon snowballed. Within 24 hours KCBS, the San Francisco radio station, was broadcasting our phone number all over California. Likewise in Chicago, Los Angeles, Washington, D.C., Canada, and New York. UPI and AP articles and photos appeared all over the United States and Canada – accompanied by our telephone number. Local TV stations 5, 6, and 7 carried film reports about us for two days – again including our telephone number. The result was close to 3,000 phone calls from 38 states and 3 Canadian Provinces. Upon hearing about the operation the telephone company started routing overseas telephone calls for Nicaragua through us. Calls from Europe soon came in. The callers ranged from the simple Maine farmer to the President General of Nicaragua, Somoza, and his ambassador to the United Nations. Many of the callers did not understand English so bilingual operators were assigned to our line. They also helped channel the 400 outgoing long distance calls we had to make. The telephone company has since informed us that our line had been called over 8,000 times. We received just over a third. This was the power of the press.

The next lesson was in organization. Realizing a type of monster had been created, we developed

WA1NBV and WA1KZE receive their "Ham of the Year" awards from Father Dan Linehan, W1HWK.

the system of paperwork that would pull us through the week. Books of radiograms, lists of skeds, emergency and priority messages, and press releases were just a few things. For the medical flight Dave Soybel, WA1NII, and I arranged the lists of volunteer medical personnel, lists of needed medical supplies and lists of badly needed clothing. We also had to arrange with the airlines for the use of a Boeing 707 and to make sure it would carry its own return gasoline. Dr. Garcia, one of the chief organizing internists arranged to staff the plane with bilingual doctors and nurses as well as surgeons and equipment operators. All this while Hans was desperately trying to get permission for the plane to land following an announcement by the Nicaraguan government that no further air traffic would be permitted inside the country. Once the special permission was secured we had to find motor vehicles to transport the doctors and one-half of the supplies to nearby Madagalda to set up their makeshift hospital. It was a lesson in organization.

There was a third lesson. It was neither challenging nor exciting; it was neither rewarding nor pleasant. Unknowingly, we had accepted the responsibility of being the last possible link to the loved ones of hundreds of people. At the other end of each phone call there were deep expressions of human emotion. I'll never forget the heartbreak, confusion, and desperation. For too many people we were the last hope. Within a few days we were able to return good news to many. To others — well, they were left in painful suspense. But there were still others: at the end of the week the government death lists were released. How do you tell a middle-aged mother that two of her three children and closest sister are dead, their bodies probably burned with the thousands of others in order to prevent the rapid spread of disease? How do you tell a 30-year-old policeman his Christmas wedding was ruined by the death of his fiancee? We still don't know. The good news was a relief and the bad news unbearable.

That is what we learned. But what about the people? What about those who read of the hundreds of hams on the air as emergency communicators? What about those who heard and viewed hams on the electronic media? They learned something, too. All too often we amateurs are forced into the position of defending our hobby. All too often the historical significance of amateur radio is overlooked. I am proud of my hobby as a hobby and as a public service. Maybe the enormous amount of publicity we received will leave some lasting confidence in the validity of ham radio. I'd like to think so. It was quite an experience and I hope it *never* happens again.

At this point I'd like to thank Dave Soybel, WA1NII, for his efficient help. His medical knowledge was one reason the medical flight succeeded. Chip Cohen, WA1JHQ, came over Christmas Eve to allow Hans and me to spend a brief amount of time with our immediate family and visiting relatives. Finally, deep thanks to my fine brother and loving parents, for hard work and amazing tolerance.

One last thought: our jobs as licensed public servants only end when natural disasters become extinct. That means you and I have our work cut out for us for a long, long time. Thank you very, very much. QST

ARRL NATIONAL CONVENTION

What we believe will be the greatest ARRL national convention in the history of amateur radio will take place seven months from now at the Waldorf-Astoria, New York City. The event is sponsored by the Hudson Amateur Radio Council, representing more than 50 clubs in the metropolitan New York area.

With its theme, "International Friendship Through Amateur Radio," the convention will feature three full days – July 19, 20 and 21 – of events devoted to virtually all interests in amateur activities.

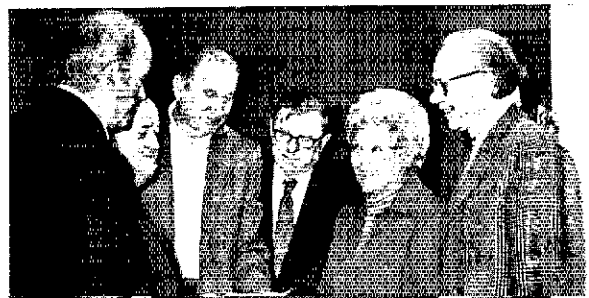
A committee of 17 W2-land amateurs, headed by Stan Zak, K2SJO, Hudson Division Director; Jules Rivman, W2TD, HARC president; Seymour Schlitt, K2BM, convention committee chairman; and George A. Diehl, W2IHA, Hudson Division Vice-Director and convention co-chairman, are scheduling a wide array of demonstrations, exhibitions and forums devoted to recent innovations in fm, SSTV, ATV, RTTY, Fax, along with the latest techniques on space, antenna design, transistors, integrated circuits. Specialty programs will feature DX, MARS, ARPSC and traffic.

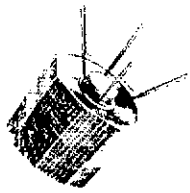
A "star-studded" ARRL forum will be headlined by the ARRL president, vice-presidents and – since the Board is meeting the day before – by 16 division directors, along with ARRL Hq. staff personnel. Special programs are planned for the XYL and YL including tours, sightseeing, and visiting TV shows in this greatest of all cities. Manufacturers' exhibits will be open Friday afternoon, all day Saturday and all day Sunday. The Saturday night banquet will be highlighted by a prominent speaker. And, promptly at midnight, initiation into the Royal Order of the Wouff Hong takes place.

A registration fee of $3.50 in advance, $4 at the door, entitles conventioneeers to program activities and "surprises." Banquet is $17.50 in advance, and will be $20 at the door (if available). An advance registration special combination is offered – $20 for both registration and banquet. And, additionally, a free gift will be given every registrant.

For registration or information, query ARRL Convention, 303 Tenafly Road, Englewood, New Jersey 07631. – *W2FGI*

A National Convention is not complete without committees, and a committee is not complete without an occasional huddle. Here's part of the Hudson Amateur Radio Council 1974 National Convention group going over an important point or two. Left-to-right: Seymour Schlitt, K2BM, co-chairman, Convention Committee; Jules Rivman, W2TD, President, Hudson Amateur Radio Council; Stan Zak, K2SJO, ARRL Director, Hudson Division; George Diehl, W2IHA, ARRL Vice-Director, Hudson Division and co-chairman, Convention Committee; Ruth Schlitt, WA2RIX, Chairman YLRL Committee; and Warren Cox, W2FGI, Convention Public Relations Chairman.





$atellite Program Funding

A Priority Target for New ARRL Foundation

THE LAUNCH of Oscar 6 in October, 1972 marked the beginning of a new era for amateur radio in space, a second stage in the development of amateur satellite communications. With Oscar 6 the amateur satellite program moved from a stunning but limited demonstration of scientific competence, imagination and ingenuity to a broader use capability by amateurs with more ordinary equipment and operating skills. Perhaps even more important, Oscar 6 has opened the door to exciting, practical applications beyond the world of amateur radio – a notable example of which is its use in the classroom with space communication as a direct supplement to course work in physics, mathematics, electronics, space science and even social studies at various grade levels. Already a joint project with NASA has elicited an enthusiastic response from teachers and school systems in the U.S. and abroad. Pilot projects involving headquarters personnel and local amateurs in a number of communities have very successfully demonstrated the practicality of bringing Oscar right into the classroom via amateur radio.

Under League sponsorship a curriculum supplement has been prepared to show teachers how Oscar can be used. It is being distributed through ARRL channels, NASA educational mailings and the National Science Teachers Association.

The special $38,000 advance authorized by the Board last summer was primarily to support an accelerated development program for Oscar 7 in order to assure continuity for the educational program. All of this is indicative of the importance the League's Board attaches to amateur satellites as a means to advance the cause of amateur radio and its value to the world.

It has become increasingly obvious to those involved in the satellite program that the broader uses of future Oscars are going to require more time and more effort and they are going to be more complicated. Therefore, more funds will be needed to support the program. It is felt, too, that funding should primarily come directly from interested amateurs and others who believe in the program rather than indirectly through the League. That is why the Board, by a separate motion, directed that a first order of business for the new ARRL Foundation is to be "the securing and disbursing of funds to encourage and assure continuation of amateur radio space activities." At one point a proposal to establish a separate "space foundation" was even considered, but it was decided that this would be inconsistent with and unnecessary in the light of the original conception of an ARRL Foundation which goes back to 1969. The idea was – and is – that a Foundation provides the specific means and flexibility to raise funds for the general advancement of amateur radio, for particular projects or causes, and for the designation by a donor of the purpose to which he wishes his contribution to be put. Donations can be made in various forms – outright gifts of cash, stocks, bonds or other securities, bequests in a will, proceeds of insurance policies by declaring the Foundation a beneficiary – to cite a few of the approaches. The Foundation keeps all such bequests completely separate from the League's regular operations and funds. In addition the Foundation provides an opportunity for persons ineligible to be League officers or directors to be involved in its plans and programs directly.

The new ARRL Foundation was officially authorized by unanimous vote of the League Board of Directors last July ("It Seems to Us . . .," *QST*, September, 1973). It came into being with the filing of a Certificate of Incorporation and By-Laws with the State of Connecticut, and seeks tax exempt charitable status by the Federal Internal Revenue Service. The latter important provision will allow donors to the Foundation to deduct such contributions on their income tax returns. The Board of Directors for the Foundation will be elected at the annual January League Board meeting. Five of the nine Foundation directors will, under the Certificate of Incorporation, be ARRL directors; the other four will be from outside the "official family" – in all probability prominent amateurs. However, they do not have to be League members or even licensed amateurs. The Foundation Board will then develop the necessary plans and programs to raise and disburse funds in support of the established objectives – with particular immediate attention to the amateur satellite program.

Thus the long-awaited ARRL Foundation is at last a reality. It fulfills an oft-expressed wish by many amateurs for a direct but controlled means of making contributions in any magnitude and in various forms to promote amateur radio generally, to further the overall work of the League or for any specific purpose the donor may designate, including support of the amateur satellite program. More details on the Foundation and its operations will be published in *QST* as they are formulated. In the meantime, anyone interested in additional information can obtain it by contacting Headquarters or his own division director.

President Harry J. Dannals, W2TUK, said, "The ARRL Foundation was not created just for wealthy amateurs. It is a means by which any of us can demonstrate in a lasting, tangible way our belief in the future of amateur radio and its role in the changing world of today and tomorrow. Each of us can register that belief according to his own means, his own interests and his own particular dedication." – *Don Waters*

OSCAR NEWS

Caribbean DXpedition – Oscar 6 Style

W1FTX has kindly provided the following summary of his Oscar 6 operations in the Caribbean last summer. Dick provided two new countries for several Oscar actives, and his contacts from Curacao represent a good percentage of the satellite QSOs from South America to date.

W1BIH/PJ9JT and W1FTX arrived in Curacao with their wives on July 27 carrying an Ameco TX-62 transmitter and 7-el Yagi for two meters. The first contact was with 8P6DR on orbit 3573 that evening, followed by W1NU. During the next six days, nine orbits yielded 56 QSOs in three North American countries. No European signals were heard, probably due to a fairly high bluff to the north and northeast of the station which shielded the antennas from the satellite. No other South Americans were heard.

The two-meter Yagi was aimed manually according to az-el data supplied by W3TMZ. W1BIH and W1FTX alternated operating and tracking from one orbit to the next. The receiving setup was a FTDX401 transceiver with preamp and a folded dipole antenna.

On August 3, W1FTX and his wife flew to St. Maarten, about 500 miles to the northeast. Vince, PJ7VL provided the receiver and by nightfall the first satellite QSOs had been made under Vince's call. Here the operating environment was not quite as favorable as from PJ9JT because of a very large and high mountain rising abruptly to the north within a short distance of the operating position. The antennas had to be located some distance away, so it was not possible for the tracker (Dick's XYL Mary-Alice) to hear the audio output of the receiver. Despite these handicaps, 26 contacts were made on six orbits from August 4 to 7. Again, no European or South American stations were heard.

W1FTX and XYL arrived on Antigua late on August 7 with no prior arrangements for receiving equipment. Landline contact was made with Mickey, VP2AR, who is Chief Engineer at the broadcast station in St. John's. He invited the travellers to his home (at 7 A.M.!) and fired up his Swan 350 for use as a receiver. Unfortunately, though statesiders later reported good return signals from VP2AR, no downlink signals were heard on the island. No other orbits were available for the Antigua stay, so the receiving problem was never solved and no contacts were made.

Future Caribbean vhf DXpeditioners might try to learn something of the topography of their intended locations in order to avoid blockage by the steep mountains that are characteristic of most of the islands. Also, make license applications at least four months in advance. It takes a long while for new applications to be processed! Finally, W1FTX advises that you leave all of your clothes at home so you can use your full airline weight allowance for ham gear!

The operating position on Curacao, showing W1BIH/PJ9JT and W1FTX anxiously awaiting the next Oscar pass.

In November we pictured DU6EG/mobile; to prove all Oscar stations in the Philippines aren't on wheels, here is DU1EJ at his home station. Edgar's antenna farm includes a ten-element Yagi, cross polarized, on ten meters – built especially for Oscar work!

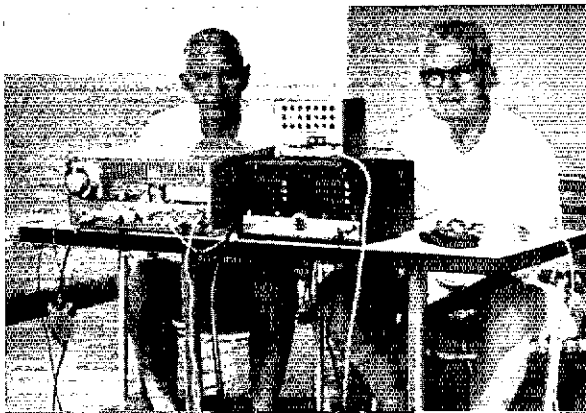
Recent Satellite DX Achievement Award Winners

JA3CF WA5STI VU2UV VK7PF DC6EQ K4KQ WB2DNN W5PZ W1WM JA8CMM W6OYJ I5CTE TF3SF.

Certificates have been issued to 167 stations in 29 countries and 5 continents.

Oscar 6 Operating Schedule

In the remaining months of the lifetime of Oscar 6, changes in the operating schedule may take place as a means of extending the life of the satellite. Due to the lead times necessary in magazine production, it is not possible to announce changes in the operating schedule in this column. The best source of up-to-date information on Oscar continues to be W1AW, which transmits bulletins on a regular basis. See "Operating News" for times. – *K1ZND*



FM REPEATER NEWS

WORD FROM FCC at this writing is that they hope to have more people working on repeater licensing. To this end, they state that it would expedite matters considerably if all applicants filed on the new repeater licensing forms (available from ARRL). In fact, if you have an application presently on file and have not used the new forms, it would be to your advantage to redo your application on the new forms. You don't have to submit a new map or 610 forms as that material is (or should be) with your present application. It should also be pointed out that *until* a new license is issued, it is still possible to amend your present application. Send the new forms to FCC, Amateur and Citizens Division, Washington, DC, 20554. One word of caution: if the application has money (checks) attached, it must go to Gettysburg.

Band Plans

We are still awaiting action from the ARRL Repeater Advisory Committee for a recommended plan for 450 MHz. It can be stated that there is unanimous agreement throughout the country on several points. All channel spacing is 50 kHz. Input/output separation is 5 MHz. The National Simplex Frequency is 446.000 MHz. The only area of serious disagreement is whether or not to have low input, high output. Some areas of the country operate low in, high out, and other areas use the reverse procedure. Most areas favor the low input simply because in converting commercial gear, it is easier to move the transmitter 5 to 6 MHz from its specified low end tuning into an amateur band, than it is to move the receiver.

In another action by the committee, National Simplex Frequencies have been set. They are: 146.520 for 2 meters; 223.500 for 220 MHz; and 446.000 MHz for the 450 MHz band. There will no doubt be a good deal of complaints from a few areas where 146.940 MHz is used as a simplex frequency. However, let's face facts, there are more 34/94 repeaters than any other frequency pairs. Our next step is to convince manufacturers to provide 52 simplex crystals, rather than 94.

We have purposely left mention of a 6-meter plan last. The repeater committee is working on a plan. However, there are strong feelings among the 6-meter people that the FCC should be petitioned to move the repeater allocations in this band. The situation is a real mess in areas where television Channel 2 is in use. Hopefully, we will have more news to report in the near future.

We have included in this issue the 2-meter and 220-MHz plans. These are the frequencies that have become standard in the U.S.A. and will soon be standard in Canada. In congested repeater areas, 15-kHz splits are being allocated on 2 meters by frequency coordinators. If you are planning a repeater, be sure to contact your area coordinator. You can obtain the address of your nearest coordinator from the ARRL Repeater Directory, available from ARRL HQ. If one is not listed for your area, contact us and we'll try to help.

Auto-patch

The following was taken from *Auto-Call*, a Washington, D.C. area club bulletin. It was written by Gary Hendrickson, W3DTN, who happens to be a member of the ARRL Repeater Advisory Committee. Gary's advice is certainly pertinent and should be read by all repeater users.

"Recent observations of 'Auto-patch' use reveals that some stations are using these facilities from their home stations, apparently solely for the purpose of avoiding the regular long-distance telephone tolls. This is strictly an illegal practice as it is considered defrauding the telephone company of its rightful revenues. Such practice could jeopardize both the amateur operator and the repeater station and should be avoided by all means. It appears that the telephone companies, the mobile telephone services, many public services and industrial two-way radio users are closely examining amateur auto-patch operations, some jealously wishing that they had similar facilities, but others scrupulously eyeing such amateur operations to see if they cannot be halted altogether. The mobile telephone services, especially, are concerned that they are being gypped out of their rightfully due revenues. So it behooves us all to watch our P's and Q's when using the several very fine auto-patches in the area."

Feedback – FM Style

Looks like we goofed (Nov. *QST*) when we said that The Chicago FM Club, WR9ABY, had the first licensed repeater with voting receivers. It turns out that WR9ABK has been licensed since June 18th and they have a voting system using five remote receivers. WR9ABK is the club call for the South-Eastern Wisconsin FM Amateur Repeater Society and takes in the Milwaukee area. – W1ICP/WR1ABH

One of the features at the New England Division convention at Hyannis, Mass. was the portable repeater setup, WR1ABH/1. Bruce Marcus, WA1NXG, on the left, is pointing out some of the features of the installation to Julius Galin, W1EA. This working demonstration proved to be a real attention-getter at the convention, particularly to hams who were not familiar with vhf fm and repeater operation. Monitoring and control on this station were particularly strict on this operation because the FCC booth was directly opposite the repeater!

BAND PLAN

146 MHz Band

GENERAL

146.00 – 146.39	Repeater Inputs
146.40 – 146.59	Simplex
146.60 – 146.99	Repeater Outputs
147.00 – 147.39	Repeater Outputs
147.40 – 147.59	Simplex
147.60 – 147.99	Repeater Inputs

All channel spacing is 30 kHz.

REPEATER CHANNELS (26 Channels)

Input	*Output*	*Input*	*Output*
146.01	146.61	147.60	147.00
146.04	146.64	147.63	147.03
146.07	146.67	147.66	147.06
146.10	146.70	147.69	147.09
146.13	146.73	147.72	147.12
146.16	146.76	147.75	147.15
146.19	146.79	147.78	147.18
146.22	146.82	147.81	147.21
146.25	146.85	147.84	147.24
146.28	146.88	147.87	147.27
146.31	146.91	147.90	147.30
146.34	146.94	147.96	146.36
146.37	146.97	147.99	147.39

SIMPLEX CHANNELS (13 Channels)

146.40	147.42
146.43	147.45
146.46	147.48
146.49	147.51
146.52 NSF*	147.54
146.55	147.57
146.58	

* National Simplex Frequency

220 MHz Band

REPEATER CHANNELS (27 Channels)

Input	*Output*
222.34	223.94
222.38	223.98
222.42	224.02
222.46	224.06
222.50	224.10
222.54	224.14
222.58	224.18
222.62	224.22
222.66	224.26
222.70	224.30
222.74	224.34
222.78	224.38
222.82	224.42
222.86	224.46
222.90	224.50
222.94	224.54
222.98	224.58
223.02	224.62
223.06	224.66
223.10	224.70
223.14	224.74
223.18	224.78
223.22	224.82
223.26	224.86
223.30	224.90
223.34	224.94
223.38	224.98

SIMPLEX CHANNELS (13 Channels)

223.42
223.46
223.50 NSF*
223.54
223.58
223.62
223.66
223.70
223.74
223.78
223.82
223.86
223.90

GENERAL

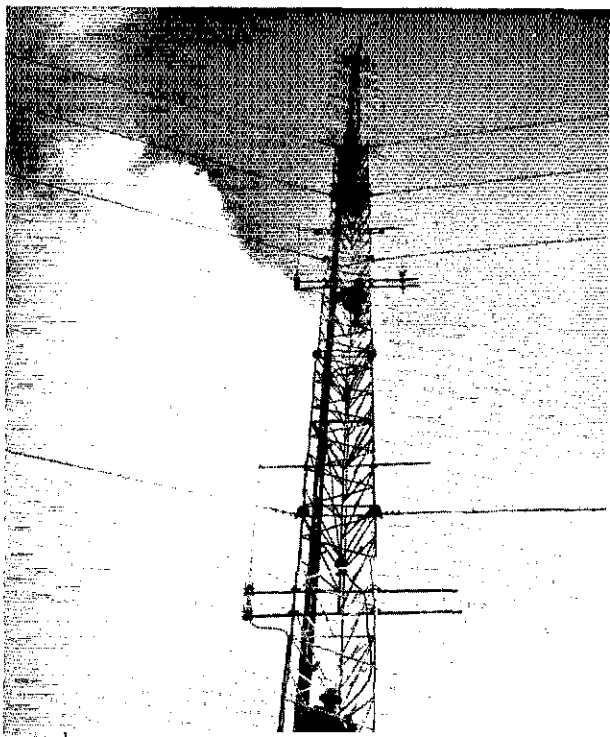
220.30 – 222.00	Control Links
222.30 – 223.40	Repeater Inputs
223.40 – 223.90	Simplex
223.90 – 225.00	Repeater Outputs

All channels spacing is 40 kHz.

* National Simplex Frequency

Strays

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:30 on a "drop-in" basis, and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U.S. 5, the Wilbur Cross Highway. (For W1AW visiting hours, see the schedule in "Operating News.")



That's Jack Robbins, WA7FLG, at the top and Larry Johnson, K7TIM, at the bottom installing the antennas for the Butte, Montana repeater. The boys didn't tell us how high the tower is but they did say that it was installed 7000 feet up on the top the Continental Divide and only can be reached a few months out of the year. Bet they have good coverage! *(Photo by K7EEG)*

"Current" Theories of Electricity†

BY MARGARET KOERNER,* WBØBEM

THE PHENOMENON which we call electricity has been a source of interest and wonder to man for centuries. Thousands of experiments have been made in efforts to understand it; thousands of pages have been written in efforts to explain it; yet even today most of us know electricity by what it does, rather than what it is. We know it, as we "know" the wind, by its effects, which can be seen, felt, and heard.

Through the years, as they have worked with electricity, scientists have developed electrical *theories* (beliefs based on observation and reason) and *physical laws*, which are theories now considered proven. These theories and physical laws, plus an overwhelming amount of related information, are treated in detail in textbooks and other technical publications. Obviously, a primer can be only a mini-supplement to such publications, and in the face of all the theories, technical information, and applications of electricity in amateur radio alone, this particular primer appears to its author as a grain of sand at the foot of Pikes Peak.

No understanding of radio is possible, however, without at least some understanding of electricity. An elementary knowledge is necessary to understand even the answers, let alone the questions, in the ARRL *License Manual* or other license guides, and knowing, rather than memorizing, can rescue you when you take the FCC exams, especially if a choice must be made from several similar answers, some of them purposely tricky.

This primer will differ from other available helps because it will not assume that you know a lot of things which you don't. Also, instead of using explanations which experts can use to "tell it like it is," explanations here will tell it only as it appears to someone recently emerged (but with license in hand) from a painful struggle to learn the same material herself. During the course of these explanations it will be necessary, from time to time, to diverge suddenly. In such cases, detour signs will be posted conspicuously at the point of turnoff.

The Electron Theory

According to present-day scientific theory, every substance in the universe consists of basic building blocks called *atoms*, so small that a single drop of water is estimated to contain more than 100 billion billion of them. Atoms, in turn, contain even smaller particles, and it is on the properties of one kind of these smaller particles, the *electrons*, that the operation of all our electronic equipment, as well as most of our electrical appliances and gadgets, depends.

To explain the extremely complex electron theory in primer form, atoms can be (or at least are going to be) compared to individual apartments in apartment complexes called Substances. Each of these atoms or apartments, regardless of the substance in which they are found, has two main "rooms" – a center one called a *nucleus* and another one, unnamed, which surrounds it on all sides.

Two types of permanent residents inhabit the nucleus. The ones important to us as radio amateurs are called *protons*. These are the pillars of the community, who never leave their room except in cases of severe disaster, such as a nuclear collision or an atomic explosion. They do, however, exert a definite amount of influence beyond the nucleus, and this influence or force is due to what is called a *charge*. The charge associated with protons is referred to as being *positive*, and is indicated by a plus sign (+). These facts about protons are easy to remember because protons, permanent, positive, and plus all begin with the letter *p*.

The outer room is inhabited by important tenants called *electrons*. Unlike the protons, these are restless characters, always on the move within the atom. Whirling endlessly and at fantastic rates of speed around the nucleus, they exert an influence or force referred to as a *negative charge*. It is indicated by a minus sign (–).

The third tenants in the atom, the *neutrons*, are not important to us as radio amateurs, though they are important to atomic physicists. These permanent residents of the nucleus are freeloaders who don't even bother to carry a charge account. About the only thing they actually *do* is add physical weight to the atom.

Several interesting characteristics and interrelationships exist as far as the *protons and electrons* are concerned.

1. In a "normal" atom – that is, one that conforms to the original plan of the builder – there are exactly as many protons as there are electrons. However, the number varies according to the particular kind of atom. Copper atoms, for example, have 29 electrons and 29 protons; carbon has 6 of each; aluminum, 13; and gold, 79. Air, ceramics and plastics, as well as a great many other substances used in radio work, contain several different kinds of atoms, each kind with its own assigned number of protons and electrons.

2. Although the protons are larger and more than 1800 times as heavy (perhaps their sedentary life?) as the electrons, each electron has exactly the same amount of charge as does a proton. This means that since they are equal in number, and their charges are *equal but opposite*, the charges

* 2133 9th Street, Boulder, Colorado 80302.

†Part three of a series.

cancel each other and a normal atom, therefore, has a *neutral* or net zero charge.

3. The electrons, with their negative charge, are strongly attracted to the protons. The protons feel the same about the electrons. Both protons and electrons, however, are not only unattracted but are repelled by others of their own kind, and the electrons, even while they are whirling around the nucleus, normally manage to keep all other electrons at arm's length. Such behavior follows the basic physical law which states: *Like charges repel; unlike charges attract.*

4. Protons never leave the atom unless physically evicted. Some electrons, however, in some kinds of atoms and by means of various pressures and lures, can easily be persuaded to break their lease and move out of one atom and into another, or they may even decide to take to the road. When this happens, it is obvious that some atoms will have more than the normal number of electrons, while others will have fewer than normal.

5. An atom which has too few or too many electrons than is normal for its kind, gets its name changed and is called an *ion*. If it gains electrons, the total negative charge of that atom becomes greater than the total positive charge from the protons, so that ion is said to be a *negative ion*. If it loses electrons, its total negative charge is cut down, and the positive charge from the protons predominates, so that ion is called a *positive ion*. The process by which all this changing takes place is called *ionization*.

DETOUR ▸ While we are discussing ionization, we will mention an application which is of vital importance in radio wave *propagation*. (The word propagation, as used here, does not mean the production of offspring, but means the travel of a radio wave through a medium such as air or water.)

Starting about 50 miles above the earth, and at times extending as far as 300 miles above the earth, there is a layer of atmosphere called the *ionosphere*. It consists of a mixture of different kinds of atoms which have been changed into ions by the ultra-violet rays of the sun. The thickness of this layer and its height above the earth depend on the time of day or night, the season of the year, and the stage the 11-year sunspot cycle happens to be in. When radio waves hit the ionosphere, they may go right on through it and be lost in space; they may be absorbed and lost; or they may, as they hit certain layers of it, be bent back to earth at varying distances from their place or origin. Once down, they may behave like skipping stones on water, bouncing up and back down again farther away, sometimes even more than once. Such behavior of radio waves is called *skip*, and the *distance skipped* depends on the frequency of the radio wave, the angle at which it is sent out into space, and all the factors mentioned above as affecting the extent of the ionosphere. END DETOUR

Conductors – Good, Non- and Semi-

Persuading electrons to move out of their atoms may or may not be an easy task. In some materials, especially metals, they are ready and willing to move at the drop of a hat, or – to be technical – at the drop of a type of pressure called a *volt*. Since moving is always a big production, with everyone in the vicinity moving at the same time, a *current* of moving electrons results, and materials in which this current can be produced easily are called *conductors*. Gold, silver, copper and aluminum are good conductors of electrical current and are commonly used in radio work.

In other materials, such as mica, glass, rubber or ceramics, the electrons insist on staying put almost as stubbornly as do the protons, and no amount of legal persuasion can get them to move. Such materials are called *nonconductors, insulators*, or *dielectrics* (pronounced dy-a-lec-trics, not dy-lectrics). They, too, play an important part in radio operation, since they prevent the currents of electrons from getting out of line and creating a lot of trouble for all concerned.

A third group of substances used in amateur radio work are called *semiconductors*. These are substances such as selenium, silicon and germanium which have a conductance in between that of metals and insulators. They are not as good conductors of electricity as copper, for example, but neither are they as good insulators as glass. Scientists have learned how to dope up the crystals of these semiconductor substances with atoms from other substances in order to make them perform desired functions. Transistors and other so-called "solid state" components or parts, produced from these doped semiconductors, are used in the construction of radios, computers and other equipment.

I, E, and R

I = Current

The word "current" comes to us from a Latin word meaning "to run" and always implies movement. When someone speaks of the current in a river, we visualize a flow of water; a current of air can be a light breeze or a hurricane; a current of electricity may consist of a flow of electrons in a conductor, a flow of electrons in a vacuum, or a flow of ions in a gas. Even when we speak of a current theory in electronics, or the current issue of *QST*, we mean one that is "going around" at the present time.

Current is indicated in equations, diagrams, and often on the equipment itself by the letter "I." Its strength is measured in *amperes*, and the equipment which does the measuring is called an *ammeter*. (Apparently "ampmeter" was too hard to say.) An ampere, however, is often too clumsy a measurement to use in amateur radio work, just as a gallon container would be clumsy to use in measuring a cup of coffee, so current is usually measured in *milliamperes*, each one of which is one-thousandth of an ampere, and *microamperes*, each of which is one-millionth of an ampere. Amperes are abbreviated *amp* or *A*; milliamperes, *mA*; microamperes μA. The symbol "μ" is the small letter mu in the Greek alphabet.

E = Voltage

The force which gets electrons moving and creates a current is referred to by four different names: voltage, electromotive force, difference of potential and electrical potential. *Voltage* is its most common name and is the one that people normally use when speaking of car batteries, power lines, lightning, etc. *Electromotive force* (*emf*) means, literally, electron-moving force. The names *difference of potential* and *electrical potential* are based on the fact that electrons have the possibility or potential for accomplishing work. When there is a *difference* of potential between two points, that difference is measured in terms of voltage. All the names mean the same thing, so you can substitute the word voltage any time difference of potential, electromotive force, or electrical potential are mentioned in the license exams.

Voltage is indicated by the letter *E* or the letter *V*, and is measured in volts by an instrument called a *voltmeter*.

R = Resistance

When we compared the current of electrons to occupants moving *en masse* out of their atoms or apartments, we said that the movement was due to the application of either pressures or lures. We did not mean to imply, however, that the moving was done without any protest or resistance on the part of the management. Even in as good a conductor as copper, *resistance* (opposition to the flow of current) is present.

Resistance is indicated by the letter *R* and is measured in units called *ohms* by an instrument called an *ohmmeter*. The symbol for an ohm is Ω, the Greek capital letter omega.

We can think of resistance as kind of an opposite to conductance, since the conductance or ease of movement of a current becomes less as the resistance to the current becomes greater. In a whimsical gesture on the part of someone, the unit of conductance was named the *mho*, which is ohm spelled backward, and even its symbol, ℧ , is the ohm symbol upside down. Mathematically, this inverse type of relationship is called a *reciprocal* one, so mathematicians, physicists, electrical engineers, etc., say that conductance is the reciprocal of resistance and resistance is the reciprocal of conductance.

Enter: THE LAW

Resistance, voltage and current are tied together in a very important way by what is known as *Ohm's Law*, one of the physical laws referred to at the beginning of this chapter. It is expressed by a mathematical equation or formula which you should understand and memorize. (In mathematics the words formula and equation can be used interchangeably.)

DETOUR → One of the commonest reasons given for not becoming a ham or even trying to become a ham, is the "I'm no good at mathematics" one. Actually, this is an excuse, rather than a valid reason, since the amount of mathematics you will need to pass the Novice or General exam, or to operate your equipment, is not that big a deal. If you plan to build, install and repair your equipment, additional math will probably be necessary, but you can learn it as you need it.

Don't get scared off at the sound of the word "equation," either. All it means is that two things are *equal*. For example, the statement "ice cream + chocolate syrup = a chocolate sundae" is an equation, and so is $3 \times 3 = 9$. The mathematical questions in the Novice and General sections of the *License Manual* will be discussed and explained somewhere in this Primer. So keep going, and accept this second chance at being better than "no good" in at least one area of math. END DETOUR

Ohm's Law is stated by the equation $E = IR$. It can also be stated $I = \frac{E}{R}$ or $R = \frac{E}{I}$. Since you already know what E, I and R stand for and how they are measured, you can say the formula in words: voltage (in volts) equals current (in amperes) mutiplied by resistance (in ohms); current equals voltage divided by resistance; resistance equals voltage divided by current.

Your assignment at this point is to say all three equations three times using letters, then three times using words. Remember that in Ohm's Law the E either stands alone ($E = IR$) or is on top of everything else ($\frac{E}{R}, \frac{E}{I}$).

A time-honored method which students use to remember Ohm's Law, particularly if they are vague about how to change one equation into another by the use of algebra, is to draw a circle and arrange E, I, and R as shown.

To find the equation for any one of these, put your thumb on top of the one you want and see what you have left. Your thumb on E says that the voltage equals IR (I multiplied by R); thumb on I says current equals E over R (E divided by R); thumb on R says resistance equals E over I. Study this Figure until you can see it without looking at it. Remember that E is placed on top of the circle, just as it is on top in the equations it illustrates.

When you know any two of the three things involved in Ohm's Law, you can always get the third. For example, suppose you have a circuit (electrical path) which has a current of 3 amperes and a resistance of 40 ohms, but you don't know the voltage. Since E is what you need to know, use the $E = IR$ formula and you have $E = 3 \times 40$ or $E = 120$ volts. If you knew the current and voltage in that same problem, and didn't know the resistance, you would use $R = \frac{E}{I}$ and get $R = 40$ ohms. If you knew E and R, but didn't know the current, you would use $I = \frac{E}{R}$ and get $I = \frac{120}{40}$ or $I = 3$ amps. You would also have worked Ohm's Law all three ways.

Always decide what it is that you want to find

out and write that down first. Add an equal sign after it, and then write down the things you already know. You will avoid a lot of mistakes if you always check your answer that way. Make up some problems of your own, and practice.

P = Power

Electricity is one of the major types of power used in the world today, and man's harnessing of that power has changed the history of the world, just as did the harnessing of wind, water, and steam.

Power, which is the rate of doing work, is measured in units called *watts* by an instrument called a *wattmeter*, and is indicated by the letter "*P*" in mathematical formulas. It can be calculated (when the current is the kind we call dc) by using the formula P = IE. This is an easy one to remember since it spells PIE (no particular kind). Written either P = IE or P = EI, it says that power (in watts) is equal to current (in amperes) multiplied by voltage (in volts).

The FCC has set up definite rules as to the amount of power you are allowed to use as input power to the final stage of your transmitter. Novices can use up to 75 watts of input power; higher classes of licensees are allowed a maximum of 1000 watts or one *kilowatt* (*kw*). The prefix *kilo* means 1000, as opposed to *milli*, which, as we have said previosly, means $\frac{1}{1{,}000}$

The power formula can also be written $P = I^2R$ and $P = \frac{E^2}{R}$, with R referring to resistance. You don't need to know these extra two formulas for the Novice exam, but you do need to know them for the General, so you might as well memorize them now and get it over with. You should also memorize the Table given below.

Alternating Current and Direct Current

(The same thing, only different)

Two different kinds of current, *alternating current* (*ac*) and *direct current* (*dc*) can be used as a source of power in amateur rigs. Ac and dc act differently, may be utilized for different purposes, and may be produced in different ways. However, they are both manifestations of the same phenomenon, and each kind can be changed into the other kind, if necessary.

Direct current, as its name implies, is distinguished by the fact that once it starts out in a certain direction, it goes directly ahead and does not turn back.

Alternating current, on the other hand, acts as if it can't make up its mind as to what it wants to do and is constantly changing direction, going *forward, then backward, then forward again.* Perhaps, instead of implying that it acts this way of its own accord, we should think of it as being controlled by two men with whips in their hands. One man, with his whip, starts it off in one direction, but almost immediately another one, whip in hand, turns it back in the direction from which it just came. Obviously, the life of an alternating current is not an easy one.

It would seem that alternating current, being forced to change direction all the time, would never get anywhere or accomplish anything. However, this is not the case. *Current is current no matter which way it is going*, and current multiplied by voltage gives power. In its own way, then, ac is just as useful as dc, and each kind of current makes its own contributions to amateur radio operation, although those contributions may be different.

Direct current can be produced chemically by a *battery;* mechanically by a *dc generator;* or

	Symbol	*Unit of Measure**	*Measured by*	*Equation*
Voltage	E	volt	voltmeter	$E = IR$
Current	I	ampere	ammeter	$I = \frac{E}{R}$
Resistance	R	ohm	ohmmeter	$R = \frac{E}{I}$
Power	P	watt	wattmeter	$P = IE$ $P = I^2R$ $P = \frac{E^2}{R}$

* Volts were named for Count Alessandro Volta, an Italian physicist who lived from 1745 to 1827.

Watts — for James Watt (1736-1819), a Scottish engineer.

Amperes — for Andre Ampere (1775-1836), a French physicist.

Ohms — for George Ohm (1787-1854), a German physicist.

electrically by a part of the rig called a *power supply*, which converts ac to dc. When produced by a dc generator, as in a car, the current may proceed directly to the place where it is needed, or it may go to a storage battery and from there go wherever it is needed (possibly to a ham's mobile transmitter).

Alternating current, which is the kind that the vast majority of people use as power for their homes, is produced commercially by huge ac generators in power plants possibly hundreds of miles away from where the electricity is to be used. Alternating current can also be produced on a smaller scale by *portable* generators which can be moved from place to place as needed. Hams use this type of generator for service to the public in times of emergency, when power and telephone lines are wiped out by earthquakes, tornadoes, floods and other disasters. They also use portable generators to provide power for their radio equipment when they set up camp for "Field Day" in the middle of nowhere.

Direct current, as soon as it is turned on, rises to its maximum strength and then forges ahead, always in the same direction, over the path provided for it.

Alternating current, when it is turned on, builds up to a maximum strength or *amplitude* peak but instead of staying at that amplitude, decreases (still moving in the same direction) back to the point of no-current flow, *reverses direction*, builds up to a peak in this opposite direction, decreases to the no-current point, *reverses*, and starts the whole thing over again. An alternating current, therefore, can be described as one that is continually changing in strength and periodically changing in direction. The movement from the beginning of the upward swing to the end of the reverse one is called a *cycle*, which comes from the Greek word for circle or wheel. These cycles are recorded according to the number of them that occur per second. The frequency of our common house current, for example, is 60 cycles per second (cps), or, as expressed in international units of measurement, 60 Hertz (Hz). The word Hertz means *cycles per second* and is not a synonym for the word *cycle*.

Alternating current is pictured on graphs by what is called a *sine* (pronounced "sign") *wave*. You can see graphs of sine waves in ARRL's *How to Become a Radio Amateur* and *The Radio Amateur's Handbook*, as well as in numerous other publications.

Either alternating current or direct current can be used as the *primary* source of power for amateur radio equipment – the ac usually being obtained from a wall outlet; the dc usually coming from some type of battery. However, it is important for you to know that this primary source of power is not what hams mean (or the *License Manual* and FCC questions refer to) when they talk about a *power supply*. What they mean by the "power supply" is a section of the rig designed to change one kind of current to the other, and to provide the proper voltage or voltages needed in the rig. Because of its ready availability, ac is used by the majority of radio amateurs as a primary source of power for their equipment. However, most of the components in the rig can work only on dc, so ac has to be converted to dc before it can actually be utilized in the equipment. This conversion takes place in the "power supply."

DETOUR ➤ The main reason ac, rather than dc, is produced by most commercial plants is that ac can operate devices called *transformers*, which can step up or step down voltages as needed. By using transformers, power plants can send out power at such high voltages that only small amounts of power will be lost from the resistance of the lines. Power plants frequently generate ac at 13,000 volts and then step it up by transformers to 115,000, 230,000 or even higher voltage levels before it is transmitted to the areas which will use it. At substations, transformers step this down to perhaps 13,000 or 7,000 volts, and then still other transformers, like the ones on poles or in the ground in your neighborhood, step it down to the 120 or 240 volts used in homes, offices, etc. END DETOUR

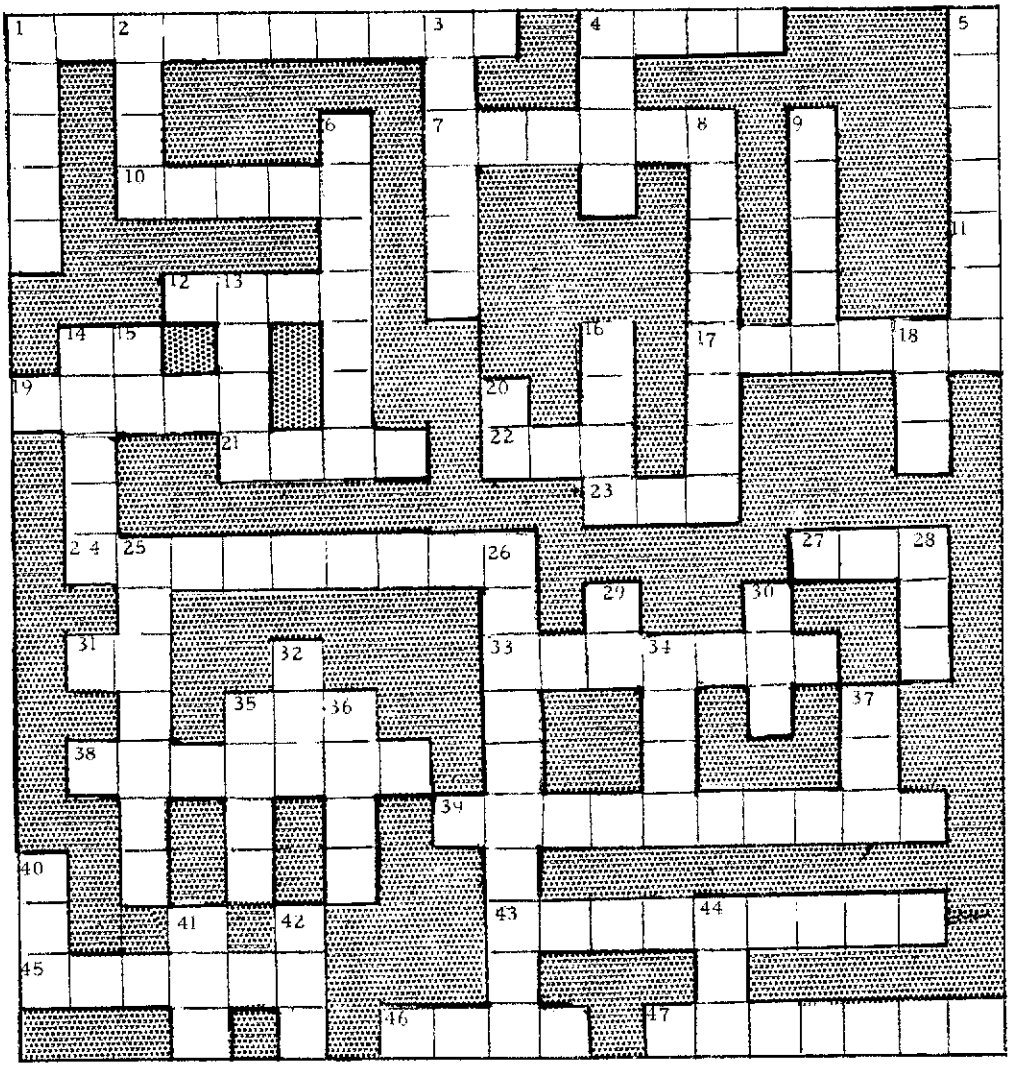
The "power supply" of a rig using ac as its primary source of power consists of three basic sections: a transformer, a rectifier, and a filter. The *transformer* steps up or steps down the voltage to the rig and helps make it possible for the proper voltages to be distributed to various parts. The sole purpose of the *rectifier* is to change the ac to dc. The power supply *filter* acts as a smoothing device for the rectified current emerging from the rectifier. The word *rectify* comes from the Latin and means "to make right." The rectifier circuit in the power supply makes ac "right" for its utilization in the rig by changing it into dc. As you study for or take your FCC exams, watch out for the words "power supply" and remember that the primary source of power and what hams and others working in the field of electronics call a "power supply" are two different things.

NOTE: Since this chapter has been directly connected with electricity, it would seem that some sort of shock could be expected. Shock, in the form of a test, follows on the next page.

Next chapter: The components of a circuit.

ACROSS

1. Reciprocal of conductance
4. The wave of an AC as shown on a graph is called a _____ wave.
7. Unit of measure of current
10. Current times voltage equals _____
11. Voltage symbol in Ohm's Law
12. Unit of measure of power
14. Abbreviation for milliampere
17. Belief based on observation and reason
19. Prefix meaning one-millionth
21. Don't do this to more than 25% of the questions on the FCC exam
22. Unit of measure for resistance
23. An atom which has gained or lost electrons
24. A poor conductor of electricity
27. Electromotive force (abbrev.)
31. Current that keeps going in the same direction (abbrev.)



33. Ohm's Law says that voltage divided by resistance equals _____
35. Popular name for a radio amateur
38. The "standard" license all Novices should be working toward
39. A solid-state component made from a semiconductor substance and used in radios and computers
43. A substance through which current flows easily is called a _____
45. License for beginners
46. Unit of measure of voltage
47. To change AC to DC, the power supply must _____ it

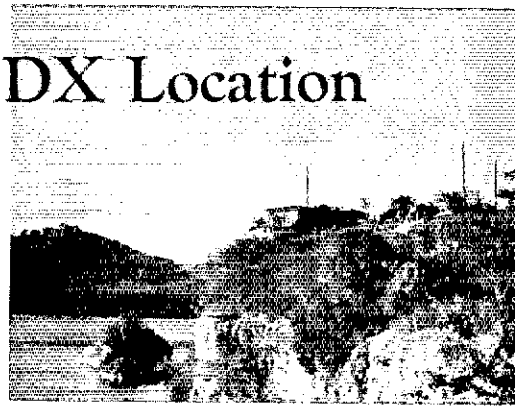
DOWN

1. Unlike charges attract; like charges _____
2. The return of a radio wave from the ionosphere back down to earth is called _____
3. An electron has a negative one
4. Transformers can _____ the voltage up or down
5. Chemical source of dc
6. In an atom, these have a positive charge
8. This one whirls around the nucleus
9. The flow of an ac wave from the point of no current flow, through a positive and negative peak and back to the no current point is called a _____
13. Unit of matter containing electrons, protons, and neutrons
14. Prefix meaning one-thousandth
15. Current which keeps changing direction (abbrev.)
16. Selenium and germanium are _____ conductors
18. Common name for amateur's gear
20. Do "power supply" and "source of power" mean the same thing?
25. Part of atom containing protons
26. Conductance is the _____ of resistance
28. Government agency administering license exams
29. If you square the first letter of these two letters, you have a power formula
30. How many kilowatts in 1000 watts?

(Continued on page 105)

The World's Best DX Location

BY JOHN H. THOMPSON,* W1BIH/PJ9JT



The Cliff House with assorted antennas.

EVER SINCE American amateur Paul Godley huddled in a tent on the barren moors at Ardrossan, Scotland back in 1921, attempting to hear for the first time amateur signals from across the Atlantic, hams have searched for the ideal location.

We think we have found it – Santa Martha Bay on the island of Curacao in the Netherlands Antilles – just off the north coast of South America.

Actually Chet Brandon found it. Ten years ago Chet, then KP4AEQ, (ex-W8BFH) and Chief Engineer of a large U.S. corporation, decided to quit the rat race and embark on a search of the Caribbean for the best spot to build a hotel. He finally reached the southernmost part of the Caribbean and after hacking his way through the cactus at the southwest tip of the 38-mile-long island of Curacao, he knew he had found what he was looking for. Chet built his small hotel – 39 rooms anchored to the coral and strung along the shore opposite Venezuela some 35 miles away – and called it the Coral Cliff. Licensed as PJ3CC (later changed to PJ2CC) with arrangements for reciprocal licensing, the spot has since been a mecca for U.S. hams.

Rich Rowe, K2BK, operated there in March, 1967, when a bent wire 35 feet high was the only antenna available, and wrote: "Gets out like a thief. The pile-ups are just unbelievable."

As a result of Rich's glowing recommendation, a group from the Connecticut Wireless Assn. and the Potomac Valley Radio Club operated there in November, 1967, easily outdistancing all competition in *CQ*'s Worldwide CW contest, with the bent wire. Since then, Chet has installed two tri-band beams, one towering 90 feet above the water, a full-sized 80-meter vertical, and other antennas. The same CWA-PVRC group, with additional operators, returned the following three years and each time ran up a new record-high score.

Another group from PVRC operated the Worldwide Phone contest there in October, 1969, as PJØDX and ran up the fantastic score of more than 17 million points, making 9270 contacts in a 48-hour period. In October, 1970, W1FJJ and W3KMV teamed up in this same contest and turned in the top score in their class under the call PJ9AF.

Jack Reichert, W3ZKH, operated the WPX contest as PJ9JR in 1970 and ended up with the world high score. Jack made another outstanding score in the 1971 contest and won the trophy for the highest single band score.

In March, 1970, three hams – all good cw men – vacationing there for snorkeling and loafing, belatedly decided to give the gang a PJ contact in the second weekend of the ARRL phone DX contest and, operating two rigs part time, made over 5500 contacts. A single CQ on ten meters resulted in a run of 937 contacts.

But, contest operation isn't necessary to appreciate the ham potential of the place. John Wilson, K3NPV, operating his Signal One barefoot while vacationing there, concentrated on 80 meters and worked, among others, VU2BEO, 4S7AB, KL7DTH/KG6, and six JAs on that band.

The author, using a five-watt Ten Tec transceiver, found he could easily work into Europe, Australia, and even into Asia, as well as into all U.S. districts with QRP.

A CQ on 14,175 kHz ssb in the morning normally will produce a seemingly endless pile-up of VK, ZL, AP, VU, MP4, and 4X4.

A CQ on an apparently dead 10-meter band will scare up a flock of stateside stations saying, "You're the only signal we are hearing. You sound like a local!"

Charlie O'Brien, W2EQS, working 160 meters with a wire that dipped to within 15 feet of the water, made numerous European contacts, all being firsts on that band.

Even a small hand-held citizen's band transceiver with whip antenna produces a cacophony of carriers from the States, 1500 miles away.

More than 50,000 contacts have been made from Santa Martha Bay over the past six years by Chet and some 35 visiting operators, under the calls PJ2CC, PJ3CC, PJØCC, PJØFC, PJØCW, PJØDX, PJ9AF (W3KMV), PJ9AG (K1UDD), PJ9GF (W4GF), PJ9JR (W3ZKH), and PJ9JT (W1BIH). Add to this all the contacts made by the local PJ hams (Curacao has about 30 permanent ham residents) and you would think that no one could possibly need Netherlands Antilles for DXCC. Surprisingly enough, during recent operations there, the author heard at least one in ten tell him he was their first PJ!

In addition to the above, consider the easy accessibility of the island – four hours non-stop

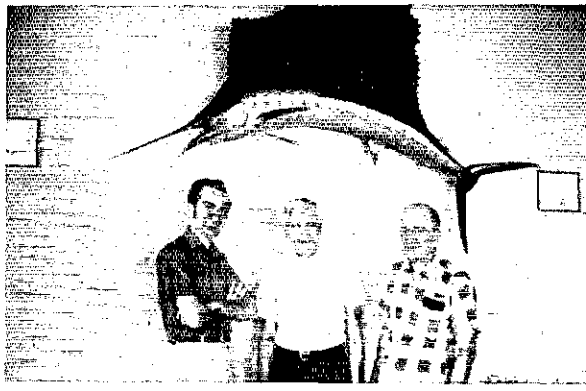
* P.O. Box 1, Torrington, CT 06790.

With a view like this from the Cliff House, it is sometimes difficult to go back to ham operating.

from New York and flights from Hartford, Washington, and Miami – the cooperative local officials, the friendly local hams, the comfortable accommodations available, the warm clear waters with excellent snorkeling, and for the edification of the XYL with a natural history bent, a wealth of bird life, million-year-old fossils embedded in the cliffs, and interesting, exotic semi-arid vegetation. Well, we rest our case for the claim that Santa Martha Bay, Curacao, is the world's best DX location.

In 1972 the hotel was sold and closed by the new owner. The antennas are being removed and the hotel buildings razed to make room for a 50-unit condominium project scheduled for completion in 1974.

However, the potential of this fantastic location is still available to the visiting ham since three new air-conditioned, waterfront homes, adjacent to the hotel, can be rented, including one equipped with a complete ham station and rotary beam. The author can provide further information to anyone interested. QST



This crew made over 5500 contacts during the ARRL Phone DX Contest. From l. to r. are K4GTS, W1BIH, and W4GF.

50 Years Ago this month

January, 1924

. . . *In strong contrast to two years earlier*, when a special cover and extra exclamation points were used to describe the first European *reception* of U.S. signals, this issue's ho-hum treatment of the two-way breakthrough of November is almost an *anticlimax. It is a time of multiple records and* achievements; for example, New Zealanders hear us in so much strength and quantity that we're QRMing each other there! The editorial tone is one of superconfidence in amateur radio's capabilities.

. . . *1XAM's transmitter circuit, used by all three* stations (1MO/1XAM/French-8AB) in the transatlantic contact, is described in detail – as is 150 feet or so of wire cage antenna, which certainly helped!

. . . *WNP is nearing the peak of its activity;* winter conditions make communication now an everyday affair. A 1HX-6XAD-WNP circuit, 6,000 miles each way, is particularly useful.

. . . Ph.D Lewis Hull of Boonton labs enters the hassle over circuits for tuned r.f. amplifiers and does a good job of solving the mysteries of "anti-regeneration" devices. And J. C. Warner of GE answers our questions about design, construction and use of receiving tubes.

. . . "The Crew at 1045 Main Street" presents the faces of 19 people on the League Hq. staff, complete with thumbnail sketches of personalities and a few glimpses of the offices – the entire third floor of a downtown Hartford building [which has long since given way to Interstate 84].

. . . $4,000 in prizes is offered for the greatest cumulative distance in reception of transatlantic signals during the tests; but entrants must certify they did not transmit.

– – – –

The Post Office Department promises faster mail service with Zip codes. Use Zip codes.

25 years ago

January, 1949

. . . *Even as now, the low-power enthusiasts* have plenty to whet their appetites. W1FTX's compact 6AK6-2E26 rig is 20 watts, phone and c.w.; W6CWQ uses a 6AG7-2E26 lineup for about the same power; W1IIN prefers the 6L6-807 *combination for a massive 50 watts. Emphasis is on* portability and emergency communications in all units. Kilowatts are still playthings of the prosperous.

. . . And W1DX shows us in "how-many-turns" *style the construction of an exciter for multiple* modes of single or double sideband, plus phase modulation to assist those with TVI problems. Carrier injection is adjustable from full power to about 30 dB down.

. . . *"When do we get 21 Mc.?" is the question* asked by the editor as well as members. International regulations were amended in 1947 to provide us a new 15-meter band (and a loss of 50 kc. at 20 meters), but the change will not be made until the fixed service can readjust to fit its greatly-reduced assignments.

. . . What're those funny-looking gadgets in W1HDQ's 420-Mc. oscillator? "Doorknob" tubes, no less – 703As. This is Ed's recommendation for building from scratch rather than from surplus. Further promotion of v.h.f. activity is supplied by WØQHC, who graphically plots station performance above 50 Mc., and by W1CTW, who takes the mathematical approach to predictions of communications potentialities.

. . . The "Correspondence" section has another smattering of complaints that *QST* material is "too technical." ['Twas ever thus.]

. . . A resumption of the "Governor's-to-President Relay" project is announced for the January 20 inauguration of President Truman.

–*W1RW*

Annual ARRL Novice Roundup Announcement

February 2 through February 10

Novices, this is *your* contest. You can improve your code speed to help prepare for that higher class exam, and you can also work new states to increase your WAS total. The contest is 9 days long, but you can only operate a maximum of 30 hours during that period. Those of school age can still get homework done, and Novices slightly older can get the beauty rest they need.

One point that seemed to give Novices problems last year was the foreign country multiplier. The U.S.A., Canada, KH6, KL7, KP4, KV4 and KG4 are *sections* and CANNOT be counted a second time as a foreign country. For example, if you work VA, WA, MI, CT, KV4, KP4, G3 and JA7 you have 7 multipliers. The KV4 and KP4 are a part of the same West Indies section and cannot be counted again as a foreign country.

During the contest, after calling CQ, listen on either side of your frequency for an answer; not everyone will have a VFO.

Contest log forms, dupe sheets (Op Aid 6), WAS maps and other operating aids are available from ARRL Hq. Send us a stamped, self-addressed envelope for some right away. After the contest, send us your log along with comments and photos. Logs become the property of the ARRL and cannot be returned, so make sure you still have a copy of your log. Entries must be postmarked no later than March 5, 1974 and must be sent to ARRL Hq.

How to Participate

Contest QSOs are much briefer than ordinary ragchews. You should not repeat your transmission (call, RST and section) at all unless you're requested to do so. Here's the way a typical exchange might go:

CQ NR CQ NR DE WN4VMC WN4VMC WN4VMC NR K

WN4VMC WN4VMC WN4VMC DE WN9AXP WN9AXP WN9AXP AR

WN9AXP DE WN4VMC 579 TENN BK

WN4VMC DE WN9AXP R 569 ILL K

WN9AXP R TNX 73 SK DE WN4VMC NR K

In most cases your state is your section. However, new hams in PA NJ NY MA CA FLA & TX should check page 6 of any issue of *QST* to learn their exact section (within the 16 ARRL divisions). If you still don't know your ARRL section after referring to page 6 of *QST*, drop us a card and we'll help you out. Generals: *don't* call CQ NR; *answer* Novice CQ NRs.

Note that time is expressed in Greenwich Mean Time (GMT). If you're unfamiliar with GMT, remember that it's 5 hours ahead of EST, 6 ahead of CST, 7 ahead of MST and 8 ahead of PST. Better yet, send for our handy Operating Aid †14, which contains, among other goodies, a time conversion chart and explanation of the RST system.

ROUNDUP PERIOD	
Starts	*Ends*
February 2	February 10
0001 (12:01 A.M.)	2359 (11:59 P.M.)
Greenwich Mean Time	Greenwich Mean Time

Scoring

Count one point for each contact (you may work a station only once, regardless of band); add your ARRL Code Proficiency credit, then multiply by the total number of multipliers (sections + countries) worked. And remember, KH6 KL7 KP4/KV4 KZ5 and VE districts are sections and *cannot* be counted a second time as a foreign country. If you work 100 stations in 31 sections + 3 foreign countries and have an ARRL (not FCC) Code Proficiency credit of 10 wpm from W1AW or W6OWP, then your score is 100-plus-10 X total multipliers (31+3) or 34, for a total of 3740 points. For details on the Code Proficiency program, see OP-News of this issue. You may work DX stations for contest credit, a multiplier of 1 is earned for each separate foreign country worked.

Read the rules carefully. Keep a check-sheet of stations worked (we have Operating Aid †6 available free) so that you don't have duplicate QSOs. Log sheets, Op Aid 6 and a map of the United States are now available from your ARRL Headquarters. *Unless first-class postage is included with your request, log sheets will be sent by third-class mail.* To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed and stamped envelope containing: your full name, call and mailing address complete with Zip code. We suggest a minimum of 8 cents postage attached. This will assure your receiving 3 log-sheets (enough for 300 QSOs), 1 Op Aid 6 and a WAS map (if desired). Using this as a guideline, you can adjust the postage according to the number of logs you anticipate needing.

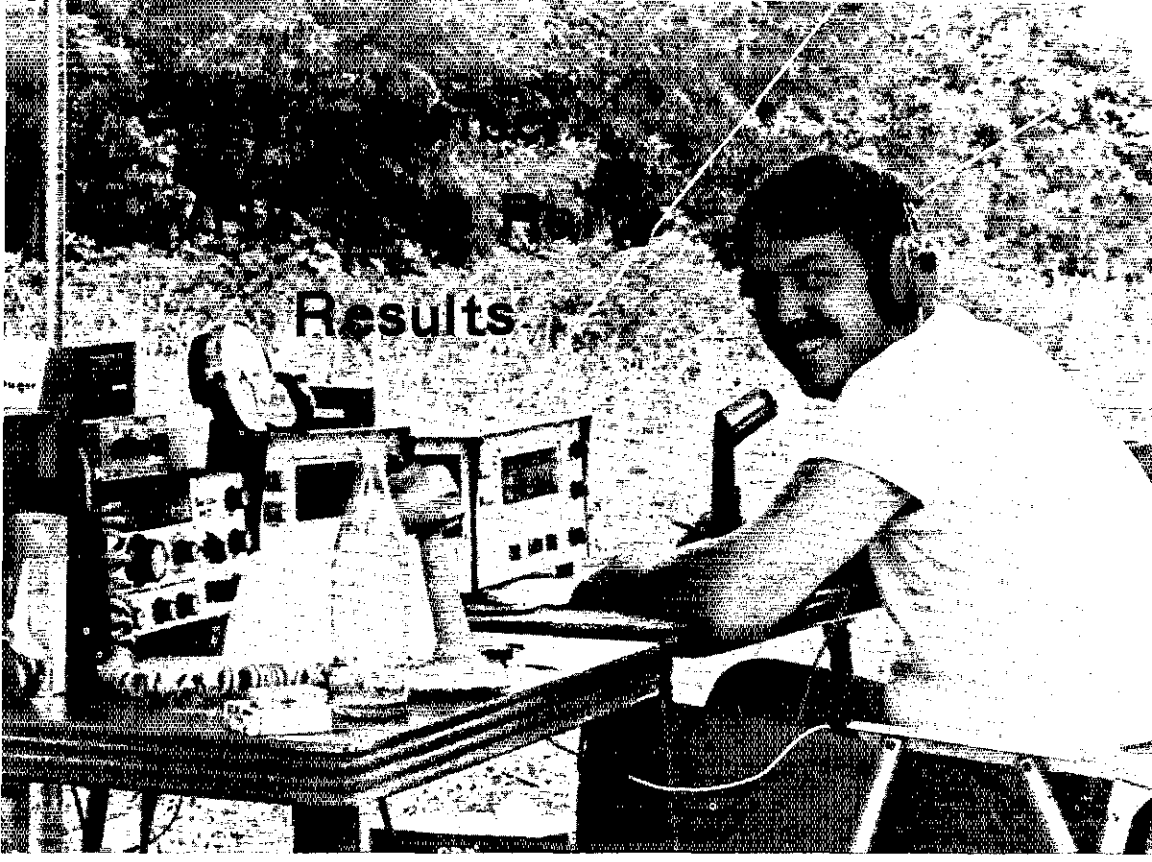
B C N U in the NRI —WA1PID

Rules

1) *Eligibility:* The contest is open to all radio amateurs in the ARRL sections listed on page 6 of *QST*.

2) *Time:* All contacts must be made during the contest period starting at 0001 (12:01 A.M.) Greenwich Mean Time on the first Saturday of February and continuing until 2359 (11:59 P.M.) Greenwich Mean Time the second Sunday of February. Time may be divided as desired but *must not* exceed 30 hours total. Off periods *may not* be

(Continued on page 162)



WB2LAI/4

REPORTED BY RICK NISWANDER, * WA1PID/WA8VRB

A SUNDAY AFTERNOON and evening aurora that covered most of the East and Midwest saved the September VHF QSO Party, held September 8 to 10, from being without a good opening of any kind. Out west a short opening *along the Coast saved the day also.*

Single op honors go to K2OWR with 32K. In addition to setting a new Hudson Division record, this score is also a new single op high for the September brawl. Nice job, Bill.

Second spot goes to VE3ASO, with a nice 18K showing. This handily breaks the Canadian Division single op record of 10K set by VE2SH in 1968.

The Northwestern Division recorded new highs in both the single and multioperator classes. In solitary fashion, K7BBO bettered his own 1971 record with a 2940 point showing. The group at W7DNU/7 snapped a year old multi record, garnering 5160 points this time.

Other multi groups did quite well also.

K5WVX set a new West Gulf Division multiop record with a 5181 point showing. This breaks his own mark of 3K set in 1971.

The Great Lakes Division high set by W8CCI was raised 4000 points by WA8PLZ with a 44K performance – good enough for fifth spot nationwide.

WB2GKE/2 just managed to set a new Hudson Division mark, topping the old record of WA2WEB/2 by 386 points. The GKE gang is again planning to set up at Mt. Equinox in Vermont for the June bash next year.

Returns were down about 13% this year to 245 total entries. Awards are scheduled for a January 15th mailing.

Top Ten – *Single op* – K2OWR 32,720, VE3ASO 18,816, K1JDY/3 15,378, K1PXE 14,202, WA1NGR 12,240, K6YNB/6 10,296, WB8BGY 10,176, W2EIF 9735, K1GYT 9628, WA3QPX 9405

Multiop – WA1MUG 103,828, WB2GKE/2 50,480, W1GGM/1 45,494, WB2ZVS 44,320, WA8PLZ 44,019, WB2KKO/2 31,350, WB2LZD/3 28,329, W8CCI 26,532, WA2KHL/2 12,512, K9HMB 9964

Soapbox

The aurora livened up an otherwise dull contest on 6 meters. – (WB2KLD). Would like to see some more multi-op stations in Virginia to provide some competition. – (WB2LAI/4). Extreme lack of activity in central California and no band openings

* Asst. Communications Mgr.

Min. Sections	30	15	4	3	1
MHz.	*50*	*144*	*220*	*432*	*1215*
VE2AEB	2	20			
VE2DFO	25	20	5		
VE2YU		18	7	3	
VE3ASO	36	28			
VE3CRU	26	18	7		
VE3EVW		17		5	
K1GYT	35	23			
K1JDY/3	21	22	9	14	
K1JIX		2	6	10	2
K1MTJ		19			
K1OJQ			11		
K1PXE		24	12	13	5
K1SFF/3		14	6	5	4
K1WHS		16	6	3	
W1DC*	16	3	4	5	1
W1EUJ	18	13	10		
W1FMF	12	11	5	4	
W1GGM/1*	26	26	16	15	3
W1HNF	10	24			
W1JSM		21			
W1YTW	13	9	10	8	
WA1FFO		23		10	
WA1GTP*	18	15		5	
WA1JZO				8	
WA1MUG*	28	23	19	20	11
WA1NGR	30	14		4	
WA1OUB	25	16			
K2ARO				10	
K2BWR*	26	20	12		
K2CBA*	22	4	7	8	1
K2LGJ				13	
K2OVS/2*	13	17			

Min. Sections	30	15	4	3	1
MHz.	*50*	*144*	*220*	*432*	*1215*
K2OWR	29	23	15	13	
K2UYH				22	
K2YCO	19	17	6	10	3
W2CVW	4	10		3	
W2EIF	13	20	11	8	3
W2UK		28		7	
W2WGL		21			
WA2HYK		19			
WA2KHL/2*	24	22			
WA2LTM					15
WA2ZZF				14	
WB2BXL/2*	22	17			
WB2FKJ/2*		23	8	8	
WB2GKE/2*	32	24	12	12	
WB2KKO/2*	30	20	11	5	
WB2LZD/3*	32	19	12	8	
WB2ZVS*	36	14	17	13	
W3ARW/3*	17	15	9	8	
W3CGV				1	1
W3CJK		21		4	
W3JLU		20			
W3KMV	21	21			
W3LUL		25			
W3PGA/3*	16	14	7	5	
W3TMZ		20			
WA3NZL	30	12			
WA3QPX	27	17		1	
K4JQU		19			
W4UCH	19	10	6	6	
W4VHH		18		4	1
WB4EOW/4*	32				
K5WVX*	22	6		5	

Min. Sections	30	15	4	3	1
MHz.	*50*	*144*	*220*	*432*	*1215*
K6GSS/6*	9	8	5	3	
K6JKQ	6	5	3	4	
K6QAX	7	5	5		
K6SSN	12	6	4	4	
K6YA/6*	9	8	4		
K6YNB/6	13	10	6	7	
W6FZJ	6			6	
W6GGV/6*	7	5	5		
W6OAL	2	1			1
W6VPZ/6*	7	5	4		
WA6UMI*	9	5	4	4	
WB6KAP	6	5	3	3	
WB6NKO	7			4	
K7AUO/7*	3	2	2	2	9
K7BBO	12	3	2	2	1
W7RPT/7*					1
W7TYR	2	2	2	2	2
K8HWW	10	9	3	1	
K8III/8		31			
K8UQA				13	1
W8CCI*	38	22	5	2	
W8QOB		10	4		
WA8MOA			4		
WA8PIE		25			
WA8PLZ*	39	28			
WB8BGY	28	18		2	
K9HMB*	19	19	4	5	
K9UVJ	24	8	6		
W9HTF		15			
W9YYF		25			
WØOHU		13		3	

* Multioperator Station

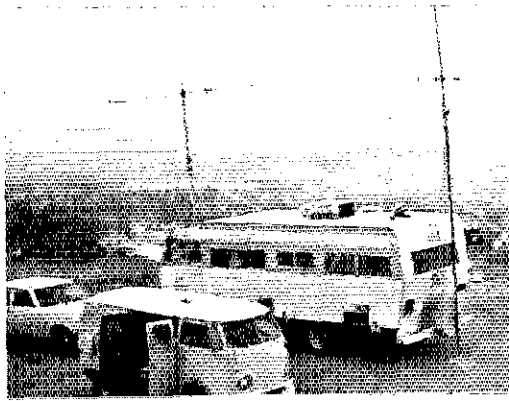
on 6 meters didn't help any this year. – (K6HXW/6). Yankee land sounded real good here in Arkansas during the Sunday afternoon buzz session. – (W5TDP). Heard many signals on 2 meter aurora but with only 50 watts out didn't have many takers. – (WA1OLK). Very cold and windy on top of Mt. Equinox. Band conditions were a little below average except for the aurora. – (W1GGM/1). Last June we had September conditions. This September, we had January conditions. – (WA1MUG). Propagation was nil except for a fine aurora. – (WBØBBC). After 35 years of VHFing I'm finally getting things glued together. – (K6JKQ). Other than wrecking Jeep, blowing up a generator and getting rained on it was a pretty normal contest. – (WB4JGG/4).

SCORES

In the tabulation to follow, scores are listed by ARRL sections within W/VE call-areas. Unless otherwise noted, the top scorer in each section receives a certificate award. An asterisk denotes a Hq. staff member, ineligible for an award. Columns indicate final score, number of contacts, number of different sections worked, and bands used. A represents 50 MHz, B 144 MHz, C 220 MHz, D 420 MHz, E 1296 MHz and above. Multioperator stations are shown at the end of each section tabulation.

DIVISION LEADERS

Single Op.	*Division*	*Multiop.*
K1JDY/3	Atlantic	WB2LZD/3
K9UVJ	Central	K9HMB
WØOHU	Dakota	. . . . .
WB4JGG/4	Delta	WA4IAX/4
WB8BGY	Gr. Lakes	WA8PLZ
K2OWR	Hudson	WB2GKE/2
WBØBBC	Midwest	. . . . .
K1PXE	New Eng.	WA1MUG
K7BBO	Northwestern	W7DNU/7
K6QAX	Pacific	K6GSS/6
W4UCH	Roanoke	WA4VCC/4
K5EFW	Rocky Mt.	. . . . .
WA4NJP	Southeastern	WB4EOW/4
K6YNB/6	Southwestern	WA6UMI
WA9QZE/5	West Gulf	K5WVX
VE3ASO	Canadian	VE3FHK



Overlooking Los Angeles and utilizing all the cushy comforts of home is the multiop group at W6VPZ/6. The antenna at left is 4 elements for 6 and at right is 20 elements for 2. Not shown above the 2-meter beam is an 11 element vertically polarized beam for 220.

VE

Quebec

VE2DFO 6650-128-50-ABC
VE2YU 1932- 56-28-BCD
VE2AEB 1232- 56-22-AB
VE2ADE 273- 21-13-B

Ontario

VE3ASO 18,816-294-64-AB
VE3CRU 7854-147-51-ABC
VE3EVW 968- 35-22-BD
VE3FHK (+VE3FHU)
6232-164-38-AB

British Columbia

VE7ASM (VE7s AFB ASI)
230- 46- 5-AB

U.S.A.

1

Connecticut

K1PXE 14,202-191-54-BCDE
WA1NGR 12,240-247-48-ABD
WA1FFO 5577-147-33-BD
W1HDQ 1152- 62-18-ABD
W1HNF 888- 37-24-AB
K1ZND* 525- 35-15-AB
W1FEZ 174- 29- 6-B
W1KHM 162- 18- 9-AB
W1WHL 140- 28- 5-AB
W1FEF 136- 34- 4-B
W1WEE 92- 23- 4-B
W1IAX 24- 12- 2-B
W1YDS 6- 3- 2-B
WA1GTP (+K1VYU)
4864-120-38-ABD
K1BWC/1 (2 oprs.)
4374-162-27-A
K1IEP/1 (+K1s CRK ICX ZKR W1UMS WA1s HYN QLH)
4176-174-24-AB
K1MUJ/1 (K1DNW WA1s HYN LPT QBD)
4160-160-26-AB

Eastern Massachusetts

K1DAT 2226-106-21-AB
K1VTE 1428-204- 7-B
K1OJQ 374- 17-11-C
WA1IZO 160- 10- 8-D
K1VIU T/1 105- 21- 5-A
WA1OAM/1 (+WA1s ONB OZI PBU)
5550-183-30-ABD
W1DC (K1NZQ W1BXI WA1GSF)
3567-109-29-ABCDE

Maine

W1YTW 4360- 83-40-ABCD
K1MTJ 1273- 67-19-B
K1WHS 1225- 38-25-BCD
WA1LXP/1 (+K1RKT WA1CDO)
1065- 71-15-AB

New Hampshire

WA1OUB 7011-171-41-AB
W1EUJ 5412-119-41-ABC
WA1FSZ/1 4123-133-31-AB
W1FMF 4064-114-32-ABCD
W1JSM 1806- 86-21-B
W1GUU 1292- 68-19-AB
WA1RZP 1045- 55-19-AB
K1PMM 168- 24- 7-A

Vermont

K1GYT 9628-166-58-AB
W1AM 1092- 52-21-AB
W1GGM/1 (+K1KEC WA1s LXU MJD NSK WA2JHR WB2GLQ K9AQP)
45,494-456-86-ABCDE

Western Massachusetts

WA1OLK 1475- 59-25-AB
K1JIX (W2BVU, opr.)
1120- 28-20-BCDE
WA1MUG (K1s DEU DQV FXY W1KZS WA1s ABV HCO IQJ JID JLD KMW PID QXG WA2s BYP CSQ PVV SCA SPL WB2s BXP DRW OEU ULS WOI WB4WVC WA8USA G3ZSS Barbara, Carolyn, Barbara, Donna, Gail, Ranger Joe)
103,828-910-101-ABCDE
WA1PQD (+WA1OAT)
760- 76-10-AB

2

Eastern New York

WA2BCM 5456-176-31-AB
K2ARO 640- 32-10-D
W2IP 128- 16- 8-B
W2NG/2 102- 17- 6-A
W2HF 55- 9- 5-BD
K2CBA (+WA1GTH WB2s BYP DNE TTV)
7938-167-42-ABCDE
WB2BXL/2 (+WA2s KAQ RUW SVC WB2s CCY FQT WN2s EQD LYR LYU MBB SDM)
6942-178-39-AB
WB2FKJ/2 (K2s DNR UKE W2AWX WA2HAQ WB2s HDS HXZ IQL)
5694-123-39-BCD

N.Y.C.-L.I.

WB2BON 2002- 77-26-AB
WA2MZH 1428- 68-21-AB
WB2TUT 455- 65- 7-B
W2TUK 130- 26- 5-B

Northern New Jersey

K2OWR 32,720-362-80-ABCD
W2UK 2905- 75-35-BD
WA2LTM 945- 21-15-E
WB2CUT 836- 76-11-B
WA2ZZF 784- 28-14-D
WA2FCW 780- 65-12-AB
W2CVW 731- 40-17-ABD
W2ODV (WA2FUI, opr.)
36- 12- 3-B
WA2FAX 24- 8- 3-AB
WB2GKE/2 (WA2s BAT DBO FZW WB2WIK Emily Katz)
50,480-554-80-ABCD
WB2ZVS (+WA2JVO)
44,320-460-80-ABCD
WB2KKO/2 (+WA2s BMS UPK WB2s DHN LPX QEA QOQ)
31,350-448-66-ABCD
WA2KHL/2 (+WA2UDT WB2s LDE LYP)
12,512-272-46-AB
WB2MFD/2 (+W2s FNT GHO IOC WA2ALL WB2s GBW HXR ZMU)
2180-109-20-AB
WA2KGU (+WB2MIC)
304- 38- 8-B

Southern New Jersey

W2EIF 9735-137-55-ABCDE
K2UYH 2684- 61-22-D
W2AXU 448- 28-16-AB
K2EVW 252- 36- 7-B
K2BWR (+K2ZRJ)
9686-148-58-ABC

Western New York

K2YCO 7755-114-55-ABCDE
WB2KLD 1188- 54-22-AB
WA2VCM 1105- 65-17-AB
WA2HYK 1045- 55-19-B
W2WGL 840- 40-21-B
K2LGJ 676- 26-13-D
WA2JOQ (WA2s ADZ BPE GCU KTJ WB2PMI)
6848-214-32-AB
K2OVS/2 (+K2LCK)
3540-118-30-AB
WB2MXS/2 (+WA2IKO)
1098- 61-18-AB

3

Delaware

WA3QPX 9405-208-45-ABD
W3CGV 10- 2- 2-DE

Eastern Pennsylvania

K1JDY/3 15,378-192-66-ABCD
WA3NGK 3172-114-26-ABC
K1SFF/3 2581- 63-29-BCDE
W3CL 1700- 76-20-ABC
W3JLU 1700- 85-20-B
WA3RJM 1617- 77-21-AB
K3ZSG 1100-100-11-B
WA3CTV 840- 40-21-AB
K3GAS 616- 37-14-ABC
WA3KFT 54- 27- 2-A
WB2LZD/3 (+WA1IQW K2YSX W2s DMK FHU WA2s RUP UKK WB2s IUU YST)
28,329-372-71-ABCD
W3ARW/3 (+K3SQO W3GF)
6419-109-49-ABCD
WA3PUL (+WA3s SBZ TGT)
1581- 93-17-AB

Maryland-D.C.

WA3NZL 6678-159-42-AB
W3KMV 4536-108-42-AB
W3CJK 2000- 74-25-BD
W3LUL 1700- 68-25-B
W3TMZ 1500- 75-20-B
K3MWQ 688- 43-16-AB
W3HH 364- 28-13-A
W3PGA/3 (K3s PHH ROJ YZY W3VRD WA3s FHV SCR TTM)
6426-136-42-ABCD
K3IVO (K3TNM W3DPU WA3s TDZ VFJ WB4ACJ WB6VGI WA9WGW)
4818-146-33-AB
WA3NUL (WB2TCZ WA3s EOP EOQ)
3161-109-29-AB

Western Pennsylvania

W3BWU 2054- 79-26-AB
W3IOH 1860- 62-30-AB
K3YVN 1386- 66-21-A
W3DJM 136- 17- 8-B

4

Alabama

WA4CQG 1624- 58-28-AB
WB4EOW/4 (+WB4NCN)
3872-121-32-A

Georgia

WA4NJP 3131-100-31-ABD
K4FRH 846- 47-18-AB
W4LNG 60- 12- 5-AB

Kentucky

K4GGI 18- 6- 3-B

North Carolina

W4VHH 1104- 41-23-BDE
WB4LDO/4 928- 58-16-AB
K4JQU 817- 43-19-B
K4ROM 602- 43-14-A
WB4MKY 140- 20- 7-AB
WB4LDP/4 136- 17- 8-AB
WA4VCC/4 (WA3MID K4s BWS LVV WA4s APD IPQ WB4s BXW CCW CES SPV YFC WN4AMU)
6975-225-31-AB
WA4WZQ/4 (+WA4WZP WB4UDS)
832- 64-13-AB

Northern Florida

WA8YYW/4 2- 1- 1-D

South Carolina

WA4LBQ/4 90- 30- 3-A
WB4NBK 8- 4- 2-A

Tennessee

WB4JGG/4 3536-136-26-A
WA4IAX/4 (+W4TZG WB4FNN)
594- 54-11-AB

Virginia

W4UCH 5453-120-41-ABCD
W4YFB 5280-160-33-AB
K4PCL/4 3968-124-32-AB
WA4SIQ 539- 49-11-AB
K4FTO 516- 43-12-B
WB2LAI/4 (+WA3SKT WA4DOX)
3874-149-26-AB

(Continued on page 105)

5

Arkansas

W5TDP 250- 25-10-B

New Mexico

K5EFW 27- 9- 3-A
W5QNQ 3- 3- 1-B

Northern Texas

WA9QZE/5 24- 8- 3-B
WB5KIX 6- 3- 2-A

Oklahoma

K5WVX (+K5BXG W5WAX)
5181-149-33-ABD

Southern Texas

W5QDB (+K5TSR WA5CBT)
780- 78-10-AB

6

East Bay

WA6SBJ (+WA6FKJ)
1287-117-11-AB

Los Angeles

K6SSN 2600- 89-26-ABCD
W6VPZ/6 (K6HRT W6s CFM LYY PJM WA6s BIL ZXR WB6s ARU JCD PZJ WWU)
2576-145-16-ABC

Orange

WA6UMI (WB6s RAL RIV)
2948-113-22-ABCD

Santa Barbara

K6YNB/6 10,296-250-36-ABCD
W6OAL 68- 13- 4-ABE
K6HXW/6 (+WA6ICX)
1054- 58-17-ABD

Santa Clara Valley

K6QAX 1547- 71-17-ABC
WB6KAP 1173- 54-17-ABCD
W6FZJ 444- 26-12-AD
K6GSS/6 (+K6BDK W6YEP WB6KBZ)
7975-285-25-ABCD
K6YA/6 (W6OCP WB6s LSN QVW YZD)
2709-117-21-ABC
WA6WSW/6 (WB6s RGR WGE WN6s SFR SET)
1469-109-13-ABC

San Francisco

WA6PYN 240- 40- 6-A
W6FAW 21- 7- 3-AB

San Joaquin Valley

K6JKQ 1458- 61-18-ABCD
WA6JUD/6 1456- 90-16-ABD
W6YKS 671- 61-11-AB
W6KGF 198- 33- 6-A
W6GGV/6 (+WB6s PKA VVO)
935- 48-17-ABC

Sacramento Valley

WB6NKO 583- 46-11-AD

7

Arizona

K9DKW/7 (+WA7NGK)
756- 54-14-AB

Oregon

W7TYR 790- 66-10-ABCDI
WA7RTA 295- 59- 5-AB
WA7AWJ 212- 53- 4-AB
K7HSI 161- 20- 7-ABCD
K7AUO/7 (K7s IUN VMN WKT W7s ADV BKN RPT UDM)
2106- 93-18-ABCDI
K7ZCB/7 (+WA7ECY)
345- 69- 5-AB
W7RPT/7 (+K7VMN)
12- 4- 1-B

Washington

K7BBO 2940-145-20-ABCDI
K7IDX/7 810- 81-10-A
WA7PVE 216- 54- 4-AB

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity NRH

CONDUCTED BY BILL MANN,* WA1FCM

The Importance of Records

IT HAS BEEN OFTEN SAID that the day of the written message is past, that communications nowadays are handled by voice and/or pictures. Amateur traffic handling is on the wane, so goes this line, because nobody sends "telegrams" any more; therefore, it is ridiculous for amateurs to handle "messages" in written form. Such things are handled by "phone patch," these days, to the extent they are handled at all.

In a lead to this column some years ago[1], this topic was discussed in some depth, and a pretty good case made for formalization of communications wherever and whenever possible. Yet, the trend to non-recorded communication continues, and more and more often we hear the practice of writing down communications derided. Another appeal for putting it in writing seems called for.

The written word is still with us, fellows and gals, and it's still important. Oh sure, it's a great deal easier to pick up your telephone and get the party you want to communicate with on the line and hash things over. You can get a lot more discussed, and for most people it's much easier to talk than to write. But when it comes to a recapitulation of who said what, where are you? Make a recording? Possible, but usually not practical (despite Watergate), and still not admissable in court as evidence, should it come to that. And even a recording, unless special announcements are made, will usually omit the date of a conversation and often the identity of those being recorded.

In the emotional and physical stress of an emergency situation, it is often just not practical for the field station to write everything down. No argument about this. On the other hand, there is all too often a tendency on the part of field station operators to make no attempt to write *anything* down, or even to get the information required for proper authentication or records. Let's enumerate a few maxims of emergency field operation:

1) Take writing materials into the field with you. Plain lead pencils are best, because they are cheap and mostly impervious to heat, cold and moisture. A standard log book can be used for all entries and notes, formal and informal, but usually it helps to have at least one pad of message blanks and some scratch paper in the form of pads.

2) Be a scribbler as you operate. In the confusion of intensive emergency operation you can't always judge which things are important and which are unimportant. So scribble down everything you can as you can – names of people, times of events, thumbnail descriptions, call letters, times – as it happens. No loss if you can't figure some of it out later; and some of it will make sense.

3) When someone wants to contact someone through your station, hand him a message blank. If the person to be contacted is at the mike at the other end, get his name, the name of the person at your end and a brief description of the subject of the exchange – get it down on paper. Don't make the mistake of assuming you'll remember it, much less remember it right. Get signatures too, if you can.

4) It's one thing to say "Get word to Col. Adams at the Red Cross that more blankets are needed at the Community Center in Podunk, according to Jeff Tonkin" – a properly addressed and authenticated communication as far as it goes – and quite another to transmit a formal message, such as "Please copy message number five, Priority, WINJM, Check 7 Riverflood, Miss., Nov. 12, Colonel Averil Adams, Red Cross, Reliefville, Miss., more blankets needed at Podunk Community Center, (signed) Jeff Tonkin, end of message." The latter takes longer, but the written and serviced message is in your log or your file. You won't have to remember what it said or who sent it to whom or when.

5) But even recorded messages should contain as much information as possible. Perhaps, in the

* Assistant Communications Manager, ARRL.

[1] "No Formal Procedure Was Used..." Feb. '66, p. 42.

On National Hunting and Fishing Day, Sept. 22, the Pioneer Valley Repeater Association, assisted by the New Haven Co. Amateur Repeater Association, set up 2-meter mobiles and portables at 4 Connecticut-sponsored events to assist in coordination among the activities. Connecticut's Gov. Meskill visited the 4 areas accompanied by W1FXK who provided the communications link. The Governor is shown here (left) with WA1RZA.

Again this year (August 23 - September 3) amateur radio and its public service attributes were demonstrated at the Ohio State Fair, under the call WO8HIO. Shown taking traffic (center) is W8KJM, with WB8AHP checking equipment. Both cw and phone NTS nets were used for traffic routing. WB8AHP is at the mike, while K8MLO is at the paddle. Some 27 amateurs were involved.

above example, Col. Adams never heard of Jeff Tonkin, so a title or identification of some kind should be indicated after the signature, if it can be obtained. Get all the information you can in the time you have to get it. It may not be possible, but to the extent it is, you'll be that much better off in any recap of the situation – and there always is one.

6) Use your head. This depends on keeping calm, a hard thing to do in the stress of an emergency. Field stations should be controlled by a station located high and dry with sufficient signal power to be heard by all, and much of the recordkeeping can be from that point. If such an arrangement can relieve the field station of most of the responsibility of record-keeping, fine. It still does not relieve the field operator from knowing who is using his facilities, for what purpose.

7) Stick to communicating. Many amateurs operating in the field are prone to make statements and volunteer opinions, some of which can be quoted in the press. If you are serving a dual or multi-purpose role, that's different. But if you are simply an amateur operating through AREC, RACES or whatever, your place is not that of a commentator or an originator of communications. You just handle the communications given to you to handle, in the most efficient manner possible. Anything you volunteer on your own is strictly "off the record," or should be.

8) Some repeaters tape-record all transmissions, or can easily be equipped to do so in an emergency. While this may be thought to relieve the necessity for a great deal, if not all, paperwork in the field, it is still far better to have as much of a written record as possible.

In short, reduce it to writing. This is a much more positive method of pinpointing than relying on memory or voice recordings. – *W1NJM.*

With the AREC

■ This issue marks the return of a section in the Public Service column which deals directly with the various aspects and objectives of the ARRL-sponsored Amateur Radio Emergency Corps. We will deal with some of the questions and problems which may arise in AREC administration and discuss topics related to AREC operation.

We'd best start by describing just what AREC is. Experience has proven that amateurs respond more capably in times of emergency when the individuals' capabilities (and equipment) are known ahead of time and practice in communications has been conducted in an organized group. Thus, *the Amateur Radio Emergency Corps has* been established as a voluntary organization of licensed radio amateurs, who have registered their capabilities and equipment for providing emergency communications as a public service to the community.

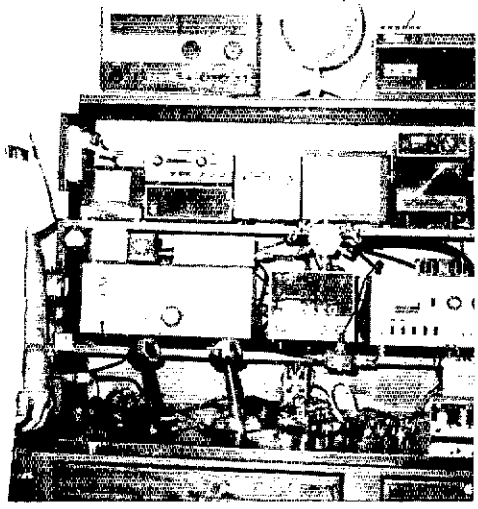
Since there is no substitute for experience gained *before* the need arises, AREC groups are encouraged to conduct regular drills or tests to maintain their effectiveness. However, no minimum participation or special equipment is required for AREC membership. Nor is League membership required.

The AREC in each locality operates under the direction of the Emergency Coordinator. In most cases, only registration of one's facilities and a willingness to be available for emergency communications are required for AREC membership. AREC registration forms (available from Hq., your EC, SEC or SCM, or included with ARRL initial-membership or renewal letters) can be sent directly to your EC, or to Hq. for proper routing to your

About time...

At this writing, there are indications that a return to Daylight Savings time because of the energy crisis, is possible. If this occurs, it is assumed that all National Traffic System nets will meet one hour earlier per UT (GMT), thus at the same *local* time. The Simulated Emergency Test NTS schedule (in the SET Bulletin, mailed to ECs, PAMs, RMs, etc.) remains the same except for the times for the Continental Traffic Net, which will be one hour (UT) earlier.

Don't forget the SET, on January 26-27! See December 1973 *QST*, page 57, or contact your Emergency Coordinator and/or net manager.



DU6EG assisted in amateur communications which may have saved the life of an injured seaman last Sept. After medical advice was given, arrangements were made to have the seaman removed from the ship and taken to a hospital in Rangoon. Details appeared in the Public Service Diary in December 1973 *QST*.

EC. If you are not presently a member, or have not registered your facilities recently, we urge you to obtain an AREC registration card, complete it and route to your EC.

Unfortunately, we do not have enough voluntary leaders (ECs) for each community or area throughout the U.S. and Canada. It is not infrequent that it is necessary to forward an AREC registration to a Section Emergency Coordinator. If you do not receive response from your registration, it is likely that there is no EC in your area. If you would be willing to better prepare your community for emergency communications, volunteering to become an EC would be a welcomed first step. As an EC you won't receive any monetary remuneration, but the rewards in leading a group to good emergency preparedness are high.

All amateurs can be of assistance to the AREC. Won't you join us in providing this essential amateur radio service?

■ *Forty SEC* reports were filed in October listing 13,668 AREC members. That's tops for the year (but still two more months for more improvement before year-end totals). In October, 1972, 36 SEC reports were received covering 11,859 members. SECs: resolve to make 1974 a 100% reporting year! Sections reported: Alta, BC, Colo, Conn, ENY, EMass, Ga, Ill, Iowa, Kans, Ky, La, Mar, Mich, Miss, Mo, Nebr, Nev, NFla, NTex, Ohio, Okla, Ont, Org, Oreg, SV, SDgo, SJV, SBar, SCV, Sask, SDak, SFla, STex, Utah, Va, Wash, W Mass, WNY, WPa.

Traffic Talk

■ In a recent Tennessee CW Net Bulletin, W4ZJY tackled a subject which is prominent in the minds of many traffic handlers. We quote Dave's remarks, with slight modifications which allow equal reference to both cw and phone nets.

"I'd like to write a few words on a most important subject. You, I, all of us active on section level NTS nets have a major responsibility ahead of us. It's been with us for a long time, but a lot of us seemingly are blind or could care less. I'm telling you tho . . . . if we don't get off our cans and do something, we will have only ourselves to blame!

"Do we want to see our section nets go extinct? Do we really care? A lot of them are just barely hanging on! Why is this? What is the problem?

"The answer is simple. We, individually, are not ORIGINATING enough traffic. If we don't originate more traffic, our section net activity will either go dead or barely hang on . . . til the bitter end.

"Traffic is the 'blood' of any net system. Without it, chances are that the system will dry up and die . . . . fade away. To a great many amateurs in a net system, and the number increases rapidly, if there isn't enough traffic to hold their interest, they won't stay with us . . . and/or it's difficult to recruit and sustain new outlets.

"One, therefore, might summarize and formulate a mathematical formula that tells us that the future destiny of our section nets is in DIRECT PROPORTION to the quantity of traffic that we as individuals take the extra effort to originate.

"Don't get caught thinking 'I'll leave it up to the other fella.' This won't do, because you can bet your boots that 'the other fella' is thinking the very same thing.

"Please work on it, fellas. Create club projects, school activities, local fairs, etc . . . . then there are those we ourselves could originate."

The bulletin goes on to quote W4PL, an "ole Tenn. brass pounder pioneer" active in traffic work for years.

"Although amateur radio is usually referred to as a hobby, as a matter of pure law, no license is ever issued to any radio station except in the public interest, convenience, or necessity (PICON). Of all who avail themselves of the privilege, the traffic man comes nearest to living up to his share of the bargin. Disaster work is spectacular, and gets headlines, but amateur radio's happiest contact with J. Q. Public is the steady day-in and day-out handling of messages free, gratis, for nothing, on the house, and with the compliments of amateur radio. We are building up for amateur radio an immense backlog of good will."

Is this still valid? We sure hope so! But it takes more than the efforts of a few. How often do you *originate* traffic on behalf of *third parties?* The public is probably not generally aware that the routine message handling capabilities of amateurs are available; *we* must go to the public. Describe to friends, relatives, business associates, etc., how messages are handled for non-amateurs. Let them know that we need messages to keep in practice for emergency situations.

That the number of messages handled by amateurs is decreasing can be substantiated by statistics. If the decline continues, we have mostly ourselves to blame. We amateurs have a good public service record, which, with a little more effort, we can sustain and improve.

■ *Procedural points.* The time and date in the preamble of a message are based on filing time rather than when the message is sent on the air.

Public Service Honor Roll October 1973

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total points in the nine categories below, as reported to their SCM. 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)*	
Max. Pts.	*10*	*10*	*12*	*12*	*12*	*20*	*3*	*--*	*5*	*Totals*
WAØVYB	10	10	6	12	12	11			5	66
KL7JDO	10	10	9	12		20			5	66
WB2RKK	10	10	12	12	12		3		5	64
WA3RCI	10	10	12	12	12	4	3			63
WA8EIX	10	10	12	12	12	2			5	63
WAØVAS		10		12	12	20	3		5	62
WA1MSK	10	10	12	12	12				5	61
WA3DUM	10	10	12	12	12				5	61
W5GHP	10	10	12	12	12				5	61
W7OCX	10	10	12	12	12				5	61
W@OYH	10	10	12	9	12		3		5	61
WB4SVH	10	10	12	9	12	2			5	60
WBØHOX		10		12	12	18	3		5	60
WA1FCM	10	10	12	12	12		3			59
W3ABT	10	10	12	12	12		3			59
KØBAD/4	10	10	12	6	12		3		5	58
WB8NRC	10	10	12	12	12	1				57
WBØCZR	10	10	12	12	12	1				57
WA1LIR	10	10	12	12	12					56
WB2OYV	10	10	12	12	12					56
WB8KZD	10	10	12	12	12					56
WA9QVT/4	10	10	12	12	12					56
WBØHBM	10	10	12	12	12					56
VE1AMR	10	10	12	12	12					56
WA2SHT	10	10	12	9	12					53
WA5ZZA	10	10	12	9	12					53
W2OE	10	10	12	12			3		5	52
WB4VYU	10	10		12	12	3			5	52
WB5AMN	8	10		9		20			5	52
KØBIX	10	10	6	9	12				5	52
KØJTW		10		12	12	18				52
WAØMLE	10	10	12	3	12				5	52
VE3GT	10	10		12	12	8				52
WB2CHY	10	10	6	12	12					50
WB8MJI	10	10	6	12	12					50
WB8NII	10	10	12	12	6					50
K3OIO	10	10	12	3	12	2				49
WB4YCV	10	10	12		12				5	49
WA6TVA	10	10	3	12	9				5	49
WA7OCV	10	10	12	12					5	49
K7OUF	10	10	12		12				5	49
WA8UPI	10	10		12	12				5	49
WA8ZNC	10	10	12		12				5	49
WB9KVN	10	10	12		12				5	49
KØMRI	10	10	12		12				5	49
VE3FQZ	10	10	12	12					5	49
VE3GFN	10	10	12		12				5	49
WB4UIH	10	8	12	6	12					48
K6GMI		10		12	12	6	3		5	48
WA4AVD	10	10	12	3	12					47
K6UYK	10	10	12		12		3			47
WA7NWV	6	10		12	12	2			5	47
K8MLO	10	10	6	9	12					47
W5TFS/Ø	10	6		3	6	20				45

WA1LNF .	44	WA4BAA .	39	K3CB . .	34
KIYMH .	44	W4WCG . .	39	WA3EOP .	34
WA3SWF .	44	W6BVB . .	39	W4UQ . .	34
WB5DBK .	44	WB8IFT . .	39	W4ZJY . .	34
WB5DLW .	44	WB8KKI . .	39	WB5FML .	34
K5YTA . .	44	WA9EED .	39	W5GSN .	34
WB6AKR .	44	WB9FOT . .	39	WA6IDN .	34
W7DAN .	44	WA9MWF/4	39	W6RFF .	34
WB8JGW .	44	WØHI . . .	39	W6YBV .	34
WBØHSZ .	44	VE3AWE .	39	W9EJ . .	34
VE3GJG .	44	VE3DPO . .	39	W9FWH .	34
VE3SB . .	44	VE3EWD .	39	WB9JPS .	34
K3PIE . .	43	WB2PYM .	38	W9KX . .	34
W8GLC . .	43	WB4EKJ . .	38	W9QLW .	34
WN1RFD .	42	WB5GZG .	38	WBØCUY .	34
W2MTA .	42	WB2ADW .	37	VE3EHF .	34
WA3ATQ .	42	WB2FNK .	37	K6NCG* .	33
WA5VBM .	42	WB2JRX . .	37	WA1NLD .	32
K7IFG . .	42	W3FCS . .	37	W4BYG .	32
WAØYVT .	42	K4IAF . . .	37	WB4DXN .	32
CI1ARB .	42	W5ABQ . .	37	WB5FMA .	32
W4WXZ .	41	WB8MZZ .	37	W6BGF .	32
WA1PHF*	40	WA2EPI . .	36	W6DEF .	32
K3ZNP . .	40	W7WAH/5 .	36	WB6PGK .	32
K4OSL . .	40	W8IBX . .	36	W7AXT .	32
W4SQO . .	40	WB8KXV .	36	W7IEU . .	32
W6AUC . .	40	WA2TRK .	35	WA7MEL .	32
WA6DEI .	40	WB4RUA .	35	WB8GKB .	32
W6INH . .	40	W5HGT . .	35	WAØYJW .	32
WB8NCD .	40	W7BQ . . .	35	VE3FGV .	32
K1SXF . .	39	W7PI . . .	35	WA3IIV .	31
W2FR . .	39	W9KRR/4 .	35	WB4ZQF .	31
WB2LZN .	39	WBØBMG .	35	WB6TYA .	31
W2RUF . .	39	WA1PGY .	34	W3LOS . .	30
K3KAJ . .	39	WB2FCD . .	34	K4BSS/4 .	30
W3NEM .	39	W2KAT/3 .	34	W8ID . .	30
WA3PZO .	39	WB2VEJ . .	34	KL7HFM .	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 liaison, 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.

The recipient of a message wants to know when the "signee" filed the message not when the amateur first transmitted it. For example, at an exhibit station more traffic is usually filed in one day than can be handled that day. Even though the traffic is held over for the next day, the message date (and file time, if used) should indicate the day that the "signee" wrote the message and filed it with the amateurs. Our job is to present accurate information to the recipient, not try to make ourselves look better than we deserve.

Speaking of the date, the year should not be included in the preamble. Let's hope we get the message delivered within the same year!

■ *Only the originator may cancel a message.* Frequently a service message is received which says "YOUR NUMBER 8 UNDELIVERABLE BECAUSE . . . X QTA." The non-delivery station can *ask* the originator to cancel the message or supply more information, but he cannot cancel the message himself without permission. Careful!

■ *National Traffic System.* On November 1, the First Region Net managership changed hands. Why is this special? Well, 1RN has only had two net managers, W1BVR and W1EFW, since its beginning when the National Traffic System started operation in 1949. No other region or area NTS net can claim such a small turnover in net leadership. W1BVR retired in 1966 after over 16 years as manager; longer than any other NTS official in the system's history. Although W1QYY has assumed managership, both W1BVR and W1EFW have remained very active in 1RN and NTS.

Other senior NTS officials are: W4SHJ, 4RN Manager since August 1961; 8RN Manager W8CHT, since September 1962; TCC-Eastern Director, W3EML, began directing in January 1963; and EAN's K2KIR, manager since April 1964.

To all NTS managers, at all levels, goes a loud burst of applause.

■ *October reports.* W2FR sez that the 100% representation record looks great on 2RN, even if

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for October Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
K3NSN	512	1785	1789	289	4375
W3CUL	264	998	909	61	2232
KØONK	112	575	566	15	1268
WØWYX	58	501	122	379	1060
W3VR	149	392	359	15	915
KØBAD/4	11	404	394	1	810
W1PEX	228	262	151	29	670
WA3RCI	78	285	220	85	668
WAØVAS	107	279	49	230	665
W6RSY	32	330	260	32	654
WA8MCR	3	281	257	24	565
WB2RKK	40	242	213	15	510

BPL for 100 or more originations-plus-deliveries

K9MWA	227	W5UH	140	WØQYH	108
WB8ITT	183	K6GMI	133	WAØYVT	106
WN1RFD	168	WBØHOX	126	WA1FCM	105
K4KDJ	159	WAØAUX	121	K6UYK	105
WA1PHJ	148	W8QCU	119	WA1PHJ(Sep.)	114
K3CR	144	K7NTS	118	WA1LIR(Sep.)	101
		WA2EPI	109		

More-Than-One-Operator Station

W4UC/4 391, W3ABT 109

BPL Medallions (see December, 1973 *QST*, p. 59) have been awarded to the following amateurs since last month's listings: WA2CNE, WA3OLG, WB4MWC, WN8MKL, WB9FHL.

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.

the traffic total is for the birds. WA2UWA is keeping a watchful eye on D2RN activities and submitting the monthly report. Weekend representation of D3RN continues to be a problem. RN5 traffic total was aided by substantial amounts of fair traffic. KØBAD has sent RN5 certificates to W2FIR/5, W4s MOQ YNG, K4YFC, WA4IJH, WB4s HJW KSL NIR, K5ROZ, WA5s EID VJW. First DRN6 report is filed by K6GMI. RN7 is again holding a 0145Z session rather than the scheduled late session because of band conditions. WA9EED has awarded 9RN certificates to K4QCQ, W9s CXY DND EI MUC NXG OYL QLW, WB9s EAY JPS KVN NJA.

October Reports

Net	Sessions	Traffic	Avg.	Rate	% Rep.
EAN	31	1368	44.1	1.111	99.5
CAN	31	969	31.3	.928	99.5
PAN	31	984	31.7	.747	96.2
CTN	31	376	12.1	.200	79.5
1RN	62	419	6.8	.346	91.7
D1RN	31	155	5.0	.283	61.3
2RN	61	412	6.7	.605	100.0
D2RN	31	81	2.6	.213	97.8
3RN	61	482	7.9	.514	95.6
D3RN	30	182	6.1	.325	93.6
4RN	56	425	7.6	.308	88.0
D4RN	11	29	2.6	.146	34.1
RN5	62	804	12.9	.497	95.6
RN6	62	650	10.5	.482	100.0
DRN6	31	121	3.9	.102	64.5
RN7	62	222	3.6	.261	71.7
9RN	62	376	6.1	.463	95.6
TEN	62	435	7.0	.429	84.8
DTRN	30	136	4.5	.129	70.3
ECN	62	243	3.9	.296	92.5
TWN	57	315	5.5	.190	87.4
TCC Eastern	111[1]	557			
TCC Central	87[1]	490			
TCC Pacific	111[1]	708			
Sections[2]	3289	12512	3.8		
Summary	*4246*	*23451*	*5.5*		
Record	*3352*	*31117*	*16.4*	*1.440*	

[1] TCC functions not counted as net sessions.

[2] Section and local nets reporting (100): MTN (MB), APN (Mar), CM GBN ODN OPN OQN (ON), WQ-V/UHF (PQ), AENB AEND AENM (AL), AKW Snipers (AK), ATEN (AZ), OZK (AR), IEN NCN NEN OrgCo-40M SCN (CA), CCN SSN (CO), BEN CN CPN NVHFTN (CT), DEPN DTN (DE), EAST FMTN FPTN GN QFN TPTN VEN (FL), GaSSBN GSN (GA), IMN (ID, MT), TLCN (IA), KSWX QKS QKS-SS (KS), KNTN KSN KTN KYN MKPN (KY), LTN (LA), SGN (ME), MDCTN (MD, DC), EMN WMEN WMN WMPN (MA), QMN (MI), MJN MSPN PAW (MN), JC2AN MoAREC MON MoSSBN WEN (MO), MTN (MT), NJN NJPN NJSN WEN (NJ), NLI NYS (NY), CN CNL NCSSBN THEN VHF-TFC (NC), BMCEN OSSBN (OH), OLZ OPEN OPON SSZ (OK), Ore-AREC OSN (OR), EPA EPAEP&TN PTTN WPA (PA), RISN (RI), TN TNN (TN), TEX TEX-SS TTN (TX), BUN UCN (UT), VN VSN (VA), NSN WSN (WA), WVN (WV).

Transcontinental Corps

W2FR fills-in for the "hospitaling" TCC-E Dir., W3EML. Poor conditions took their toll on TCC-E statistics. A TCC-P certificate has been issued to W6ISC by K5MAT.

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	124	89.5	1502	557
Central	95	91.5	1044	490
Pacific	124	89.5	1474	708
Summary	*343*	*90.1*	*4020*	*1755*

The TCC roster (Oct.): Eastern Area (W3EML, Dir.) – W1s EJI NJM QYY, WA1MSK, W2s FR GKZ KAT/3, WA2s AYC CXY UWA, WB2RKK, W3EML, K3s CB MVO, W4s SQQ UQ, K4s GTS KNP, WB4s OMG SGV, W8s PMJ VDA/4, K8KMQ, WA8PIM, WB8KKI, VE3SB. Central Area (KØAEM, Dir.) – W4s OGG ZJY, K4BSS, WB4s HQW YCV, W5s GHP QU SBM TNT, WB5s FDP FML, W9s CXY NXG, K9HDP, WA9EED, WØs HI IYP LCX MOQ ZHN, KØDDA, WAØROK. Pacific Area (K5MAT, Dir.) – W5RE, K5MAT, W6s BGF EOT IPW ISC MLF RSY VNQ VZT, WA6DEI, WB6s AKR VKV, W7s BQ GHT KZ UTM, K7s NHL QFG, WØLQ, KØOTH.

Independent Net Reports (October)

Net	Sessions	Traffic	Check-ins
Hit & Bounce Slow	17	88	149
North American Traffic	27	265	495
Mike Farad	25	121	170
40 Meter Sideband	21	1200	222
Hit & Bounce	31	737	329
Northeast Traffic	31	181	261
75 Meter ISSB	31	245	1244
IMRA	41	450	1243
7290 Traffic	44	508	2311
Clearing House	27	274	339
Ohio Valley Teenage	31	100	333

Public Service Diary

■ We have received additional accounts of amateur activities concerning the Tornado which struck Clay Center, KS, on Sept. 25. Members of the Kansas AREC from Zones 3 and 4 monitored 75 and 2 meters throughout the night to ascertain the community's needs. At 0915, Sept. 26, they set up base stations at Red Cross Hq. Additional stations were established in Greenleaf and Linn (which were also struck by tornadoes) for coordinating Red Cross service and providing health and welfare assistance. Support was also provided by Kansas State Univ. ARC (WØQQQ), Univ. of Kansas ARC (KØKU) and Kaw Valley RC (WØCET). Some 1382 messages were handled in 84 hours of operation involving the WAØCJQ, WRØABB and WRØANG repeaters and more than 50 amateurs. - (WAØUXI, EC, Zone 3; WBØFZR, AEC; KØJMF, SEC KS)

NTS Central Area Staff Chairman, WØZHN, met with Tenth Region Net Manager, WØHI, at the International Peace Gardens Hamfest on the North Dakota - VE4 border last July.

WØQQQ was manned for about 75 hours, handling 120 messages. Many club members took equipment into the area and spent about 150 hours in addition to manning the club station. - (WØQQQ Newsletter)

■ On Sept. 26, WB2FXB requested that someone summon police and ambulance to Marker 83 on the Ohio Turnpike where an accident with injuries had occurred. K8HNI responded and called police who were quickly dispatched. - (WB8JJU)

■ While mobile on U.S. 50 in Johnson Co., MO on Sept. 28, WA9ZTY overtook an automobile-transport truck carrying junked cars, one of which was on fire. He called KØBIX through the WAØVWQ repeater requesting authorities be notified. WA9ZTY then attempted to alert the driver. - (KØBIX, SEC MO)

■ During October, Harris Co., TX amateurs reported and summoned aid to 12 automobile accidents and summoned 6 ambulances using WR5AAA. - (WA5ABA, EC Harris Co.)

■ On Oct. 3, KG4FU was called by HP4CK requesting help. A mother and daughter had been bitten by a dog (later found to be rabid) while visiting in South America. KG4FU relayed the message to the American Embassy in Ghana and later learned that the family had begun appropriate medical treatment. - (KG4FX/WB5IBA)

■ WB4JVY came upon a stalled car on a railroad track (Oct. 5) which had become stuck when an attempt was made to push it off the tracks. Knowing that a train was due, WB4JVY called on WR4ADD for assistance. W4WLF suggested that the railroad dispatcher be called. WB4ZAG made the call then alerted the Sheriff's Dept. The train slowed down until the tracks were cleared. - (K4AOZ)

■ While stopped at an intersection north of Warrensburg, MO on Oct. 6, WA5KBH's auto was struck from behind. Authorities were notified through the WAØVWQ repeater. - (KØBIX, SEC MO)

■ Red Cross requested two amateurs to go to Oneonta, AL, to furnish communications during a raging fire on Oct. 8. WB4s APT ZAG volunteered. WA4CXD and WB4ZAG operated on 2 and 75 meters handling traffic from the fire zone to Red Cross Hq. in Birmingham until the fire was brought under control. - (K4AOZ)

■ At approximately 2015 on Oct. 10, WB4ACJ mobile-3 came upon a serious auto accident at Fort Meade, MD. He called WA9WGW/3 who relayed to county police. WA3SWS assisted in keeping the frequency clear. - (WA3SWS)

■ Torrential rains began in Enid, OK, about 2230 GMT, Oct. 10. Information from mobile and fixed stations indicated likely major flooding. K5CAY notified state c.d. and Red Cross by 2-meter fm through W5OZE, as long-distance telephone circuits began to go out of service. Amateurs were alerted. At 1100 GMT the following morning, a communications post was set up by EC WA5ZOO and WA5UJF. Throughout the day, amateur radio was the only dependable link to state agencies and communications were handled on WR5ABW and the Okla. Phone Emergency Net (with W5YJ, Okla. State Univ. ARC, NCS during most of the emergency). During the 3-day period, 28 formal emergency messages were handled as well as 499 h & w requests. Eighteen Enid amateurs participated.

A call was received from Lammont, OK that a small child was having a high fever and in need of immediate medical attention. WA5UJG contacted a helicopter pilot and arranged an airlift.

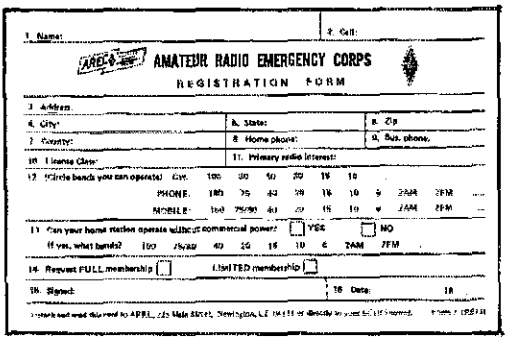
State National Guard Hq. in Oklahoma City lost contact with their units in Dover, OK. Amateur communications were used until their radio contact was restored. - (WA5FSN, SEC OK)

■ At 1530 Oct. 13, WB8FKC witnessed an automobile accident while driving on I-77 near Akron, OH. He contacted WB8DXW via WB8DJP repeater and police were dispatched within seconds after the accident occurred. - (WA8COA, SEC OH)

■ Eight members of the Malden RACES group participated in or at the Chelsea (MA) Fire on Oct. 14. WR1AAA was operated on an emergency basis until 0300, Oct. 15. K1s LOG .VTE assisted in getting baby supplies and food to the Chelsea Armory. K1VTE also helped coordinate some of the radio units into the National Guard units at the scene. WA1s QLC QLD QPR were assigned to the Armory. Amateurs came from all over Massachusetts to help out. - (W1BHD)

The Minuteman Repeater Assn., under the guidance of K1MPD, set up command stations at Chelsea Police and Fire Hq., aboard a National Guard helicopter, at the Chelsea Naval Hospital and at the National Guard Armory in Everett. Other amateurs were scattered throughout the disaster scene working with National Guard and city officials. - (K1CCW)

■ In the early hours of Oct. 27, a forest fire developed in the Lake Moreno Campo area 50 miles southeast of San Diego, CA. San Diego Repeater Assn. members were the first on the scene and succeeded in evacuating many livestock. AREC and RACES members were alerted and put on standby. At 1400, two mobiles were dispatched to a Campo high school to set up an evacuation center. At 2000 two mobiles were sent to Potrero Co. Park to watch for possible evacuation of that



AMATEUR RADIO EMERGENCY CORPS

REGISTRATION FORM

Have you filled out one of these new AREC registration forms yet? You should. See "With the AREC," elsewhere in this column, for details.

area because of heavy winds. Mobiles maintained surveillance for 24 hours at which time the fire had been mostly contained. - (W6GBF, SCM SDgo)

■ Traveling on Highway 11 in Minnehaha, Co., SD on Oct. 28, KØRSL came across an accident. His WRØABX call was answered by WAØRIQ who called police and ambulance. Assistance arrived within 5 minutes. - (WAØRIQ, SEC SD)

■ On Nov. 2, WA4GGN was driving in a remote section of Birmingham, AL, when his car had a blow-out. He called on 2-meter simplex. K4UMD answered and called WA4GGN's wife who sent help. - (K4AOZ)

■ While traveling on I-75 near Anna, OH, on Nov. 4, WB8OSO witnessed a serious two-car accident. Using 2-meter fm, WB8PJZ was advised of the accident and relayed the information to police. A patrol car near the scene was immediately dispatched and aid gotten to injured survivors much faster than would have been possible without the assistance of amateur radio. - (WA8COA, SEC OH; WB8OSO)

■ Near Aiken, SC, WB4ZVX came upon an overturned car/travel trailer on Nov. 4. He called for help on the WB4PLN repeater and police arrived in about five minutes. - (W4BYG, SCM GA)

■ Shortly after noon on Nov. 5, the business district of Indianapolis, IN, was struck by one of the worst fires in its history. Amateurs with hand-portable capability were assigned to rescue and medical evacuation units at the scene of the fire. This operation was handled on 2-meter simplex frequencies. Mobile units were sent to check all of the fire stations in the city which were left unmanned. Operation was handled through WR9ABP. Forty-one amateurs responded to the call for assistance. - (K9DUR)

■ Owensboro, KY AREC assisted Civil Air Patrol in location of a downed small aircraft during the period Nov. 9 through 11. The aircraft was first spotted by W4OYI, W4EWM and WA1KAT/4 from the air. WB4ANL was directed to within 500 yards of the sight, but could go no further. The party landed and WA1KAT joined the ground party consisting of WN4DPW and CAP officials. They were directed to the downed aircraft from the air via 2 meters. - (W4CID, SCM KY; W4OYI, ADir.)

■ On Nov. 11, K4TQU had serious car trouble 13 miles from Ocala, FL. His 2-meter call was answered by WB4FJA who arranged motorist aid on the expressway. - (W4BYG, SCM GA)

■ During the summer months, the Sioux Valley Repeater Assn. was activated 8 times to provide communications with key towns in the 4 southwest Minnesota counties which are under the coordination of the National Weather Service at Sioux Falls, SD. When severe weather watches were issued, the Service contacted amateurs who then announced the details of the watch on WRØABX, thus alerting the stations in the Minnesota counties. When threatening weather developed, amateurs were requested to set up operation in the Severe Weather Room in the NWS office. - (WAØRIQ, SEC SD)

■ *September Special Events.* Eleven members of the Central Ohio AREC linked checkpoints, observation points and the control point in the 1973 Sunriser 400 Road Rally on Sept. 15. - (WB8DDE) In western Massachusetts and western Connecticut, 18 amateurs, four 2-meter repeaters and one 75-meter SSB net were utilized by AREC members providing Audobon Society members communications among themselves and a coordinator during their observations of the annual fall migration on Sept. 15-16. - (WA1DNB, SEC) On Sept. 22, the Central Ohio AREC assisted with communications for the American Cancer Society's Bike-a-thon. Amateurs were along each bike route, at Cancer Society Hq. and much of the communications were through WR8ABV. - (WB8AHP) The start and finish lines in the Lake Luzern (NY) Fall Festival Canoe and Kayak Race were linked by 11 members of the Glens Falls Area AREC on Sept. 29. - (K2AYQ, EC)

October. On Oct. 7, 4 amateurs aided Chesapeake, VA, and its hospital fund by supplying communications for a Walk-a-Thon. Most work was on 2-meter simplex with autopatch calls through WR4ACN. - (WA4BUE) Members of the Tampa Bay Repeater Assn. supported a Boy Scout camping trip on Oct. 19-20, using hand-held 2-meter rigs. - (WB4TUP, EC) The March of Dimes Walk-a-Thon in Palo Alto - Los Altos, CA was held Oct. 20 with 8 amateurs from the Southern Peninsula Communications System assisting. - (W6DEF) The Central Ohio AREC was out again in force (this time 26) to furnish checkpoint contact for a sports car road rally in Fairfield Co. on Oct. 21. - (K8MLO, AEC) At request of Marion Co. (IN) Sheriff's Dept., 34 members of the Marion Co. Emergency Communications Net patrolled suburban Indianapolis Oct. 29-31 to help keep down amount of Halloween vandalism. - (K9DUR) A Witch Watch was conducted by members of the District Heights (MD) Radio Club in cooperation with local police and recreation counsel on Halloween. - (WA3RJS)

November. The WR4ACN repeater was used on Nov. 6 to effect earlier election returns in Chesapeake, VA, with 22 amateurs from the Hampton Roads Radio Assn. (RACES) participating. - (WA4BUE) During the 1973 Univ. of Florida Homecoming Parade, local amateurs provided a "rescue" service for fallen paraders, on Nov. 16. - (WB4OMG, EC) QST

SOUTHEASTERN DIVISION CONVENTION

Miami, Florida **January 19-20, 1974**

Don't let "Ole Man Winter" get you down; take a break for two exciting days in the warm Florida sunshine at the 1974 ARRL Southeastern Division Convention and Tropical Hamboree. Let us entertain you with forums on DX, contests, traffic and ARRL activities. Miami Bayfront Park Auditorium will be filled to the walls with the latest in new equipment, a giant swap shop, club displays and thousands of eye-balling hams. ARRL Headquarters will be represented by the "Dynamic Duo" – Ellen, W1YL, and Bob, W1CW, White. Division director Larry Price, W4DQD, will bring up-to-date news from the January Board Meeting. Pack your bag and come on down!

For the ladies we have an afternoon of bingo; luncheon will be served preceeding the fun. Saturday evening group dinners are planned for OCWA, DXers, and others who will have their own speakers for interested visitors.

Headquarters hotel is the Everglades, 244 Biscayne Boulevard. Special convention rates are $19 single; $22 double. No advance deposit necessary if arrival is before 6:00 P.M.

Convention registration is $1 ($2 at the door), ladies luncheon and bingo, $5. Tickets and hotel reservations should be made through Dade Radio Club, P.O. Box 73 Biscayne Annex, Miami, Florida 33152. Hotel reservations should include arrival and departure dates. Please make checks or money orders for tickets payable to Dade Radio Club.

COMING ARRL CONVENTIONS

January 19-20 – Southeastern Division, Miami, Florida.
March 1-3 – Delta Division, Lafayette, Louisiana.
March 23-24 – Great Lakes Division, Muskegon, Michigan.
June 8-9 – Georgia State, Atlanta.
June 15-16 – Florida State, Orlando.
July 19-21 – NATIONAL, New York, N.Y.

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.

Hamfest Calendar

Illinois – Wheaton Community Radio Amateur's 12th annual Mid-Winter Swap n' Shop is Sunday, February 10, DuPage County Fairgrounds, Wheaton. Hours 8-5. Tickets $1.50 advance; $2 at door. Two buildings and unlimited parking. Bring your own tables. Free coffee and donuts 9-9:30 AM. For info contact L. O. Shaw, W9OKI, 433 S. Villa Ave., Villa Park IL 60181 before February 3.

Illinois – Sterling Rock Falls Amateur Radio Society's hamfest is March 10, at the Sterling Coliseum, 212 3rd Ave. Advance tickets $1.50; $2 door. Write: Don Van Sant, WA9PBS, 208 11th Ave., Rock Falls IL 61071.

Indiana – Lake County Amateur Radio Club's 21st annual banquet is February 9, 6:30 PM, at the Sherwood Club, 600 East Joliet St., Schererville (2 mi. east of Rt. 41, 1/4 mile north of Rt. 30). Chicken-dinner – all you can eat, awards, fellowship, speeches, entertainment, gifts, all for $6. For tickets write: Herbert S. Brier, W9EGQ, 385 Johnson St., Gary IN 46402. No tickets sold at door.

Indiana – LaPorte Amateur Radio Club's annual Swapfest-Auction is February 10, in the LaPorte Civic Auditorium beginning at 10 AM. Auction begins at 1 PM, talk-in .94 and 22-82.

Michigan – Oak Park Amateur Radio Club's fifth annual Swap n' Shop is Sunday, January 13.

Oklahoma – Fort Sill Amateur Radio Club's 27th annual hamfest and banquet is February 9, 10.

Wisconsin – West Allis Mid-Winter Swapfest is Sunday, January 27, at Waukesha County Exposition Center. (Take Trunk Hwy. F, exit on I-94 south 1.2 miles to County FT and West .8 miles to Swapfest). Doors open at 8 AM; refreshments available. Talk-in on 3985 and 146.94. Rain or shine. Tickets $1 advance; $1.50 at door. Write: WA9KRF, 4582 South Ahmedi Ave., Milwaukee WI 53207.

Strays

A little gremlin messed up the Field Day Class 4A call area leaders. The list should read: VA3JJ/3, W1NHK/1, W2FR/2, W3AI/3, W4CVY/4, W5SC/5, WA6LXN/6, W7YE/7, W8MAA/8, W9LM/9, WØERH/Ø. The 4A leader was WA6LXN/6.

– – – –

The call of the Granite State ARA (7A) was listed as W1FTS. It should be W1TFS.

– – – –

The "non-club group" score of W9EU/9 (3A) really belongs to the Indy DXers. They also had a Novice station under the call of WN9KRK/9. This information was inadvertently left off their log.

– – – –

The score of W9FK/9 (3A), West Allis RAC, should be listed as 1737-B-26-3824. This action raises them 3 places in the listings.

An error on our part placed the June VHF QSO Party log of W1EUJ in the check log category instead of the competitive listings. His score should read: 10,716-297-47-ABC. His multiplier box listing is 21-15-11 on 40, 144 and 220 MHz respectively. Correction of this error results in his winning the New Hampshire section certificate.

– – – –

The cw multi-single score of W3WJD was inadvertently left out of the DX Test listings. The total is 955,935-291-1095-C-46. Operators were W3WJD and W3BGN. This also increases the FRC club total to 43,566,329 points.

– – – –

The single operator cw score of K4CG (WA4-KJR, opr.) was included in the PVRC club totals but not listed in the results. The score should read 872,727-251-1159-C-85. This results in K4CG winning the Virginia cw certificate.

Correspondence From Members-

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

TEST CREDIT

● I commend your request that FCC allow a second chance for those applicants who fail the code test at an examining office the first time around. I know of several cases of no more than two mistakes during the one minute of solid copy at 13 wpm; as you so emphatically state in your request, he has kissed his $9 goodbye.

To some of us the code comes easily; to others it is extremely difficult. Nervousness and anxiety certainly enter into the picture during any examination. The FCC examination is no exception. Two people with equal code copying ability under different circumstances but with different nervous make-ups should not be penalized for it.

Let us hope that the FCC sees it your way and relaxes their rubber stamp rule just a little. Many people would think a lot more of them if they did so. – *C. Tom Massey, WB2ZBI, Glen Rock, NJ*

● The proposal for credit for cw is rather a waste of time. No one really minds the money. I believe what most licensees would like to see is code credit if you pass and then fail the written. I would gladly pay $18 for Extra Class if I could "prime" for the cw, take it, pass it and then (if I fail written) I could concentrate full effort on theory knowing the cw is behind me. – *Hugh Vandegrift, WA4WME/Ø, St. Louis, MO*

[EDITOR'S NOTE: The League's requests for test credits were covered in detail in *QST*'s "Happenings of the Month" column as part of its response to Docket 19658, p. 4, May 1973, and in a petition for rule amendment, p. 84, November 1973.]

WITS

● Since I was licensed in 1954, there was never a day on 20-meter cw, that the call WITS, calling a DX station, was not heard.

Don was on the air early in the morning, and in the evening, 7 days a week, working QSO after QSO, with many stations answering, "Hello, Don, nice to see you again." But this past year the call WITS was heard less and less, day after day, until one day in September the key was silent. I was greatly saddened to learn about the death of Don Mix. Along with many of Don's friends all over the world, I will surely miss hearing, "73 de WITS." – *Paul Neveu,Jr., WICKA, Bristol, CT*

PUBLIC SERVICE

● It has been an honor as well as a pleasure for me to have received the Public Service Award from ARRL. I thank you wholeheartedly for having sent me the diploma. I think that for me to have collaborated in the emergency due to the earthquake of Managua, on December 23rd, 1972, was only a duty that every radio operator must be ready to accomplish.

I would also like to thank the ARRL for the valuable and effective help that it gave to all of us at once through Bob Denniston, WØDX, Vice President of the ARRL and President of IARU. This help, as well as the presence of Bob himself, was very useful to us. I tell you this, interpreting also all the Managua radio amateurs' and its inhabitants's feelings. – *Ignacio Amezola G., YN1IAG, Managua,D.N.,Nicaragua*

● Thank you very much for the several laudatory comments which have appeared in *QST* magazine regarding participation of our amateur club station, KZ5USA, during the Managua earthquake tragedy last December. I understand that it is nearly impossible for you to print the entire story of each station's participation in the disaster relief effort during the critical days and nights following the earthquake.

Operators of KZ5USA voluntarily spent a good portion of their Christmas and New Year's holidays at the station passing disaster relief and health and welfare traffic. They indicate that the Stateside amateurs did a remarkable job of message handling and were extremely cooperative. I am sure your comprehensive training program in emergency communications for amateurs had much to do with the orderly manner in which all stations conducted themselves. Your organization is certainly to be congratulated for your outstanding efforts in this field.

I would like to nominate each of the KZ5USA operators for the American Radio Relay League Public Service Award for the selfless manner in which they conducted themselves during the period 23 December 1972 to 4 January 1973. I am extremely proud of these radio amateurs and of their actions in attempting to relieve some of the pain and suffering of the victims of this tragedy. – *Lester K. Tate, Colonel, SigC, Commanding, U.S. Army Strategic Communications Command-South, Fort Clayton, Canal Zone*

DXCC

● Many years ago, phone DXCC was established as an award separate from mixed-mode DXCC because of the relative difficulty of working new countries on phone at that time. That situation has changed drastically. These days anyone with a mouth, a transceiver, and a tri-bander can earn a 300 sticker in a few years.

Since the emphasis has shifted to phone DXing, finding "new ones" on cw has become increasingly difficult. I feel it would be appropriate to establish a cw-only DXCC, with the justification for establishing this award being basically the same as was used to establish the phone DXCC nearly thirty years ago. Recognition should be given for "doing it the hard way."

Additional benefits to be considered might be: (1) getting some of the dormant Honor-Roll types back on the air between expeditions that generate "new countries," and generally inject new life into the DXCC program (2) promote incentive licensing and cw skills (3) improve band-usage and possibly relieve some of the congestion in the phone bands. – *Brian Kelly, W3YIK, Aldan, PA*

ENERGY CRISIS

● The recent call by the President for energy conservation offers amateur radio an excellent opportunity to show its cooperative spirit. ARRL should recommend all amateurs voluntarily reduce their rated input power by operating "barefoot." The amount of energy saved by operating at a power input of 200 watts instead of 1000 watts over an extended period of operation (the ARRL DX Test is a good example) could be significant, as well as demonstrating amateur spirit.

One simple method of encouraging cooperation would be to prohibit high power operation during contests, and giving bonus multipliers for operation below 100 watts. Not only would this approach save energy, it might even make operation more enjoyable with a significant reduction in QRM. If everybody operates low power, we all have a fair chance. Our low power friends overseas would appreciate it too! – *Pat Burns, W4ZYQ, Smyrna, GA*

● With the energy crisis now fully upon us, isn't it time for all radio amateurs to do their part? I recommend all hams QRP their rigs to a maximum of 200 watts or less. That "barefoot exciter" is really only a few dB below a kW anyway. When you see the FD results and consider that this contest creates the maximum QRM of any operating time of the year, they show that even the battery groups or individuals can hold their own with ten watts or less (just check 1A and 5A categories). For my own part, I resolve to continue my QRP work with less than 10 watts and use no more than 200 in any future contest until the country catches up with its energy crisis. To quote G6CJ's QSL card: "Aerials which put the signals where they are wanted: a good crystal filter receiver: these, not QRO, will beat the QRM." Amen! Think of the kWhours we'll save in a year! – *David L. Hayden, W4WHK, Orange Park, FL*

STEMMING THE TIDE

● The FCC is on the road to legalizing 11 meters. First the antenna height limitation will be changed to 60 feet. Then all they have to do is legalize "Skiptalk" and "Leanyers" and they won't have an enforcement problem. Eleven meters is the only place I know of where outright contempt brings awards of favors. Only our diligent efforts will stem the tide in our favor. – *Alan Applegate, WBØBHE, Lakewood, CO*

BEING PREPARED

● I read with interest the letter from W8VRZ/8 regarding the attempts at K8EMY/8 to pass a message to New Hampshire during their Field Day operation. I couldn't help but wonder how they would have gone about passing the message during normal times: perhaps by getting on and searching for a New Hampshire station to take it?

It is a shame that the operators of the Southeast Amateur Radio Club are unaware of the existence of the National Traffic System. The NTS doesn't stop for Field Day; all the nets were in operation during that period and ready to handle that message as a matter of routine performance, making one little Girl Scout in the Cleveland area very happy. Instead, she was disappointed, not because of the impossiblility of passing a message during Field Day, but because of the lack of awareness on the part of the originators.

I operated with the Wayne Amateur Radio Technical Society during Field Day, and we handled a number of messages without difficulty, because we went through established NTS section nets. If the operators at K8EMY/8 had done the same, there would have been happiness instead of disappointment in their camp, I know.

I note with interest the comments about Field Day being a demonstration of emergency preparedness in communications. Any operator that thinks he is prepared for an emergency, but has no experience in net operation and doesn't even know where to find the nets to take his traffic, is deluding himself. It is this kind of operator that is more a hindrance than a help in a real emergency situation.

So to the operators at K8EMY/8 I say, fellows, if you are really interested in demonstrating your readiness to help in an emergency, then come around to the nets during the year and develop those skills which are so vital to emergency communication. Then when an emergency occurs, or during Field Day next time, you will be able to say, "Yes, I can help get that message through" – and mean it. – *John E. Bastin, WB8KKI, Manager, Ohio Slow Net, Wooster, OH*

TAMING TVI

● I think I should pass along to the ham fraternity some tips on how I tamed the TVI, BCI, TVI, and so on:

1) Build a house on the top of a hill, or in any other good spot away from other homes.

2) Don't install a phone (use the fm repeaters)!

3) Have a high fence or wall around your property.

4) Keep two ferocious dogs inside.

Well, during my first year on the new QTH, I never had the usual complaints on my operation, beside a farmer that noticed his chickens would lay fewer eggs when the big array was pointed in his direction! – *Charlie Monti, IIAMC, Merate, Italy*

MAKING IT POSSIBLE

● I was gratified to learn that my application for Life Membership in the League has been approved. I have always taken great pride in the work done to make the League the true voice of amateur radio operators in the United States.

My initial contacts with radio amateurs inspired me to pursue an education in electronic engineering. At the same time, and perhaps more importantly, it provided a bridge between myself as a young high school student and the adult establishment. These social contacts were important to me in my formative years and were reinforced through various incentives and activities such as AREC and Field Day.

Looking back over the approximately 18 years that I have been associated with amateur radio, I have many fond memories of the people I have met and of the various challenges that, sooner or later, confront all radio amateurs, as well as the gratification derived from participating in Civilian Defense activities, and from uniting families through the use of radiograms and phone patches.

I would like to sincerely say "thank you" to the organization which I truly believe did much to make the above possible. – *Richard E. Klein, K2STT, Forest Hills, NY*

IARU News

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

ZS RESTRICTED CODE-FREE LICENSE

The Postmaster General of South Africa has announced that his government will now issue a restricted amateur license for operation above 144 MHz to any person who has, except for the code test, demonstrated qualifications for a full amateur license. Crossband operation will not be permitted in cases where the entire or part of the communications link (including satellite communications) operates on frequencies below 144 MHz. Call signs will have the ZR prefix.

COSTA RICA, CANADA RECIPROCITY

On November 15, 1973, the Department of Communications in Canada announced that a reciprocal amateur operating agreement with Costa Rica had been concluded, effective immediately. Amateurs seeking permission to operate in Costa Rica should address inquiries to Mr. Guillermo Salgado, Oficina Control Nacional de Radio, Ministerio de Gobernacion, San Jose. The national amateur society is the *Radio Club of Costa Rica*, Apartado 2412, San Jose.

American Council of Voluntary Agencies for Foreign Service, Inc.
200 PARK AVENUE SOUTH, NEW YORK, N.Y. 10003
(212) 777-8210 • CABLE: ACVAFSERVE

November 5, 1973

Mr. John Huntoon
General Manager
American Radio Relay League
225 Main Street
Newington, Conn. 06111

Dear Mr. Huntoon:

On the occasion of a Foreign Disaster Relief Conference held recently, under the auspices of the U. S. Agency for International Development, the 18 American voluntary foreign service agencies participating voiced their debt of gratitude to amateur radio operators throughout the United States for the help rendered in times of foreign disasters. They asked the American Council of Voluntary Agencies for Foreign Service in which most of them hold membership, to make this fact known to you, and through you to the amateur radio operators who have been most generous and helpful.

Representatives of the various organizations attending the Conference cited numerous examples of times when they have been helped; when often the first and only means of direct communication with a stricken community overseas was through the untiring efforts of amateur radio operators. The occasions of such major disasters as the earthquakes in Peru and Managua were mentioned as well as numerous other tragedies.

Therefore, in behalf of these agencies whose names appear on the attached list, and of the people they serve overseas, please accept and in turn extend to the members of your League, our most sincere expressions of gratitude.

Very sincerely yours,

Leon O. Marion
Leon O. Marion
Executive Director

LOM:gbj
Encl.

20,000 AMATEURS IN WEST GERMANY

The *Deutscher Amateur Radio Club* reports that in July, 1973, the Federal Republic of Germany for the first time exceeded 20,000. The total includes 4,463 vhf-only (Class C) licenses, including 77 for repeaters; 15,600 for all amateur bands (Classes A and B); 553 club stations; and 874 aliens. In the first six months of 1973, the number of amateur licenses in the country rose 2.75%. Class C licenses increased by 7%, and Classes A and B by 1.6%.

QSL BUREAUS OF THE WORLD

For delivery of your QSLs to foreign amateurs, simply mail cards to the bureau of the proper country as listed below. Cards for territories and possessions not listed separately may be mailed to the bureau in the parent country: *e.g.*, cards for VP8s go to *RSGB* in Great Britain. W, K, VE and VO stations only may send foreign cards for which no bureau is listed to *ARRL*. See "How's DX?" for QSL information on specific stations.

Algeria: ARA QSL Service, P. O. Box 2, Algier R.P.

Angola: LARA, P. O. Box 484, Luanda

Antarctica: Dave Porter, K2BPP, Mountainside Rd., Mendham, NJ 07945

Argentina: RCA, Carlos Calvo 1424, Buenos Aires, BA

Austral/French Antarctic Lands: via Malagasy Republic

Australia: VK1 QSL Officer, VK1ACA Canberra Radio Society, P. O. Box 1173, Canberra City, A.C.T. 2601; VK2 QSL Officer WIA Hunter Branch, P. O. Box 134, Charlestown, N.S.W. 2290; VK3 QSL Bureau, Mr. E. Trebilcock, 340 Gillies St., Thornbury, Vic. 3071; VK4 QSL

It is with considerable pride that the *ARRL* shares this letter with the amateurs of the world. The voluntary agencies attending this Foreign Disaster Relief Conference were the American Freedom from Hunger Foundation, American Friends Service Committee, CARE, Inc., Catholic Relief Services, Christian Reformed World Relief Committee, Church World Service, Community Development Foundation, International Peace Academy, Lutheran World Relief, Medical Assistance Program, Pan American Development Foundation, The American National Red Cross, The Salvation Army, and World Vision Relief Organization.

Officer, P. O. Box 638, G.P.O. Brisbane, Qld. 4001; VK5 QSL Bureau, Mr. Geo. Luxon, VK5RX, 27 Belair Rd., Torrens Park, S. Aust. 5062; VK6 QSL Bureau, Mr. J. Rumble, VK6RU, Box F319, GPO Perth, W.A. 6001; VK7 QSL Bureau, P. O. Box 371D, G.P.O., Hobart, Tas. 7001; VK8, 9, Ø, Federal QSL Bureau, 23 Landale St., Box Hill, Victoria 3128.

Austria: OeVSV, Box 999, A-1014 Vienna
Azores: via Portugal
Bahama Islands: BARS, Box 6004, Nassau
Bahrein: (All MP4) Ian Cable, MP4BBW, P. O. Box 425, Awali
Barbados: ARSB, Box 814E, Bridgetown
Belgium: UBA, Postbox 634, 1000 Brussels
Bermuda: RSB, Box 275, Hamilton
Bolivia: RCB P. O. Box 2484, Cochabamba
Brazil: LABRE QSL Bureau, P. O. Box 070004, 70000 Brasilia DF
Bulgaria: CRCB, Box 830, Sofia
Burundi: via Zaire QSL Bureau
Canada: See ARRL QSL Bureau in this issue
Canal Zone: Lee DuPre, KZ5OD, Box 407, Balboa
Cape Verde Islands: RCCV, CR4AA, Praia, Sao Tiago
Chagos: via Seychelles
Chile: RCC, P. O. Box 13630, Santiago
Colombia: LCRA, P. O. Box 584, Bogota
Cook Island: ZK1 QSL Bureau, c/o Radio Station Rarotonga, Rarotonga
Costa Rica: RCCR, Box 2412, San Jose
Cuba: FRC, Apartado 1, Habana
Cyprus: CARS QSL Bureau, P. O. Box 216, Famagusta
Czechoslovakia: CRC, P.O. Box 69, 113 27 Praha 1
Denmark: EDR QSL-Central, Harry Sorensen, OZ6HS, Ingstrup Hovdegaden 51, DK 9480-Lokken
Dominican Republic: RCD, P. O. Box 1157, Santo Domingo
Ecuador: GRC, P. O. Box 5757, Guayaquil
El Salvador: CRAES, P. O. Box 517, San Salvador
Ethiopia: Telcoms ARC, Box 1047, Addis Ababa
Faeroe Islands: OY-QSL Bureau, P. O. Box 184, DK 3800 Torshavn
Fiji Islands: QSL Bureau, P. O. Box 184, Suva
Finland: SRAL, Box 306, 00101 Helsinki 10
France: REF, Boite Postale 70, 75560 Paris Cedex 12
French Oceania: RCO, P. O. Box 374, Papeete, Tahiti
Germany (East): DM QSL Bureau, P. O. Box 30, 1055 Berlin
Germany (West): DARC Amateurfunk-Zentrum, P. O. Box 1155, D3501 Baunatal 1
Ghana: GARS QSL Bureau, P. O. Box 3773, Accra
Gibraltar: RAF Amateur Radio Club, RAF North Front, Gibraltar
Great Britain: (and British Commonwealth): RSGB QSL Bureau, G2MI, 29 Kechill Gardens Bromley, Kent BR2-7NH
Greece: RAAG, P. O. Box 564, Athens-107
Greece: (SVØ only): c/o Mars Station, APO NY 09223
Greenland: via Denmark
Greenland: (U.S. Personnel) OX5A-E via MARS Director, XP1AA, 1983 Comm. SQ., APO New York 09023. OX4F-H via MARS Director, XP1AB, 2004 Comm. Sq. APO NY 09121
Guam: MARC, Box 445, Agana, USPO 96910
Guantanamo Bay: GARC, Box 12, FPO, New York, NY 09593
Guatemala: CRAG, P. O. Box 115, Guatemala City
Haiti: RCH, Box 70-B, Port-au-Prince
Honduras: RCH, Apartado 273, San Pedro Sula
Hong Kong: HARTS, P. O. Box 541
Hungary: HSRL, P. O. Box 214, Budapest 5
Iceland: IRA, Box 1058, Reykjavik
India: ARSI, QSL Bureau, P. O. Box 534, New Delhi 1
Iran: ARSI, Box 1000, APO New York, NY 09205
Ireland: IRTS, QSL Bureau, P. O. Box 462, Dublin 9
Israel: IARC QSL Bureau, P. O. Box 65, Herzliya
Italy: ARI, Via D. Scarlatti, 31, I-20124 Milan
Ivory Coast: ARAI, B. P. 2003b, Abidjan
Jamaica: JARA, Red Cross Bldg., 76 Arnold Rd., Kingston 5
Japan: (JA): JARL, Box 377, Tokyo Central
Japan: (KA only): FEARL-M, HQ 5AF, Box 1414 APO, San Francisco, 96525
Japan: (KA6 only) KA6 QSL Bureau, ORC, Ft. Buckner, APO, San Francisco 96331
Johnston Island: KJ6BZ, c/o MARS Stn., Det. 1, 1957 Comm. Gp., APO, San Francisco 96305
Jordan: RJRAS, P. O. Box 2353, Amman
Kenya: RSK QSL Bureau, P. O. Box 45681, Nairobi
Korea: KARL, Central Box 162, Seoul
Korea: (HL9) HL QSL Bureau, Signal Section, USFK/EUSA, APO, San Francisco 96301
Kuwait: Alhalf Nasir H. Khan, 9K2AN, P. O. Box 736, Kuwait, Persian Gulf
Laos: Houmphanh Saignasith, XW8AL, P.O.B. No. 115, Vientiane
Lebanon: RAL QSL Bureau, P. O. Box 8888, Beirut
Liberia: LRAA, Post Box 1477, Monrovia
Liechtenstein: via Switzerland
Luxembourg: R. Schott, 35 rue Batty Weber Esch-Alzette
Macao: via Hong Kong
Madeira Islands: via Portugal
Malagasy Republic: QSL Bureau, P. O. Box 587, Tananarive
Malawi: H.Y. Bvumbwe, 7Q7AE, P. O. Box 24, Blantyre
Malaysia: QSL Manager, MARTS, Box 777, Kuala Lumpur
Maldives: (8Q6) via Ceylon

On a recent trip to Lima, *ARRL* member K3KWJ/K4WA (r.) had the opportunity to attend a meeting of the Board of Directors of the *Radio Club Peruano*. Dex was greeted by the presiding officer, vice president OA4JT. The *RCP* publishes a monthly magazine, *OA4O*, under the direction of editor OA4AEP.

Maldives: (VS9) via Great Britain
Malta: 9H QSL Bureau, P. O. Box 575, Valletta
Mariana Islands: see Guam
Marshall Islands: KX6 QSL Bureau, via KX6BU, Box 444, APO, San Francisco 96555
Mauritius: Paul Caboche, 3B8AD, Box 467, Port Louis
Mexico: LMRE, P. O. Box 907, Mexico, D.F.
Midway Islands: KM6BI, Box 14, FPO, San Francisco 96614
Monaco: ARM QSL Bureau, Pierre Anderhalt, 3A2CN, 41 Bd du Jardin Exotique
Mongolia: JT1KAA, Box 639, Ulan Bator
Morocco: ARRAM, P. O. Box 299 Rabat
Mozambique: LREM QSL Bureau, P. O. Box 812, Laurenco Marques
Netherlands: VERON, Postbox 400, Rotterdam
Netherlands Antilles: VERONA, P. O. Box 383, Willemstad, Curacao
New Zealand: NZART, P. O. Box 489, Wellington
Nicaragua: CREN QSL Bureau, Apto. 925, Managua
Nigeria: NARS QSL Bureau P. O. Box 2873, Lagos
Northern Ireland: via Great Britain
Norway: NRRL, P. O. Box 21, Refstad, Oslo 5
Oman: ROARS, Box 981, Muscat
Pakistan: LARS, P. O. Box 65, Lahore
Panama, Republic of: LPRA, P. O. Box 9A-175, Panama 9-A
Papua: Via VK9 QSL Bureau
Paraguay: RCP, P. O. Box 512, Asuncion
Peru: RCP, Box 538, Lima
Philippine Islands: PARA QSL Bureau, P. O. Box 4083, Manila
Poland: PZK QSL Bureau, P. O. Box 320, 00-950 Warsaw
Portugal: REP, Rua de D. Pedro V., 7-4, Lisbon
Puerto Rico: Alicia Rodriguez, P. O. Box 1061, San Juan 00902
Rhodesia: RSSR, P. O. Box 2377, Salisbury
Romania: CRC, P. O. Box 1395, Bucharest 5
Rwanda: Box 663, Kigali
Samoa (American): D. E. Earnest, KS6DY, P. O. Box 1618, Pago Pago 96799
Samoa (Western): Director of Post Office and Radio, Post Office, Apia
Scotland: via Great Britain
Senegal: Ch. Tenot, 6W8BF P. O. Box 971, Dakar
Seychelles: QSL Bureau, Box 191, Victoria, Mahe
Singapore: SARTS, P. O. Box 2728, Singapore 1
South Africa: SARL, P. O. Box 3037, Cape Town
Spain: URE, P. O. Box 220, Madrid
Sri Lanka: RSSL QSL Manager, P. O. Box 907 Colombo
St. Vincent: QSL Bureau, P. O. Box 142, St. Vincent, West Indies
Surinam: VRAS, P. O. Box 566, Paramaribo
Sweden: SSA QSL Bureau, Jonakersvagen 12, S-12248 Enskede
Switzerland: USKA, c/o Franz Acklin, Sonnenrain 188, CH 6233 Bueron/LU
Syria: TIR, P. O. Box 35, Damascus
Tanzania: via Kenya
Thailand: RAST, GPO Box 2008, Bangkok
Trinidad and Tobago: T&TARS, P. O. Box 1167, Port of Spain
Uganda: via Kenya
United States: See ARRL QSL Bureau in this issue
Uruguay: RCU, P. O. Box 37, Montevideo
U.S.S.R.: CRC, Box 88, Moscow
Vatican: HV1CN, Domenico Petti, Radio Station, Vatican City
Venezuela: RCV, P. O. Box 2285, Caracas
Virgin Islands: Graciano Belardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, V.I. 00820
Wales: via Great Britain
Yugoslavia: SRJ, Bulevar Revolucije 44/II, P. O. Box 48, 11001 Belgrade
Zaire: UZRA QSL Bureau, B.P. 1459, Kinshasa 1
Zambia: RSZ, P. O. Box 332, Kitwe 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 5 by 8 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,WN1 — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.
W2,K2,WA2,WB2,WN2[1] — North Jersey DX Assn. P.O. Box 505, Ridgewood, NJ 07451.
W3,K3,WA3,WN3[1] — Jesse Bieberman, 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,WN4 — J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL 32901.
W5,K5,WA5,WB5,WN5[1] — ARRL W5 QSL Bureau, Box 1690, Sherman TX 75090.
W6,K6,WA6,WB6,WN6 — 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,WN8 — 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.
W**Ø** — Reggie Hoare, W**Ø**OYP, P.O. Box 115, Mitchellville, IA 50169.
K**Ø**,WA**Ø**,WB**Ø**,WN**Ø** — Dr. Phillip D. Rowley, K**Ø**ZFL, Route 1, Box 455, Alamosa, CO 81101.
KP4,WP4[1] — Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, PR 00902.
KV4 — Graciano Belardo, KV4CF, P.O. Box 572, Christiansted, St. Croix, VI 00820.
KZ5 — Lee DuPre, KZ5OD, Box 407, Balboa, CZ. Box 407, Balboa, CZ.
KH6,WH6[1] — 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 Douglas Avenue, Montreal 301, PQ.
VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downsview, ON.
VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg R3N OE8, MB.
VE5 — A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, SK. S4S 5E5.
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[1] — 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 4 1/4 by 9 1/2 inch or No. 10 business envelopes.

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

Remember the "Let's Talk Transistors" series by Robert E. Stoffels, WB9ESH? We've put together a reprint booklet of this 9-part transistor primer and it is available from ARRL for $1 including postage.

some of the rough spots. In June, stations were given until August 30 to comply with the rules; in August, licenses were extended indefinitely until completion of the paper work by FCC; however, compliance with the rules was mandatory after this point. New exam study questions were announced by FCC for Novice, Technician, Conditional and General, with heavy emphasis on the regulations.

The only Canadian regulatory action was a clarification of conditions requisite to issuance of a "provisional" operator certificate of proficiency.

Turning now to League organizational affairs, the ARRL Foundation, Inc. came into being during the year; a temporary Board of Directors was in action; by-laws were adopted, and IRS asked to give its blessing. A permanent Board, with at least five directors drawn from League directors out of a total of nine (to satisfy IRS requirements) will be elected later this month (January). By then, the Foundation should be "in business" to receive tax-free bequests and gifts and to make grants for special amateur activities, particularly in space, but also for scholarships, fellowships, and the like.

The League also formed an Emergency Communications Advisory Committee to join the others already functioning in respect to contests, repeaters and DX. New standing committees of the Board, created at the July 1972 Board meeting, went into operation in January: International Affairs, Plans and Programs, Membership Affairs, Management and Finance, Legal and Regulatory. Radio Amateur Satellite Corporation (Amsat) was the recipient of the ARRL Technical Merit Award, signalling the successful operation of Oscar 6. Funds up to $38,000 were made available to Amsat to accelerate production of Oscar 7, and W1AW was equipped for wire remote control of the Oscar command transmitter at Talcott Mountain. A new edition of the *License Manual*, the 70th, appeared late in the year, organized for the first time by subjects, with additional-study references after each topic. And with the 1975 edition of the *Handbook*, publication will be in time for the previous Christmas season. As the League switched from manual records to an outside computer service bureau, members displayed the patience of Saints – despite "computer fatalities," garbled addresses and missing *QST*s. Employees of the League will be brought into the Social Security system, as authorized by the Board at its July meeting. A new activity was adopted: a 10-meter contest in December, to stimulate activity and prove the "dead band" may be a state of mind rather than a fact.

During 1973 *QST* reported more than 200 incidents (a new record!) in which amateur radio provided communications during or after emergencies, with tornadoes and auto accidents the most numerous. Preparations for this sort of work go on all the time, but most conspicuously in the Simulated Emergency Test (SET) each January and in Field Day each June. SET in 1973 logged more participants than ever before, with 4862 amateurs having been enumerated in official EC and NTS reports. FD (which of course is also contest, picnic, campout and hamfest) rang up its highest number of participants since 1967 and all other statistics also showed gains over recent years. The Daytime National Traffic System DNTS was organized, with its Continental Traffic Net (CTN) beginning operations in March. It received its first major workout in late July and early August, handling traffic from the Scout Jamborees in Idaho and Pennsylvania.

On the technical side of things, antenna and transmission line articles and items on vhf and microwaves were the most numerous. Quite a bit of attention was focused on low-power rigs to carry along into the great outdoors – or just for the challenge of achieving DX with flea-power. Solid-state predominated, but there were some high-powered amplifiers and a complete 80-meter transceiver using vacuum tubes for those of us who are more comfortable with these devices.

Swinging to international scenes, the Administrative Council of the International Telecommunication Union determined that there will be a general World Administrative Radio Conference in 1979 which could – and probably will – rearrange the allocations table, hf bands in particular. To meet the opportunity (and the threat) of the WARC, the Board updated its conference preparatory working papers and authorized the General Manager to hire additional staff for the preparatory task if and when it becomes necessary. The government, with League participation, has already begun work leading to the establishment of the U.S. position in advance of that conference. The Board also made a grant toward refurbishing station 4U1ITU, located at ITU headquarters in Geneva. Continuing the international contact among amateur societies which will lead to a united position, ARRL President Dannals attended the Region II Conference of the International Amateur Radio Union, in Santiago, Chile, along with IARU President/ARRL Vice President Denniston and Canadian Director Eaton who were involved in the meeting as regional officers.

The only substantive measure raised in Congress and directly affecting amateurs was the Teague Bill, which would insure interference suppression measures on home entertainment equipment. At press time hearings had not yet been scheduled, suggesting perhaps that not enough letter-writing had been done by amateurs. (As concerns letters alerting Congressmen to FCC's proposed Class E CB rules, however, amateurs were less bashful, with scores of copies reaching Hq. for our information.)

The fraternal side of amateur radio continued in good shape, with nine Divisional and six state conventions, probably 100-plus hamfests, banquets and auctions, and the first-ever ARRL Technical Symposium, held September 14 in conjunction with the Roanoke Division Convention at Reston, Virginia. The papers presented, on space techniques, will soon be available - free to symposium participants; at $3 to others.

Thus, with alarums and frustrations on the regulatory side, warm fraternity increasingly evident on the other hand (and projections for the highest League membership ever to be scored as of January 1) we leave 1973, with a guarded, "73" to it – and best wishes to all of you for "More in 74" of peace, prosperity, and ham radio satisfaction. QST

Happenings of the Month

- Election Results
- FCC Asks Space Rules
- ARRL Replies on 220 MHz
- Advisory Committee Appointments

ELECTION RESULTS

In the November issue, we reported on the uncontested elections or reelections of Canadian Director Noel B. Eaton, VE3CJ, and Vice Director A. George Spencer, VE2MS; Dakota Director Larry J. Shima, WØPAN; Delta Director Max Arnold, W4WHN; Great Lakes Director Richard A. Egbert, W8ETU; Midwest Director Paul Grauer, WØFIR; and Southeastern Director Larry E. Price, W4DQD.

In the nine remaining posts, balloting among the members was necessary and resulted in the reelection of two directors and two vice directors, and the selection of five new vice directors.

Starting alphabetically with the Atlantic Division, **Harry A. McConaghy, W3SW,** won a third term as director, garnering 3836 votes to 1637 for G. W. "Bud" Hippisley, Jr., K2KIR. **Jesse Bieberman, W3KT,** was reelected for a fourth term as vice director with 2811 votes as against 1309 for Layfield Lynn Lamb, W3BWZ, 738 for Harold C. Smith, WA2KND, and 626 for George S. Van Dyke, W3HK. In the Pacific Division, **J. A. "Doc" Gmelin, W6ZRJ,** will continue in the director's post which he has held since 1968; the tally was 1537 for Doc, 1057 for Lee R. Wical, KH6BZF. Vice Director **Albert F. Gaetano, W6VZT,** nailed down a second term with 1386 votes to 1197 for Gary A. Stilwell, W6NJU, who was Southwestern Division vice director until he moved to the north last summer.

The late Ralph Thetreau, W8FX, long-time SCM of Michigan, was one of the best-known and most-respected amateurs of his area. A student loan fund at Lawrence Institute of Technology has been created in memory of Tate by the Detroit Amateur Radio Association; fund coordinator is George Goldstone, W8AP. Additionally, Harry Walsh, K8DX, has prepared and presented a memorial plaque which has been placed in the administration building of the Institute. Accepting the plaque from Harry is Professor Nandor Zimmersman, K8MIF, at right. *(R. G. Sheufelt photograph)*

The closest race in years was in the Dakota Division where **Thomas M. Kulas, WAØIAW,** squeaked out an 11-vote win over the current vice director, Edward C. Gray, WAØCPX, 477 to 466. Tom is 27, lives in Minneapolis, and is employed by the Northern States Power Company as a distribution engineer. He's been an assistant director of the division for four years; is a director of the Minneapolis Radio Club and trustee of its station WØCKF, and is a past vice president of the Badger Amateur Radio Society, W9YT. WAØIAW holds appointment for ORS, belongs to A-1 Operator Club and AREC, and won the Division's certificate of merit in 1970. A life member of ARRL, Tom has been licensed since 1963.

Filling the vacant post of vice director from the Delta Division is **John H. Sanders, WB4ANX,** of Kingsport, Tennessee, senior vice president of Eastman Chemical Products, Inc. John is 52 and has been an assistant director in the Delta division since 1970. Club credits include various officer posts in the Kingsport Amateur Radio Club, Bays Mountain Radio Club, and Tennessee Council of Amateur Clubs. John has served as section emergency coordinator for Tennessee in the past and remains a member of AREC. A life member of ARRL, he holds appointments as OPS and OBS. John got 819 votes, and Walker J. Coffey, W5NCB got 759 votes.

In the Great Lakes vice director contest, **William E. Clausen, W8IMI,** tallied 2222 to 1244 for Henry Zimmerman, K4FU. Bill is 35, lives in Columbus, Ohio, and is an associate professor in the Department of Engineering Mechanics at Ohio State University, where he also serves as faculty advisor for its amateur radio club. Currently SCM for Ohio, Bill is past manager of the Buckeye Net and past vice chairman of the Ohio Council of Amateur Radio Clubs. W8IMI holds ORS, is a member of AREC and the A-1 Operator Club, life member of

the League and was first licensed as K3TDR in 1962.

Taking Paul Grauer's just-vacated spot as vice director in the Midwest Division is **Richard W. Pitner, WØFZO**, at 65 a retired citizen of Sioux City, Iowa. He scored 1286 votes to 659 for L. C. "Chuck" Miller, WAØKUH. Dick has been an assistant director of the Midwest division since 1951; past president, past vice president, past secretary-treasurer, Sioux City Amateur Radio Club; past treasurer Inter Club Radio Council; and secretary-treasurer and net control of the 3900 Club. WØFZO also was radio officer for Iowa Area 7 RACES and currently is alternate area radio officer. He holds OBS appointment and has been licensed since 1928.

Ted R. Wayne, WB4CBP, of Miami, Florida, won a three-cornered race to become vice director of the Southeastern Division. He had 1741 votes, Evelyn D. Gauzens, W4WYR, had 710, and incumbent C. James Roux, K4THA, had 617 votes. Ted is 56 – retired from the practice of law, but active in real estate development. His club credits include president of the Country Cousins, president of the South Florida FM Association, secretary of the Southeastern Repeater Association and trustee of the WB4HAA repeaters. He is past emergency coordinator for Dade County and belongs to Air Force Mars and AREC.

ARRL FILES REPLY COMMENTS ON 220

The League has filed responses to the comments filed in Docket 19759 by the Electronics Industries Association, E. F. Johnson, Hy-Gain and others who are in favor of Class E Citizens Radio at 224-225 MHz. The text follows:

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

In the Matter of

The Creation of a new class of Citizens Radio Service and the reallocation of frequencies between 224 MHz and 225 MHz in the band 220-225 MHz now allocated for shared use by stations in the Amateur Radio Service and Government Radiolocation Stations for that purpose

Docket 19759
RM-1633, 1656, 1747
RM-1761, 1793, 1841

To: The Commission

REPLY COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE

The radio spectrum is a priceless natural resource which must be wisely and efficiently used to provide for present and future requirements. Spectrum management is far more than the weighing of conflicting demands; it requires searching evaluation of each proposal and often the rejection of proposals of considerable public appeal and private benefit. The lessons now being so painfully learned from the present energy crisis must not be ignored by the Federal Communications Commission and other spectrum management agencies and offices in evaluating the proposal in this proceeding.

Frank Cassen, W4WBK, and his wife Margaret received a special award of appreciation from the Mid-South Amateur Radio Association for 22 years of service to Memphis and the association when they departed for retirement in California. Frank was vice director from the ARRL Delta Division from 1964-1965 and 1970 until September 1973. *(Photo thanks to W4MII)*

A request for allocation of spectrum space must be supported by most extensive and persuasive facts conclusively establishing the need for the space, the unavailability or unsuitability of other frequency bands, and the long range effects upon other potential users and services. When the space already is allocated to and being used by another service, the effect of the loss upon that service must be considered. "Blue Sky" predictions of benefits and pressures exerted both directly and indirectly by lobbyists and other private interest groups must be rejected by the Commission.[1]

Substantive comments in opposition to the instant proposal outnumber substantive comments in support by at least ten to one.[2] The principal proponents are (1) the Electronic Industries Association and equipment manufacturers and dealers who, almost without exception, want 2 and even 3 MHz of the 220-225 MHz band rather than the one MHz proposed, and (2) specialized Class D users,

[1] The lobbying activities of the Electronic Industries Association, the principal proponent and the petitioner in RM-1747, and some manufacturers are well documented in the early comments supporting RM-1747, in the trade press, and in a feature article in the *Washington Evening Star* for April 6, 1972, "Frequency Lobbying Intense." A copy of that article is attached. Seldom has a week passed in the last year without at least one published report having come to the League's attention to the effect that the decision already has been made to adopt the proposal irrespective of the comments filed in this proceeding. Credence is given to such reports by the failure of the Commission to invite the submission of alternatives in response to its Notice of Inquiry and by the open secret that almost every member of the Commission's professional staff involved in administering the Citizens Radio Service over the years has been strongly opposed to opening up another portion of the spectrum for a new class of Citizens Radio Service. One of the reasons the League has requested oral argument before the Commission *en banc* is its exclusion from a closed door meeting held at the request of EIA.

[2] Brief expressions in opposition outnumber those in support by about the same ratio. A surprising number opposing are citizens radio licensees.

Drawers full of unclaimed QSLs are the bane of every QSL Bureau. Here is the "dead file" at the K-WA-WB-WNØ bureau, with manager Phil Rowley, KØZFL. Dave Soldan, WAØMLE, who took the picture, handles messages via NTS reminding amateurs to claim the cards. But don't wait for a message — keep *your* QSL bureau (addresses page 88) supplied with stamped, self-addressed envelopes.

primarily groups engaging in emergency communication activities, who press more for relief for the unsatisfactory conditions now prevailing in the 27 MHz Class D band than for the proposed 224-225 MHz allocation.

Not one of the proponents of the reallocation of a portion of the 220-225 MHz amateur band for a new Class E citizens radio service has given a single substantive fact to support the reallocation of even one kiloHertz of the 220-225 MHz band from the meritorious and ever expanding Amateur Radio Service for such a speculative blue sky proposal.[3] Not one of the proponents has made a single practical and worthwhile suggestion as to how a *disciplined* service can be established. The priceless natural resource simply cannot be squandered upon such a speculative proposal.

The original EIA request for reallocation of a portion of the 220-225 MHz band to the Citizens Radio Service was based upon the fallacious assumption that the Amateur Radio Service has little use for the entire band. Comments by many hundreds of amateurs have proven otherwise. In spite of the adverse effect of the EIA's request and the Notice of Inquiry, amateurs have been flocking to the 220-225 MHz band in ever increasing numbers because of saturation of the 146-148 MHz repeater band in many sections of the country and the ever increasing availability of 220 MHz equipment.[4,5] The state of the art with respect to separation of input and output frequencies would make the 220 MHz band virtually useless for amateur repeater operations should even one MHz be withdrawn as proposed.

The proponents of a Class E service have failed to advance a single substantive reason as to why such a service can be accommodated only in the 220-225 MHz band. They argue only that the propagation characteristics of the band are such as to insure use of the band as intended by the rules because there would be no incentive to use transmitting powers and antenna heights in excess of those permitted by the rules. Those making such an argument display a shocking lack of knowledge of the propagation characteristics of the band and the competitive spirit of human beings.[6] Amateurs have been employing tropospheric bending and ducting for years to communicate over hundreds of miles in the 220-225 MHz band.[7] The propagation characteristics are such that citizen banders will have an even greater incentive to use high power with high gain and elevated antennas on 225 MHz than on present 27 MHz Class D frequencies, both (1) to obtain service areas comparable to those now being realized in the Class D service in spite of drawbacks of a-m and (2) to engage in DXing.[8,9,10] The Commission must not be led into such a trap.

[3] If the Commission is persuaded by arguments of some manufacturers that 3 MHz is or soon will be necessary to implement the proposed service, then it is illogical to consider a portion of the spectrum where the Office of Telecommunications Policy has indicated a maximum of 2 MHz could be released, and then only for a highly disciplined use.

[4] The opposition of the State of California, Office of Emergency Services, reports "38 RACES (Radio Amateur Civil Emergency Service) frequency assignments between 224.000-225.000 MHz (are assigned) to California Civil Defense Organizations in 22 of our 52 counties, and are sub-assigned to a number of jurisdictions within their boundaries."

[5] The argument of Hy-Gain Electronics Corporation that the 220-225 MHz band is a "vast wasteland" not only ignores the use of the band by the Radiolocation Service but also is so grossly inaccurate that it raises doubts as to the validity of its other arguments. It is indeed surprising that Hy-Gain supports a 25-watt Class E power limit when it is the manufacturer of the infamous "Afterburner" power amplifier which has contributed so greatly to the lawlessness in and the breakdown of the Class D service.

[6] Class D 27 MHz operators do not limit the DXing to long distance F2 layer skywave transmissions over hundreds of miles. Here in the Washington area they can be heard many times every day bragging about working Philadelphia, Norfolk and Richmond during periods when longer distance transmissions are impossible.

[7] *The Radio Amateur's Handbook*, 1973 Edition, pages 564-5. The record for DX in the band is 2540 miles between California and Hawaii.

[8] E. F. Johnson Company is one of the principal manufacturers of Citizens Radio equipment, including the highly efficient single sideband (ssb) transceivers for Class D 27 MHz operation which is permissible under the existing rules. Nevertheless, in an effort to support the Class E 224-225 MHz proposal, Johnson used far less efficient amplitude modulation (a-m) on 27 MHz in the field tests reported in its comments. Even then, contrary to some statements in its comments, its tests confirmed the superiority of Class D 27 MHz a-m over 224-225 MHz fm for both mobile-to-mobile and mobile-to-base service. In addition, Johnson's test of interference to and from radar in the 220-225 MHz band is far from persuasive. The single controlled station test was not representative of the conditions which would exist with dozens and perhaps hundreds of Citizens Radio transmitters and multiple radar installations in a given area. Radar interference in the 224-225 MHz band is reported in the comments of the State of California, Office of Emergency Services.

[9] It is significant that each one of the principal proponents of a Class E 224-225 MHz service carefully avoided any discussion of the advantages of ssb in improving the 27 MHz Class D service.

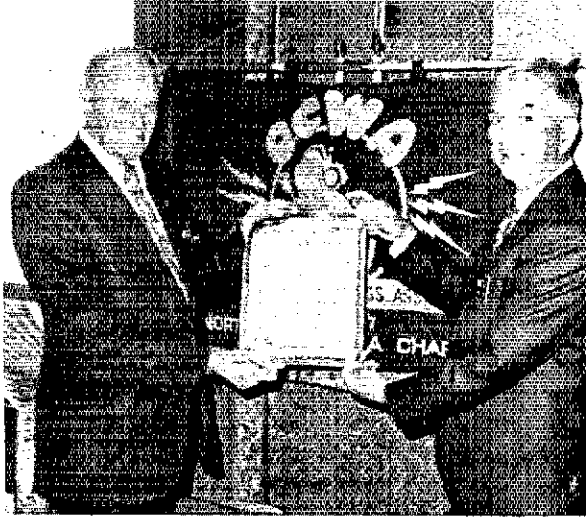
[10] The analysis of various modulation methods submitted by R. P. Haviland, W3MR, is most significant and conclusively proves the superiority of 27 MHz ssb over 225 MHz fm.

The Notice of Inquiry unequivocally states that the Class E service will not be established in the 220-225 MHz band unless and until the Commission is firmly convinced that any such service will be a *disciplined* service. *Not one of the supporters of the Class E proposal has advanced a single positive suggestion as to how a disciplined service can be assured.* With but one or two exceptions, the manufacturers even have opposed any requirement for automatic transmission of an identifying signal to facilitate monitoring and enforcement.[11] [12] Each merely suggests more extensive and effective monitoring and enforcement than that now directed to the 27 MHz Class D operations.[13] [14] The even more difficult and expensive monitoring and enforcement requirements for a Class E 220 MHz service are discussed at length in the League's comments. Surely the Commission will not be so gullible as to fall for such valueless promises

Estimated growth of a new Class E service over a ten-year period was requested by the Notice of Inquiry. The responses of EIA and some manufacturers are essentially identical and are unsubstantiated even by the record of growth of the Class D service.

If economic benefits to manufacturers and dealers is a valid consideration in spectrum management, and the League respectfully submits that it is not, improvement of the 27 MHz Class D service will provide far greater benefits than can ever be realized from the proposed 225 MHz Class E service. The periodic upgrading of various radio services through a program of planned obsolescence has created most substantial and ever increasing markets for new equipment and has brought about greatly improved spectrum utilization. The undesirable characteristics of the 27 MHz Class D band can be minimized, the reliability and range of service can be greatly increased, illegal operations can be greatly reduced, and the industry can reap a windfall beginning almost immediately by adopting the comprehensive program outlined by the League in its comments in this proceeding. The Commission already has taken one small step in this direction by the recent amendment of its rules requiring type acceptance of all Class D transmitters sold after November 22, 1974 and of all Class D transmitters in use after November 23, 1978.[15] This action alone will provide most substantial and immediate benefits for the manufacturers and dealers. On the other hand, there is no assurance that a Class E service as proposed ever will gain widespread acceptance. The proponents of a 225 MHz Class E service have been blind to the opportunities now at hand, i.e., phasing out a-m on 27 MHz and the substitution of ssb.[16] [17] [18]

Little useful purpose will be served by a further reply to the comments filed by supporters of this proposal. Every single argument of the proponents



Russ Estep, W6AUC, who has held most of the offices in Northern California Chapter QCWA over a period of many years, was honored with a certificate for meritorious service from QCWA National President Barry Goldwater, K7UGA. Making the presentation at the ARRL Pacific Division Convention is the current chapter president, Earle K. Snider, K6TST, right.

[11] Two manufacturers of integrated circuits, Raydax, Incorporated, and Texas Instruments, have submitted comments giving the cost of such circuitry as from $7.50 to $12.50 per unit. Nevertheless, some of the manufacturers have opposed the use of such devices claiming they would cost from $50 to $100 per unit.

[12] Antenna Specialists Co., in opposing automatic identification devices, states that "Short range devices with automatic identifiers would make the task of regulation impossible without the establishment of hundreds of new field monitoring crews." How many more field monitoring crews would be required if automatic identification is not used?

[13] The comments of Henry R. Brandt, WA2-JDF, echo the views of tens of thousands of amateur operators:

> 2. By opening up a new class of Citizens Radio Service, the Commission is only encouraging the growth of the present overwhelmingly illegal Citizens Band operation. The Commission is not dealing with the root of the overcrowding problem on 27 MHz – it is merely setting up a temporary "fix" instead of a permanent solution . . . The proposed 224-225 MHz band will just be "buying time" for the Commission while conveniently avoiding the real problem — illegal users. If the unlicensed and hobby users of the 27 MHz CB were forced off the air, the band would not be saturated and there would be no need to expand into Amateur Radio Bands.

[14] The Commission should note that some of the principal supporters of a "disciplined" Class E service are contributing to the illegal Class D operations by manufacturing and selling amplifiers for high power operation, variable frequency oscillators to replace crystals, and even high power transceivers. Pious notes such as "Not for CB Use" are like an advertisement that a "Saturday Night Special" handgun is not to be used for unlawful purposes!

[15] Report and Order, Docket No. 17196, released October 16, 1973, FCC 73-1049, 38 FR 29323.

[16] Even should the Commission decide to establish a Class E service, months and perhaps as long as two years will elapse before a single unit can be placed in service because another rule making proceeding will be required before rules can be adopted for equipment characteristics, licensing procedures, and operating procedures. The notice in this proceeding is so limited in scope that the only rule which can be lawfully adopted is an amendment to Part 2, the Table of Allocations.

[17] Much of the 27 MHz ssb equipment now on the market has a-m compatibility, which makes possible an orderly changeover program.

[18] Unless the Citizens Radio industry comes forward with a positive workable proposal for improvement of the Class D service, the League may take the initiative in seeking adoption of the many practical suggestions contained in its comments in this proceeding.

Some 10,000 Scouts and 15,000 visitors had a chance to see the San Antonio Radio Club station W5SC in operation at a Scout show in October. Control operator here is Bill Eaton, WN5KKN, with Explorers Ruben Reyes and Abelardo Flores and Scout Bobby Hamilton looking on.

of a Class E service in the 220-225 MHz band was anticipated by the League and discussed in its comments in this proceeding. The League offered positive and practical proposals for providing the improved and additional service sought by those not seeking to advance their own private economic interests.

As the result of its review of practically every one of the many hundreds of comments filed in this proceeding, the League recommends the following actions by the Commission without delay:

1) Withdraw the proposal to establish a new Class E Citizens Radio Service in the 220-225 MHz band or in any other portion of the spectrum other than 25-27.5 MHz.

2) Issue a notice of proposed rule making looking toward requiring (1) all new 27 MHz Class D transmitters manufactured and sold after January 1, 1975, to be capable of transmitting on one sideband with suppressed carrier (ssb) and (2) providing for termination of all a-m operations in the 27 MHz Class D service by January 1, 1977.

3) Issue a notice of inquiry inviting suggestions for implementation of the recommendations of Advanced Technology Systems, Inc., and the Highway Safety Research Institute, University of Michigan, for improved channelization of the Class D service.

Oral argument before the Commission *en banc* is respectfully requested unless the proposal to reallocate any portion of the 220-225 MHz band is withdrawn by the Commission.

Respectfully submitted,
THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
By Robert M. Booth, Jr.
Its General Counsel
November 23, 1973

ALVA A. SMITH, WØDMA

Alva A. Smith, WØDMA, Caledonia, Minnesota, who was 68, died in October of a heart attack. From 1939 to 1946 Al was manager of the ARRL W9 QSL Bureau, and from 1946 to 1969, of the WØ QSL Bureau. His devotion to the volunteer chore was so deep as to put a strain on the word, "dedication."; it was recognized with the ARRL Certificate of Merit at retirement from the post – and a scrapbook full of letters from satisfied "customers." Al will be deeply missed throughtout Zero-land.

50-YEAR MEMBERS OF ARRL

Fifty years of membership in and service to an organization is a signal achievement – we salute the following 77 individuals who had, through reference to ARRL records, established the fact of at least 50 years of membership in ARRL prior to November 21, 1973. These men are the foundation for strength of amateur radio and the League. Each has been supplied with a 50-year lapel pin and a ceramic wall plaque.

Others who believe they have 50 years of ARRL membership are urged to write, so that we can attempt to verify from our records. In some instances our early records are incomplete, in which case we are obliged to ask for additional data from the applicant, such as old membership certificates, references in QST, and the like. Unfortunately, we have had to turn down several applicants, because of the lack of adequate documentation.

Lloyd L. Beranek, W9AXT; Harold H. Beverage; Jesse Bieberman, W3KT; William J. B. Bond; Harold C. Bowen, W1DQ; Jesse H. Boyd, W8AFB; Richard S. Briggs, W1BVL; Paul V. Brobst, WØDYZ; Charles H. Campbell, W2IP; William F. Choat, VE3CO; Edward J. Collins, W4MS; W. Rad Coover, W6RF; G. S. Corpe, W6LM; Howard M. Crosby, W2CCG; Clifford H. Daykin, W2AEE; Russell Dunaja, W3BBF; Kenneth M. Ehret, W5APG; Lewis E. Flicker; Fred J. Elser, W6FB/W7OX; Eugene A. Fattey, W2HNL; Charles F. Felstead, KH6CU; Frank Frimmerman, W2FZ; Everett H. Gibbs, W8AQ; William H. Goodell, Jr., WA4SDK; Wayland M. Groves, W5NW; L. C. Hardy, W2OO; George Hautenschild, W3KD; Edward W. Heffner, W6CNK; Bartow H. Huff, W5AHD; Ray Keller, WØDU; Wesley E. Kidd, K4HEW; Dr. Charles L. Klenk; Henry F. Koch, Jr., W2EW; Elmer J. Kregel, WØAJT; Thomas H. Letts, VE2BG; Thomas C. Lightfoot, W3KB; Graham G. Maconomy, W6BUK; Sherman J. Mallery, W2CJX; Hiram R. Martin, W4BH; Leroy May, W5HN; Albert P. McDowell, Jr., W3AR; John G. C. Miller, W2ORI; John B. Morgan, K1RA; Robert M. Morris, W2LV; Homer Nichols, W1BM; Percy C. Noble, W1BVR; Albert Pardee; Robert H. Parker, W1TO; Vance Phillips, W6GH; J. H. Platz, W7HA; M. W. Price, W9HZ; Ed. G. Raser, W2ZI; Henry L.

Reid, W4KU; Castner S. Risley, W2BGT; Harris A. Robinson, W3LW/K2GOY; Vincent L. Rosso, W5KC; James P. Saunders, W1BDV; Robert K. B. Saxon, W9BDP; William C. Schmezer, W3KRG; Alva A. Smith, WØDMA; P. L. Sprague, W1UP; David Talley, W2PF; A. H. Thieblemont, W2ZRF; Ferd C. Thiede, W2EC; Victor O. Tresidder, W9TQ/WA9KHU; Walter G. Walker, Sr., W4AKN; Don C. Wallace, W6AM; Dr. A. LaFayette Walsh, W2BW; Herbert F. Wareing, W9NY; J. B. Wathen, III, W4BAZ; Dr. Charles W. Weber, W3CC; Andrew S. Webre, W5JSK; Henry J. Welsh, W1CPB; A. G. Wentzel, Jr., W2HX; Fred Westervelt, W4NO; Harold P. Westman; C. W. Williams, W4KJP.

PAUL F. GODLEY

We regret to report the death on October 20, 1973 of Paul F. Godley, ex-2ZE, of Little Falls, N.J. "Paragon Paul" was sent by ARRL to Scotland in 1921 for the TransAtlantic Tests, where he succeeded in identifying the signals of 27 North American amateurs. He was regarded as the foremost receiver expert of the day, and his Paragon receivers were highly prized by amateurs. In 1926 he founded the Paul Godley Company, consulting engineers; he retired in 1963. He worked at various times with other radio pioneers including Marconi, Pupin, DeForest and Armstrong. Paul was a past president of Radio Club of America, Inc., a life member of Veteran Wireless Operators Association, and a member of ARRL and IEEE. Death came suddenly from a heart attach at age 84.

ORDER OF CANADA TO VE1ER

Albert McQuoid, VE1ER, of St. Andrews, New Brunswick, was invested on October 24, 1973, as a Member of the Order of Canada by the Right Honourable Roland Michener, Governor-General of Canada. The award recognizes meritorious service to Canada or its people on a regional basis. Though Albert has been blind since he was eight years old, he is an accomplished organist and pianist, auto mechanic, electronics repairman, piano tuner and of course radio amateur. He's also an honorary member of the Canadian Legion and is active in Kiwanis. Our hearty congratulations!

CB ILLEGALS INDICTED, SENTENCED

Results are beginning to show up from FCC's use of special monitoring teams on 27 MHz. U.S. Judge Edward J. McNanni at Cedar Rapids, Iowa, has imposed fines, suspended sentences and probation on three residents of Ralston, Iowa. Roger Lawrence Oxendale was fined $300, given a 6-month term of Federal confinement (suspended upon payment of the fine) and a year probation. Terrill L. Millner was fined $200 and given a three-month suspended sentence. Sandra S. Peterman was fined $150 and placed on probation for six months. Charges included unlicensed operation, hobby type communications, communications with unlicensed stations, superfluous communications and failure to limit communications.

Raymond J. Deffenbaugh, KFO-3572, of Daly City, California was fined $500, suspended, and placed on three years' probation for violating the Commission's rules. Alfred D. Zeidler, also of Daly City, had prosecution postponed for three years, conditioned on no further violations of the rules. These actions were in the Northern District of California, by Chief U.S. Magistrate R. S. Goldsmith.

Judge Phillip C. Wilkins, U.S. District Court of Eastern California at Sacramento sentenced Cressy O'Neail Chambers of Stockton to 182 days in jail, suspended after 15 – conditional on disposition of all his radio transmitting equipment – and one year probation. Chambers had been found guilty of transmitting obscene language on the citizens radio band.

A Federal Grand Jury in San Diego has indicted Charles J. Nieters, James L. Nichols and Thomas K. Caudle on charges of transmitting obscene language from mobile citizens radio stations and on charges of conspiracy.

Carlton R. Cobb, KDW-1886, of Norfolk, Virginia was indicted by a Federal Grand Jury in Alexandria for transmitting a threat over his citizens radio station to injure the FCC Engineer in charge at Norfolk.

There have also been increases in administrative action by FCC as a result of special monitoring team activity, as reflected in newspaper reports reaching Hq. from all over the country.

ADVISORY COMMITTEE APPOINTMENTS

ARRL has four advisory committees in specialized areas of interest – DX, Contest, Repeaters, Emergency Communications – to screen new ideas, evaluate suggestions from members, and make recommendations to the ARRL Board and headquarters staff in their respective fields. President Harry J. Dannals, W2TUK, has appointed a number of amateurs, previously nominated by three or more League members, to these committees for new two-year terms beginning January 1.

Scotty Brown, VE3CMZ, is surrounded by Scouts as he operates VE3NBC (North Bay Amateur Radio Club) during Jamboree-On-The-Air in October. About 80 Scouts participated. Any other good photographs around showing a variety of Scout/ham radio activities? *(North Bay Nugget photo via VE3CEH)*

Contest Advisory Committee

Newly appointed to the Contest Advisory Committee is Stephen P. Branca, WA2BLV, of Somerdale, N.J., who has been an amateur and League member since 1958. An Extra Class licensee, he is very active in Sweepstakes, the ARRL DX Test and various other contests.

Malcolm P. Keown, W5RUB, has been on both sides of the contest fence — as chairman of the Delta QSO Party, and as a regular participant in SS, ARRL-DX, Field Day, Novice Roundup, Communications Department (CD) parties and so on. A resident of Vicksburg, Miss., Mal has been a League member and amateur since 1958 and holds the Extra Class ticket.

Thirty-one CD Party victories as top scorer nationally make Kenneth E. Keeler, W6PAA, a "natural" for membership on CAC. Currently resident in Belmont, Calif., he has also used K2EIU and WA6ØKF in hundreds of contests. Ken is a director and past president of the Northern California Contest Club; an Extra Class licensee; has held appointments as ORS, OPS, OO and OBS and has been licensed since 1952, a member since 1953.

C. LaMar Ray, W9LT, Grabill, Indiana, is another very active contester by phone and cw, with many first place certificates to show, both in individual competition and at K2GL, multi-operator, multitransmitter. The former holder of K9CUY, WB2MFX, K1RTB and W8CCJ, LaMar has also held various offices in the Rochester DX Association and the Nashua (N.H.) Mike & Key Club and is a member of the Indy DXers and Ft. Wayne Radio Club.

Albert Vitt, WAØCVS, a licensed amateur and League member since 1959, has also been named to CAC. An Extra Class licensee and resident of Broomfield, Colorado, WAØCVS has been active in most of the contests, particularly Sweepstakes, since 1961. He has held ORS and currently is an OO, also taking part in the CD parties. Albert is a member of the Denver Radio Club.

From British Columbia comes Leslie G. Sawkins, VE7BDJ, of Mt. Lehman. Lee has posted top scores in the VE/W contest, SS, ARRL-DX contests and CD parties, recently from VE7WJ's station. He holds ORS, 5-B DXCC No.134, and the Advanced Amateur certificate of proficiency. He's been an amateur eleven years, an ARRL member ten.

Continuing or renewed appointees are W1BGD, chairman; W3BQV, K4BAI, K7NHV and KH6IJ. WØPAN is Board liaison; W1YL is staff lisison.

DX Advisory Committee

Newly appointed to the DX Advisory Committee is Dr. John R. Sheller, WA8ZDF, of Groveport, Ohio. Although he's been licensed only six years, Doc is Extra Class and has a DXCC total of 310 mixed, 306 phone. He takes part in all phases of DX: phone, cw, contest and organizational/social. A member of Columbus Amateur Radio Association, he was its DX Nite chairman last year.

Jack Ravenscroft, VE2NV, of Dorval, Quebec, has served four years on the Contest Advisory Committee but now has been named to the DXAC He also served as ARRL/VE2 QSL manager for eight years. A member of the First Class CW Operators Club (FOC), Jack has been licensed since 1938, a League member since 1939, and holds the Advanced Amateur certificate of proficiency.

Continuing or reappointed members are W1BIH, chairman WA2FQG, W3BWZ, K4IKR, W5AO, W6RGG, W7LFA, W9NN and WØELA. W1QV represents the Board, W1CW the headquarters as liaisons.

VHF Repeater Advisory Committee

The only new member of the VHF Repeater Advisory Committee being named right now is Bob Dreste, K7VOR, of Phoenix, Arizona. Bob holds the Technician Class license, has been licensed and a League member since 1962 and operated his own repeater for two years. He's a past president of the Phoenix VHF Club; the Amateur Radio Council of Arizona and the Arizona State Fair Radio Exhibit. He's trustee of the Arizona Repeater Association's machines, WR7ABQ, WR7ABR and WR7ABS and is editor of the ARA bulletin, "Squelch Tail." He also serves as an assistant director in the Southwestern Division.

The remaining members are: K1ABR, Chairman W2ODC, W3DTN, K4GHR, W5VPQ, W6OLD, W8LGL, W9BUB, and VE3WT. Liaisons are W5EYB for the Board and W1ICP for the staff.

Emergency Communications Advisory Committee

There are no new appointees to the ECAC since it was just formed this past summer. Members are: chairman WA4PBG, W2URP, W3PST, W4IYT, K5SVD, W6INI, W7IEU, W8ERD/W9OKN, W9QBH, WØPB, and VE3DV. Board liaison is W4WHN and headquarters liaison is WA1FCM.

Nominating forms can be obtained from Headquarters and require the signatures of three ARRL members. Nominations may be made at any time, and remain "on call" indefinitely.

FCC INQUIRES ABOUT SPACE RULES

As stated in capsule form in December "League Lines," FCC has issued a notice of Inquiry seeking advice on rules for the Amateur-satellite Service. Deadline for comment was set at January 7, but since that would leave little time for discussion among amateurs after its publication, the League has asked for an extension of time. The text of the FCC study follows:

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

Notice of Inquiry
(Docket 19852)

1. On February 14, 1973, the Commission adopted amendments to Part 2 of the Rules, in Docket 19547, conforming to the extent practicable with the Geneva Radio Regulations, as revised by the Space World Administrative Radio Con-

(Continued on page 164)

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

H o w :

Purty, huh? Real DX, too, Kohoutek's DX-peditionary gem is due for encore in only 75,000 years, they say. All this fuss over an old ball of ice a few miles thick. But thereby hangs a tail, and that flashy plume is what most of the hubbub is about.

Tail, indeed. *Webster's* seems fairly sure that a tail ought to be at or near the rear of an object if said object's front or head be in direction of motion. Not necessarily a comet's, though, and we find it somewhat disconcerting to comprehend something moving that fast preceded by its own tail. "Appendage" fits better. Or is it really going backward sideways?

We are reminded that the earth passed right through the wash of Halley's comet back in 1910. What did that do for 20 meters? Probably nothing; we'll never know for sure. Halley's job arrived on the downward slope of a solar cycle that bottomed out three years later. This new visitor has curiously similar timing.

Astronomers assure us we won't be flicked by Kohoutek's appendage on this run. That's unfortunate because the way 28 MHz is acting we would warmly welcome the help of any stray ionizations that come along, negligible though they be. Maybe next time. Happy New Year, little oddball!

For the rest of us, 1974's rare DX has reason to get rarer. Husbanding of liquid fuel resources is lopping off some convenient but unprofitable airline flights to a few of our favorite boondocks. DXpeditioners who worried about getting to Bongo-Bongo quickly will now sweat getting there at all. And back. We may yet have to rely on Danny Weil's old sailboat or Tom Sawyer's raft.

Scientists are climbing into the technological attic to take a second long look at dusty designs for China clippers, choochoo trains and the jet-stream dirigible. We've heard of history repeating itself but can it really run backward? That's carrying nostalgia too far. We'll have to believe it when those quaint Wincharger ads of the '30s reappear in *QST*.

† † †

W h e r e :

As many as thirty log pages for past KH6EDY/Kure operation are lost. KH6BZF has confirmed all QSOs of record direct or via tortuous bureau routes. (WCDXB) . . . As QSL manager for ZB2CF, 9G1s GG and GV I'm unable to answer a number of cards received from W/Ks who failed to supply self-addressed stamped envelopes. Logs are on hand for QSOs through October, and all QSLs with s.a.s.e. have been answered. (WA2MVO) . . . Australians are using their AX tag again, same suffixes, and New Zealanders are sometimes ZMs. (LIDXA) . . . WA6MWG's acceptance of WB4BUQ/8R1 QSL chores dates from October 8, 1973, but WA4WTG no longer handles TJ1BF's QSLing. (WCDXB) . . . Uruguayans swap their CX prefix for DV or CW now and then, suffixes the same. (DXNS) . . . Hint-hint – VU7GV is an enthusiastic philatelist. (JDXRC) . . . Sweden's SSA bureau now answers to Jonakersvagen 12, S-12248, Enskede. (DXNS) . . . QSLing for tentative Bhutan work by VU2KV and W6KNH, possibly as A55KV, will be handled by 'KNH. (WCDXB) . . . Splended QSL returns from the DJ-DK-DL crowd! (W1OPJ) . . . 9C4AA displays one of Mexico's rarer prefixes in contest work, and CI is sometimes used by Canadians to go with regular suffixes. E.g., QSL CI1EO to VE1EO. (VERON) . . . I'll answer every card received for my summertime activity as KV4IF (W2AAF) . . . Less than ten days after our October FG0AFA/FS7 contest work about five hundred QSLs had arrived. Cards for all 3842 QSOs were quickly prepared thanks to assitance from W2MIG. (K6SE/2) . . . San Marino's 9A label gets occasional mileage in special activities. (DXNS) . . . 1 QSL 100 percent upon receipt of cards through the Bangkok bureau, direct if s.a.s.e. is

HB9QD's wintry QTH of the Month in Tessin canton reminds us 'tis the season to be jolly. Enrico runs up fat phone scores in DX tests with that quad and will probably be banging away again in the '74 ARRL fray next month and next.

ZS5LB hooks plenty of W/Ks with this neat Vryheid layout. In fact Albert needs only Alaska on 10 and 15 meters to clinch his ARRL Five-Band Worked-All-States certification. You overseas chaps who haven't yet turned the 5BWAS trick get a golden opportunity to do so in the February-March ARRL DX Contest just around the corner. *(Photo via K4WLS/KL7)*

supplied. (HS3AJJ) . . . W6s BSY CUF DOD ISI ITD JZU KG KJG LQC OKK OL NTQ UZX, K6s DC OSO TXZ TWT YGS ZM, WA6s AHF CXK DJI IEB JVD LFN TOK, WB6s BGQ COB DOQ and several helpful spouses pitched in to keep the ARRL Sixland QSL Bureau branch rolling in September. Who deserves credit for manning *your* Bureau substation? (NCDXC) . . . Help! WB4YKM wonders how to wheedle cards from TG9CD, VE$\emptyset$NWI, VP2s LAW VBU, YU4AVW, 6Y5MD; and WN6SWM likewise re CR6AL, JA1MCU/C21, JD1YAA, VK9MH and ZL5AL. Any 'alp? . . . Now three cheers and a happy tiger for your "QSLers of the Month" — CP1s EU JV, CR7RM, CT2AK, DA1ED, DJ1XU, EL2DZ, F6s ANO CLZ/FC, FO8BV, FP8DH, Gs 3NVA 4BIA 8FG, GC2FZC, GW3VOW, HB9AHO, HC1GB, HH2JT, HI8XAA, HR1RSP, I$\emptyset$JX, JY9VO, KC4-USP, KG6AAY, KH6s FLC HDB IBT, KJ6BZ, KL7HFO, KV5GF, LA9JM, M1B, MP4BJR, OA6-CV, ON4KD, OX5AA, OZ4KL, PJ9JT, SV$\emptyset$WMM, TG4SR, TR8VE, TU2DO, VE1XQ, VK4s VU VV, VPs 1EV 1KD 1RB 9H, VS5WW, WA1CQA/HC1, WBs 4BUQ/8R1 5FGJ/YV5, XE3LK, XT1AJ, YSs 1FQM 2OB, ZB2CF, ZM3RK, 3D2EK, 4U1ITU, 5B4AO, 5H3JL, 5T5s EEI LO, 5U7s AZ BA, 6W8DY, 6Y5AH, 9G1GG, 9H1s BK CH, 9L1VW, 9X5VA, 9Y4s USA and VV, plus QSL aides CN8CG, Ws 2PPG 9NNC $\emptyset$GX and K2BPP — all soundly praised by "How's" contributors Ws 1OPJ 4WFL $\emptyset$JCT, WA2MVQ and WN6SWM for confirmational comebacks quicker than the norm. Any swift receipts at your QTH? . . . Your monthly *Callbook* complement now, but remember that each entry is necessarily neither accurate, complete nor "official." They're *your* suggestions, not ours. Just might do the trick for a new DXCC credit or two. Help yourself. . . .

CR6AEP, Box 1217, Benguela, Angola
DA1QN, Box 412, OPSO, APO, New York, NY 09611
ex-DL8ME/W6 (to G5BCX)
DM8THI, Box 09, Ilmenau, D.D.R.
DT6UUL, 8351 Ratherwalde, Stolpen, D.D.R.
EA8JE, Box 81, Puerto Osario, Canary Islands
EA9EW, Box 213, Ceuta, Spanish Africa
EL2CQ, Box 192, Monrovia, Liberia
ex-EL2Y, G. Cayetano, c/Bolivia, 31-16-3a, Barcelona 5, Spain
EL7F, Box 538, Monrovia, Liberia
F2QQ, R. Gemehl, 95 rue H. Barbusse, 92700, Colombes, France
FG7AK/FS7 (via F6AEV)
FG$\emptyset$ZZ/FS$\emptyset$ (via F2QQ)
FR7AX, P. Guannel, P.O. Box 109, 97420, Le Port, Reunion Island
FY7YI/FG$\emptyset$, Box 460, Guadeloupe, F.W.I.
G3RWL, R. Limebear, 60 Willow Rd., Engfield, Middlesex, England
HA1$\emptyset\emptyset$KKN, P. O. Box 64, 1475, Budapest 10, Hungary
HI7OMR, O. Rivera, Box 516, San Pedro, D.R.
HS3AJJ, Sgt. A. Hubbert, PSC Box 3887, APO, San Francisco, CA 96304
I1DFB, Box 349, USA StratCom Sig. Spt. Agcy., APO, New York, NY 09019
I4FGM, P.O. Box 3113, Bologna, Italy
JR1YIE, R. Houston, 1956th Comm. Gp., Box 73, APO, San Francisco, CA 96525
K5LWL/YV6 (via K5LPE)
KX6BW, P.O. Box 305, APO, San Francisco, CA 96555
PJ8ID—WB8IDD/KV4, J. Labo, K$\emptyset$OST/5, 3022 Ravine Tr., Carrollton, TX 75006
PZ1CQ, S. Toreson, Box 1881, Paramaribo, Surinam
TA5 1HY 2QR (via W5QPX)
TI3QH, Box 703, San Jose, C.R.
UP2CG/CO2, c/o, CRC, Box 88, Moscow, U.S.S.R.
VP1JWW, P.O. Box 526, Belize, British Honduras
VP2s M MJK MQB MYA (to W5MYA)
WA5VKJ/HB$\emptyset$ (via W3HNK)
WA6JEB/KW6, H. Wright, Box 616, Wake Island, 96798
WA8KMJ/KL7, J. Wright, NavComSta, Box 185, FPO, Seattle, WA 98777
WB4BUQ/8R1 (via WA6MWG)
WB4NXR/VP7 (to WB4NXR)
WB4TAF/VP7 (via WB4NXR)
XE1NNR, Dr. M. Alfani, Box 349, Veracruz, Ver., Mexico
ZF1GS/VP7 (via WB4NXR)
5A5TU, Box 372, Tripoli, Libya
8R1X, Box 164, Georgetown, Guyana
9U5s CM CR RB (via ON5TO)

A4XFF (via ROAR)
AP2KS (via SM1CNS)
CE1EO (see text)
CT2AEP (via CT2BK)
DA1OR (via K9BWI)
DL1RK/HB$\emptyset$ (via DARC)
DM8IKW (via DM3VUH)
DT4QN (to DM2FQN)
EA8JJ (via W3HNK)
EL2DO (via W1NGQ)
F2AQ/m (via 3A2AH)
ex-FM$\emptyset$IX (to FR7AX)
GD3AIZ (via G3LXQ)
HB$\emptyset$AIC (to HB9AIC)
HB$\emptyset$NL (to HB9NL)
HG8U (via HA8UD)
ex-HI8XTF (to I1DFB)
LJ2S (via LA8VP)
LX1JAT (via LX1DC)
PJ4DA (via W3BYX)
PJ9AVN (to PA$\emptyset$AVN)
PJ9GIW (via K4BAI)
SI9WL (via SSA)
TA1MB (via W3HNK)
TY1UW (to EL3ZU)
VP2EN (via G3TXF)
VP2EY (via W3HNK)
VP2MDX (via W4PRO)
VR1PC (via WA6KQB)
VS9FBS (via G3LQP)
W6LUV/VR1 (to W6LUV)
XT2AL (via F6AXP)
ZD8JD (to F2JD)
ZF1WL (to G3RWL)
ZK1CU (via ZL2BAG)
3A2CP (via WA3HUP)
4C9AA (via W2GHK)
ex-5R8AG (to FR7AX)
8P6EU (via W1CER)
9A1EL (via OE5PV)
9G1GV (via WA2MVQ)
9H1AF (via RSGB)
9Z4LO (via FTARS)

These offerings are yours through the generosity of contributors Ws 1EII 1IUB 1OPJ 2JNO 4WFL 6UUX $\emptyset$JCT, Ks 2YFE 3CR, WAs 1PID 2MVQ 8GCW, WB5HVY, WN6SWM, VEs 3CUI 7BAF, VO1KE, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich, N. 72T, England), International Short-Wave League *Monitor* (E. Chilvers, 1 Grove Rd., Lydney, Glos. GL15

5JE, England), Japan DX Radio Club *Bulletin* (JA3GZN), Long Island DX Association *DX Bulletin* (K2KGB), Newark News Radio Club *Bulletin* (M. Witkowski, Rt. 5, Box 167, Stevens Point, WI 54481), Northern California DX Club *DXer* (Box 608, Menlo Park, CA 94025), Southern California DX Club *Bulletin* (W6EJJ), VERON's *DXpress* (PAØs INA TO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloid*. Any late tips in your log to pass along to the gang?

† † †

W h e n c e :

ASIA — Although reciprocal operating authorization has not been agreed upon between the U.S. and Japan, the latter has taken some initiative. W/Ks may not, as foreigners, hold personal calls but we can now have the exclusive use of club calls as members, which clubs must have at least two-thirds Japanese membership. Works out fine. These calls are distinctive in that the numeral is followed by the letter Y or Z. Mine came through courtesy of JA1s EIK ENZ and UVQ. After a quarter century signing JAs 2AX 7AX, KAs 2AX 7AC and 9AR I hope to meet DX friends again on 15 and 20 as JR1YIE. (W6UUX) . . . Many have tried for licenses here on Taiwan during the past two years with no luck. From my own experience currently W/Ks should expect no such operation from BV-land for a long time to come. Except, of course, for my friend BV2A who is closely monitored when active. It also seems foolish to speculate on the possibility of early amateur radio activity on the China mainland under present circumstances. (WA9VXT) . . . VU2FBZ graduated from the beginner class and now signs VU2ANI. Fred and VU7GV, who has been active in the Andamans since April, are working to expand their newly formed Radio Amateurs of Andaman and Nicobar Islands society. Fred and Sulu run 70 and 45 watts respectively on 20 cw and both use quad antennas. VU7GV also checks into Southeast Asia nets on 14,320 kHz at noon GMT now and then using a-m. VU2ANI favors 14,040-14,080 kHz. (W4UMF) . . . VU2CW is a third amateur activating Andamans & Nicobars. Our Bay Islands Amateur Radio Society is training twenty enthusiasts for an amateur exam soon to be conducted at Port Blair. The group includes a doctor, a teacher and two YLs. BARS proposes to set up a club station, issue a newsletter and is a Federation of Amateur Radio Societies in India member. I would like to correspond with hams and SWLs having DX interest. (VU7GV via W1YL) . . . I'm a 19-year-old Indian amateur and would also appreciate overseas correspondence. I study zoology at Calcutta U. and my interests include swimming and pop music. I like 14-MHz cw with my homemade VFO-807 rig, 50-foot-high dipole and an S20R receiver made by Hallicrafters in 1945. This set-up is primitive but I work lots of DX on 20. (VU2APU) . . . Enjoyed meeting rare 9N1MM at NJDXA and W9DXCC get-togethers. (W2GT, K9UIY) . . . I'm back in Virginia after two years as EP2TC in Tehran. Putting up wire beams for 40 and 75 meters while planning a new 80-foot tower. Nice roomy QTH near Falls Church. (W4TRP) . . . JD1YAA, active on all DX bands, is the Japan Meterological Agency club station in the Ogasawaras. (WN6OSS) . . . Nothing encouraging yet in response to my Burma ministry of communications inquiry regarding possibility of XZ licensing. (HS3AIG) . . . Active members of Japan DX Radio Club include JA1s AA AB AS BF BK CC CQ CR DM JM KF TD KAB, JA2s DN JW LC UU WB, JA3s AA BG IW SJ, JAs 6ZD 8AA 8AQ 9AA ØAA and ØCA (JA3GZN) . . . I'm quite busy on cw, usually 14,065, 21,065 or 28,065 kHz, from Ubon Ratchathani. I'll be operational here until May, then back to WA8GCW. (HS3AJJ) . . . Asian addenda via the aforementioned clubs press: EP2TW suffered broken bones in a fall while erecting his new quad. Switch to Safety! . . . VS9MJ (ex-9V1QH-G3ZVV) shows near 14,200 kHz at 1600-2000 GMT. Jim should be raisable well into '74. VS9RAF demonstrated amateur radio at a military exhibition on Gan isle with VS9UA (G3UAO) at the controls. . . . HL9VR is due to depart Cheju Do at any time, meanwhile rackin' the pack near, 14,235 kHz. . . . 4W1BC (G4ATQ) concentrates 14,250-14,260-kHz sideband activity at 1230-1600 GMT on Saturdays from Sanaa. . . . K4AIJ is said to be over China way investigating doubtful on-the-air possibilities. . . . JA7AO goes after Europe, his last needed continent on 160, on cw at 2000-2100 GMT, transmitting on 1908-1912 kHz while listening 1825-1800, almost every week end. . . . UAØFGM, 3618 kHz at 1200 GMT, was 80-meter country No. 105 for K6WR. . . WØOL, SWLing from Formosa, answers to NAMR-2, Box 14, APO, San Francisco, CA

AFRICA — 5R8AG leaves Malagasy for Reunion where he becomes FR7AX. Radio conditions were not the best while I signed 5R8AC this winter. (W3ABC) . . . Some radiotelegraphers working a 5R8AG apparently think they're working HR8AG. (W1JUB) . . . ZE1CX will get an SB102 going in Salisbury after recent marriage. (W3HNK) . . . WB4WHE, reapplying for a Cameroons call, hopes to help issue TJ1 QSOs once more. (WN6OSS) . . . 3B8DL knocks off for 3B9-land with a new transceiver along. (WA5ZWC) . . . Three of the four days OH2MM & Co. spent in Mali were wasted on frustrating authorizational red tape. (W3LB) . . . TU2DV now has a 60-foot-high TH6DXX to go with his Heath outfit. My dad visited Chuck for two weeks as TU4AG. (WA6NFC) . . . For rare ones I recommend watching the Afrikaners Net on 21,355 kHz when conditions permit. (WA3SWF) . . . 9G1HE is reported active each Tuesday and Thursday near 14,175 kHz after 2000 GMT. (VE3CUI) . . . XYL W4EJQ and I closed down ON8UL in Brussels for a move to Mali. We'll have our gear with us and hope to sign a TZ call from Bamaku. (W4EJP) . . . EL2Y shut down permanently and moved to Barcelona. (WA1PID) . . . VQ9R and 6W8DY pep up the 15-meter Novice slot on weekends. (WN6SWM) . . . Africana courtesy literature of clubs and groups: 5X5NK continues to feed 5BDXCC appetites near 7090 and 3790 kHz. . . . ZD3D moved from Banjul in favor of 7P8-land but ZD3M's phone remains available on 20. . . . VQ9HCS, near 21,300 kHz at 1700-1900

ZS5WN has a ready paddle for any battle, your Key of the Month. Youngsters, you swing to and fro alternately for dots and/or dashes with this sleek and simple homespun sideswiper. A good op can hit a smooth and stylish 30 or 35. ZS5WN probably will favor us with another graceful demonstration in next month's ARRL International DX Competition open to one and all.

UA6XG's homegrown cubical quad has four elements on 10 and 15, three on 20 meters, and is twirled by a surplus Red Army rotator. That's Vic inspecting the stick during WA9YEY's recent visit to Rostov.

GMT, expects to radiate from Astove island in the Cosmoledos into 1975. Harry's new 1.75-kW power plant will help. . . . VQ9s B BP M and R knocked off their Farquhar fun in late October in the face of worsening weather and worse propagation. . . . Ex-VP8GZ relieved ZD9BM on Tristan da Cunha in October and should now be signing ZD9BT. . . . All amateur activity may be suspended in Burundi this month, terminating the availability of 9U5s CM CR and RB on 14- and 21-MHz ssb. . . . TR8SS hoped to have Spanish Guinea on 20 phone by the holidays. . . . ZS1ANT's cw breaks through on 14,040 kHz at 1730 GMT or so from the South Africa Antarctic Expedition.

OCEANIA — KG6AAY is ably manned in the 15-meter Novice band by WN3TLK with a KWM2 and 100-foot-high TH6DXX. (WN6OSS) . . . I'm a radio inspector with NZPO (New Zealand's FCC) and favor 7 MHz. I previously signed G3TJD and ZL2BID. (ZL1SV via W9JQB) . . . The VK7 Golden Jubilee Award for W/K/VE/VOs is based on QSOs with five Tasmanian stations last year. Qualified? S.a.e. plus International Reply Coupons to Box 851J, GPO, Hobart, 7001, will bring details, (WIA) . . . A year ago I was assigned the call VK9ZAC for use on Mellish reef but we got no closer than Darwin aboard yacht *Luthien*. (HS3AIG) . . . Prominent Perth SWL Peter Drew dropped by here on a world-wide tour with two companions. (WA9UES) . . . KX6BW, 14,260 kHz around 1000 GMT, supplements the Marshalls efforts of KX6s KU and KV. . . . KH6GLU wants to try his DX luck in FW8-land again one of these days. . . . W7JEG and W5QQQ/7 mounted their October Saipan sortie under Western Washington DX Club auspices.

EUROPE — The fall 10-meter season opened here on schedule, cw QSOs with EA2JP, HG4KYB, KZ5BB, LUs 2DEK 3DSI 6EF 7DZ, OH2BAD, PYIs HQ MB, UP2s PAP PBI, UV9DX, ZC4BI, ZE1EN, ZSs 2AG 6AL 6SS, 7Q7DW, 9H1CH and others. HB9LO, I2CEX, LUs 1DPR 6DKX, PY1MCC, YV5AIZ, ZC4CY and 3B8MS were heard. I use an FTDX560 and 3/4-wavelength ground-plane on 28,040 or 28,182.5 kHz, calling CQs at hourly intervals during the day. Very little QSO activity is noted in the 28,180-28,200 kHz beacon region, however. (G3RFG) . . . Napoleon's old Elba diggings were the site of recent operation by IA5s ALL and RVB. IIs ALL and RVB officiated on 15 through 80 with Drake, Swan and Trio gear plus dipoles. (ARI Savona) . . . Check with HA1VE for details on Claudius Radio Club's Savaria award based on QSOs with specified Hungarian stations since 1969. (HA1-KYY) . . . QSOs with ten Slovakia area amateurs since 1945 can qualify non-Europeans for the Slovensko Diploma issued by our Central Radio Club, P.O. Box 69, 113-27, Praha 1, Czechoslovakia. (OK3BG) . . . Contacts with twenty LA stations including six north of the Arctic circle since 1949 may qualify you for NRRL's WALA sheepskin. S.a.e. plus IRCs to LA4YF will secure specs. (LA5QK) . . . Thirty-member Star Radio Club of Leeds looks for W/K contacts from G3ZWA on 20 ssb at 2000 GMT each Wednesday. (E. Pronin) . . . SVØWXX does his DXing from the isle of Levkas. (WB4KZI) . . . Nice silver anniversary QSO with I8AOH who was signing I1AOH when I worked him in '48. Also 23 years between contacts with FI9I. (W1OPJ) . . . SVØWH operator Gordon, active from Nea Makri for several years, now relocates to Maryland. (K2JFJ) . . . PAØs BN and MOD take over as VERON certificate comanagers at P.O. Box 1166, Arnhem, Netherlands. They promise prompt handling of inquiries and applications. (PAØALU) . . . SY5MA lives about 25 miles from Mt. Athos and likes 40 cw. Bill was formerly active as W3CA and will have ssb available soon. (W4KA) . . . That 3824-kHz beacon signing RIZY is a Russian job located 56N and 162E, roughly. (W5QPX) . . . After three inactive years our military-sponsored IIDFB installation is again on the air. I formerly signed F7FT, HI8XTF and KZ5TC. (W1EII) . . . Marvelous trip to the U.S.S.R. last fall where I found UAs 6XG and 9BQ most hospitable. Both receive *QST* gift subscriptions. (WA9YEY) . . . I visited Germany around the same time, enjoying fine fellowship with DJ8TP, DKs 2SO 3HL 9SN 9SO and other members of Aalen Amateur Radio Club. (K9EFY) . . . RSGB's 40-meter contest really brought out the Gs in force. UP2CG/CO2 and F5ZW/KP4 are heard trying our 7-MHz environs. (VE3CUI)

SOUTH AMERICA — I hope north-south propagation remains excellent for U.S.A. contacts from Bolivia and I'll be concentrating mostly on cw operation around 14,027 kHz during evening hours. Neighbor CP1EU is enthusiastic about 160-meter work. Max usually keeps at it 'till 0200 GMT. CP1FW is currently the only Bolivian station with SSTV capability, welcoming skeds. Nobody here using RTTY to the best of my knowledge. My own tour at La Paz is now drawing to a close. (CP1JV) . . . HK3CVX and others investigate Malpelo prospects. (W6OKX) . . . CEØAE/6 spent a few days with us this past summer. Fr. Dave hopes to return to Easter early in '74. (WA3HUP) . . . 9Y4MH hunts WN2 on 21 MHz almost daily beginning at 2200 but Keigh ignores premature breakers. (WNØGTJ) . . . PY8ZAI is well heard near 28,598 kHz. Fr. Gilbert, originally from Indianapolis, has been a missionary in Brazil for thirteen years. (W8EFW) . . . Gene of K1NAP should be manning KC4USV in Antarctica by now and expects to roll up plenty of contacts in the ARRL DX Contest next month. (WA9MZS) . . . OA4SO returns to Lima after six years at Penn State. (K3CR) . . . More from the south via

the press grapevine: The importance of properly spaced cw characters is illustrated by the number of ham radio-telegraphers who think they're working HKØBYU instead of HKØBKX. . . K5QHS/CEØ scored 1500 October QSOs from Juan Fernandez isle on 10 through 40 meters and may try VP2 spots on his next swing. He totes medical paraphernalia with him on such junkets which should ensure welcome for the good doctor wherever he goes. . . . PYØAO's September Trinidade thing was a project of Rio's DX Stars ARC. . . . LU1ZC may get back to Deception this season. CE9s AQ and AR are already there, and UA1KAE/7 may try a new 4K-type call from nearby King George isle in the South Shetlands. G3RFH is tempted to sign on for another South Sandwich sting where he once signed VP8HF before a hurried retreat from volcanic fallout. WB5BID expresses interest in the place, too. . . . An 80-meter outburst by VP8JV is imminent with Europe prime target. . . . LU5HFI logged 75 countries on 28 MHz in one October weekend. Don't count out old 10 just yet!

NORTH AMERICA – Returned to ham radio after a 19-year absence and worked 115 countries in my first two months back on the air, all 21-MHz code and voice with a TS511S and 35-foot-high 3-element quad. Conditions are supposed to be slow? (WØJCT) . . . After a hamming hiatus of 25 years I returned to the game in '72. QRP types should do well now on 40 if they listen carefully, especially for Pacific DX. Because pile-ups are shallow, chances of QSO are usually excellent regardless of power. (W6OKX) . . . While QSOing Novices from ZF1PL I observed that, though unskilled in rapid exchanges, they had happily not yet developed the obnoxious operating habits displayed by some of our DX veterans. Too bad certain frequency-hogs don't get the opportunity to hear themselves as DX hears them. I work around them as best I can, trying to give the patient and courteous operators a break. DX hogs may get their contacts but they may not get their QSLs. (W1REW) . . . The DX pals I made as HR1RTS, YN1RTS and W7OJW can find me on 20 cw from Virginia. Hope to replace my vertical with a good beam soon. (WA4BVX) . . . My first ARRL DX Contest as a General got me 28 new countries. Now for '74's! (WB4WHE) . . . Here in the Yukon it's difficult to organize any form of stable amateur radio club due to a constantly changing and moving population but last year we managed to informally organize hams across the Territory. Among successful projects is the attainment of amateur radio car license plates, also authorization to use the VA prefix for commemoration of the Klondike Gold Rush's 75th anniversary. VE8FD, Yukon's only YL licensee, frequents the VE8 net on 3782 kHz at 0400 GMT, also the low end of 20. Julie was first licensed as VE6AHF at Calgary in 1971. At least two VE8s contemplate hitting 160 meters this season. (VE8CD) . . . Let's remember that FCC issued many a citation for improper station identification during last year's ARRL DX Test. (W5SZ) . . . Western Washington DX Club members now are some 150 strong. (WA7JCB) . . . West Coast *DX Bulletin* subscribers numbered almost 800 after 262 consecutive weekly issues. (WA6AUD) . . . Need only Africa for WAC, four states for WAS, and one more New Zealander for BCGA. (WN6SQD) . . . I'd like to see short-wave propagation discussed more thoroughly in *QST*. (W5ILJ) . . . DX stations just below their usual 7100-kHz band limit should tune higher more often for Novice calls. (WN6SWM) . . . Let's keep 28 MHz active, especially checking those beacon signals. (WB4VKW) . . . I've been surprising new two-letter-suffix holders by sending them "QSL originals" from my 1920-'21 file. (W9NN) . . . QSOs with three PJ1 stations could qualify you for VERONA's Curacao Certificate. We're saluting our society's 25th anniversary. (PJ2IC) . . . My old KWM2A worked 45 countries as Canada's first amateur aeronautical mobile, was portable-VE8 on the DEW line and worked out well as VPs 5WW and 7DX. (VE2WW) . . . W3VMB came down from the DEW line but Ws 1LXE and 3DNY remain portable-VE8. VP2SAH still cuts through well on 7-MHz cw with his 10-watter. (VO1KE) . . . Just passed my General; 20 meters here I come! (WN4DLY) . . . Made 700 contacts in PJ8AA fun on St. Maarten where PJ7s EF and RO are permanently active. VP2VV signs FG7AK/FS7 on 14,245 kHz at 1900 GMT. (W2BBK) . . . Reached the 140-mark with 180 watts and a vertical. (WA3SWF) . . . Vertical and 180 watts here, too, with nearly 100 confirmed. (WA2FIQ) . . . No, WN9IWY isn't the world's last rockbound Novice. I'm in the same boat but have QSLs from 23 of 65 countries worked in seven months on 21 MHz. How about more WN activity on 10? (WNØJFJ) . . . At my end it's 67/51 worked/confirmed on 15 meters. Any chance of half-DXCC certification for WNs? (WN7UMU) . . . Poor 10 offers less and less DX. Short-skip contacts help, but we need more 28-MHz activity for the obvious reason. (VE3CUI) . . . Good 20-meter cw DX with my 40 watts and ground-plane, particularly out Oceania way, and four more states will mean WAS. ELØP/mm dropped anchor here for a pleasant June visit. (VE7AFX) . . . Listening to fine DX on 75 meters including UAØFGM and XV5AC while awaiting my Tech ticket. (ex-WN6JPB) . . . WB2KXY and I scored 650 contacts on 15, 20 and 40 from St. Pierre as FPØs KX and II. (WB2MAN) . . . HR1RSP collects rare U.S. counties almost daily near 14,336 kHz. (WA6CPP) . . . Ten and 15 leave much to be desired but 20 has been steady, providing a few nice countries of the more unusual sort if one looks around a bit during the day; 0000-0200 GMT for the Pacific, 0500-0700 for southern stuff. (VE7BAF) . . . First QSO from St. Pierre on my FPØXX DX-cursion was with W1HGA, the last with W9CN. I used FP8CT's outfit and found pile-ups almost unbelievable. (K1DRN) . . . I expect to sign KZ5NG through 1974 while in the Navy, then return to WA4UAZ. (ex-GM5AXO) . . . Much DX fun on 15 and 40 Novice bands with my unusual callsign, an HW101 and dipole at Coco Solo. (KZ5QRN) . . . Finally got my diagonal dipole going on 20 with G3UZ, KH6IGC and ON6LW. More to come! (WA1PHJ) . . . I'm hooked on DX for life. My first two General contacts were HR3VFB and 9Y4HR. (WBØHIY) . . . Look forward to better openings on 20 after

(Continued on page 168)

VP5LD tries his DX luck at the Fairbanks shack of WL7HQT. Larry is widely worked on 14- and 21-MHz cw when home on Grand Turk isle. What was he doing in Alaska? Family reunion with brother-in-law KL7HMU who provides this picture.

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

K1CTL, Charles A. Daunt, Plymouth, NH
W1CTZ, Frederick S. Allen, Newport, NH
W1FDO, William H. Hand, Andover, CT
W1GCU, Henry N. Grenier, Waltham, MA
K1IFY, Raymond P. Pierce, Beverly, MA
W1OD, James A. Bain, Framingham, MA
K1RLI/WA1JWH, Russell H. Nelson, Center Ossipee, NH
W1UN, Joseph B. Dodge, North Conway, NH
Ex-K1YDU, George A. Dwyer, North Hinsdale, NH
W1ZT, George E. Nothnagle, Trumbull, CT
WA2ACO, Steven M. Haas, Great Neck, NY
W2AOG, Frederick L. Seufert, Sun City, AZ
W2CIR, Samuel Sosenko, Pearl River, NY
WA2DLD, Martin L. Zuckerman, Livingston, NJ
WB2DMH, Peter H. Durbrow, New City, NY
WB2DWT, Jerome F. Walker, Rochester, NY
K2IXR, John J. Foley, Jersey City, NJ
K2KYS, Norman A. Whitney, Riverhead, NY
K2LFD, Henri W. P. Heystek, Warren, NJ
W2NEP, Arnold J. Seipel, Montville, NJ
WA2PGJ, C. Paul Thomson, Gibbstown, NJ
WB2WWD, John K. "Lymie" King, New Rochelle, NY
W3SWK, Willaim G. Hofer, East Pittsburgh, PA
WA4DID, J. Wilson Doty, Miami, FL
WA4FHV, Shelley Frontis, Jr., Buxton, NC
K4GIL, Thomas J. Baker, Gastonia, NC
WB4GTT, Edward V. Soper, Fairfax, VA
W4ILJ, Adam Mayer, Newport, NC
K4QYB, Norman E. Staley, Ft. Lauderdale, FL
W4RHV, Arthur C. Osburn, Memphis, TN
K4RUA, Clarence J. Pattillo, Sr., Birmingham, AL
K4RV, John F. Mellinger, Sr., New Port Richey, FL
WA4ZLV, Eric D. Thomas, Clarksville, TN
W5ABS, Claude S. Morgan, Metairie, LA
W5HCP, John E. Douglas, Paragould, AR
W5HCY, Emile Antonini, Sr., New Orleans, LA
W5IZW, Tom J. Eller, Pampa, TX
W5LQP, Frank J. Kincaid, Jr., Port Arthur, TX
W5MOQ, W. W. Bell, Houston, TX
WA5RST, Howard D. Beckelmann, San Antonio, TX
WA6DSH, Sidney R. MacDonald, Burbank, CA
W6JTN, Donn S. Smith, Santa Barbara, CA
WB6LLE, Virgil Munhollon, Glendale, CA
WA6ONL, Lee E. Ellis, Menlo Park, CA
W6RFS, Lewis E. McLerny, Hawthorne, CA
WB6VVT, Everett T. Plumer, Santa Monica, CA
W7GID, Alfred E. Griffin, Portland, OR
WA7HKR, Spencer T. Adams, Port Angeles, WA
W7IHL, Ira D. Riggins, Pullman, WA
K7PUS, Raymond W. O'Dell, Hillsboro, OR
W8KSL, Arthur T. Clarkson, Hazel Park, MI
K8YGQ, Bennie Winningham, Flint, MI
W9BSK, Durward F. Crook, Evansville, IN
W9HRV, Steve Miller, Lansing, IL
WA9MWT, Howard L. McKissick, Lynn, IN
W9QFB, Thomas V. Rogers, Chicago, IL
WAØEMC, L. W. McGrew, Anselmo, NE
WBØHEX, Gavin J. Shaw, Minneapolis, MN
WNØHZW, James D. Krause, Longmont, CO
KØICG, Joseph A. Lillegraven, Madison Lake, MN
VE3BSG, J. G. Strain, Ottawa, ON
VE7ANX, L. A. "Tug" Wilson, North Vancouver, BC
DJ3FI, Rudolf Wersin, Erwitte, West Germany
SM5AMP, Onni Sutela, Orebro, Sweden
TF3EA, Finer Palsson, Reykjavik, Iceland

Tentative GMT dates for major 1974 ARRL operating activities

January	*February*	*March*
2 W6OWP Qualifying Run	2-3 DX Competition, phone	2-3 DX Competition, phone
5-6 VHF SS	2-10 Novice Roundup	6 W6OWP Qualifying Run
12-13 CD Party, cw	7 W6OWP Qualifying Run	15 W1AW Qualifying Run
16 W1AW Qualifying Run	10 Frequency Measuring Test	16-17 DX Competition, cw
19-20 CD Party, phone	14 W1AW Qualifying Run	25 W1AW Morning Qualifying Run
26-27 Simulated Emergency Test	16-17 DX Competition, cw	

April	*May*	*June*
4 West Coast Qualifying Run	1 West Coast Qualifying Run	6 West Coast Qualifying Run
6-7 CD Party, cw	11 Frequency Measuring Test	8-9 VHF QSO Party
16 W1AW Qualifying Run	15 W1AW Qualifying Run	13 W1AW Qualifying Run
20-21 CD Party, phone		22-23 Field Day
29 W1AW Qualifying Run		26 W1AW Morning Qualifying Run

July	*August*	*September*
12 W1AW Qualifying Run	13 W1AW Qualifying Run	7-8 VHF QSO Party
13-14 "Open" CD Party, cw		8 Frequency Measuring Test
20-21 "Open" CD Party, phone		11 W1AW Qualifying Run
		24 W1AW Morning Qualifying Run

October	*November*	*December*
10 W1AW Qualifying Run	9 Frequency Measuring Test	7-8 160-Meter Contest
12-13 CD Party, phone	9-10 SS, phone	10 W1AW Qualifying Run
19-20 CD Party, cw	15 W1AW Qualifying Run	14-15 10-Meter Contest
28 W1AW Morning Qualifying Run	16-17 SS, cw	26 W1AW Morning Qualifying Run
		31 Straight-Key Night

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* W3WRE

1974 YL Activities Agenda

ABOUT THE TIME we have said "good bye" to the last New Year's Day caller, looked over the Christmas gifts again, and decided to have a quick supper so that the last Bowl game can be watched without interruption, we find ourselves looking at the blank page that is the new year. 1973 was so full of all sorts of activity that we begin to wonder just where do we go from here?

January begins the YL year with the newest of the YLRL sponsored contests, the DX to Stateside YL. The cw portion is scheduled for January 9-10, and the phone contest is January 23-24.

February and March are the months for the annual YL-OM contest, the most popular of all the YLRL events. Here the OMs will have the opportunity to log all those gals, both in this country and DX, that were limited to YL only participation in the January contest. The phone section will be February 23-24, with the cw portion scheduled for March 9-10.

April is an open month with only one date to remember; the deadline date for receiving the contest logs from YL-OM participants has been set at April 25.

The annual QSO Party of the YLISSB is always set for a weekend in May. The date has not yet been announced.

June is always a busy month. YL clubs who like to participate in the annual ARRL Field Day will be very busy with last minute planning and the event itself. It is also the month of the annual Midwest YL Convention, and usually the YLISSB Convention, scheduled for the Southwestern United States in 1974, is held in June.

July, normally a vacation month with little or no major activity, will this year have the theme that all roads lead to New York City and the YL activities and forum of the National ARRL Convention at the Waldorf Astoria, July 18-19. The NYC YLRL will host the women's programs at this event.

There is nothing but summer and vacation in August, but September marks the YLRL "Howdy Days," designed for YLs only. October and November again have the strictly feminine note in contests with the YLRL Anniversary Party that celebrates the birthday of this world-wide YL organization. October is also Floridora Month with the members of the YL club in Florida operating daily during October to give contacts to those who are eager to acquire the club certificate. November has become synonomous with the Trillium Weekend, an annual activity, both cw and phone, in which the members of the Ontario Trilliums provide contacts with their membership in this popular contest of the Canadian YLs.

Throughout the year are scheduled monthly club meetings, both the local radio clubs with which we are affiliated, as well as the YL club meetings in our particular community, or in many cases on-the-air meetings. There are the YL nets that are set for every day in the week so that we can choose the one that suits us best. Our calendars include the special day that we send our news to our District Chairman so that she, in turn, may meet her deadline to *YL Harmonics*.

We have our personal schedules of events, the annual banquet, the deadline to renew our license, or the hamfests and conventions we plan to attend that almost always include a YL get together of some sort.

QST, club bulletins and *YL Harmonics* list the events that keep us up to date well in advance so that none of us need really be in the dark and ask when we find a flurry of activity "What's up, Doc?"

National YL Clubs

YL clubs in this country have long been a part of the amateur radio scene. Some are organized on a local scale for formal meetings of women in the larger cities across the country, while others have a statewide, or even multistate membership.

L-r: WA6UBU, Esther Gardner; XE2ID, Blanca Sores; WB2OSP, Dorothy Holmes; K6KDB, Merrien Swanson; and WB6DFN were among the YL members of *Colegas y Amigos* during their visit to a new school for the deaf in Ensenada, Mexico, one of the many goodwill projects of this club. *(K6IBJ photo)*

*YL Editor, *QST*. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

Linda Pettit, WB6ZSE, can be found on the Western Amateur Radio Morse Code Network operating the old landline code.

The growth of the YL population in DX countries has resulted in YL clubs organized on a national scale on almost every continent. Asia is represented by the 25 YLs in India who meet regularly in an on-the-air type organization; and by the over 130 women in JLRS, Japan's national YL radio club. The recently organized YLRC Elettra Marconi in Italy is the only formal YL club on a nationwide scale in Europe. In Oceania, the YLs in New Zealand meet regularly on the air in the monthly National Net, while Africa's SAWRC represents women operators of the Republic of South Africa. In North America, CLARA, the steadily growing club of Canadian women, has a membership that covers all Canadian Provinces.

While YLRL was originally organized as a nationwide club of women amateur radio operators in the United States, it has become international through the worldwide membership, and the club's "Adoptee" program. The YLISSB is also an international system that, unlike the other clubs, includes men in the membership.

WA0SVD, Helen Swanson, an active member of the YLISSB, is one of the many handicapped amateurs.

YL CW Nets

There are six YL cw nets available to all classes of women amateur operators. For the YL Novice who wants to meet other gals WN0GQL, Helen Morse, Novice Correspondent of *YL Harmonics*, has scheduled two sessions on Tuesdays: 7.171 MHz at 1500 GMT, and the other on 21.150 MHz at 2100 GMT. Another Novice net sponsored by Leona Peacor, W1YPH, has been set for Fridays, on 3.721 MHz at 2100 GMT. Each Thursday at 1400 GMT YLN, can be found on 7.123 MHz to assist Novices to increase their code proficiency with the goal of upgrading their license.

Two more YL cw nets are listed on Mondays each week. The New England Codettes CW Net meets on 3.695 MHz at 1330 GMT; and the PJYL Net meets on 28.650 MHz at 2330 GMT. PJYL offers a certificate for operation on this net.

More on "First YLs"

When Diane Cardell, VQ9DC, received her call last year, she joined the very rare group – those who are not only the first YLs to receive an amateur radio operator's license in their countries, but also the only YL operator.

Diane became interested in radio when she served as a Communications Signaller in the WRENS (Women's Royal Navy Service). She and the OM, VQ9MI, lived in Kenya before moving to their present home in the Seychelles Islands.

Two Japanese YL operators have, through a move to another country, joined the group of being the first women amateur radio operators from their country to receive a call in another. Akiyo Nishino, JH1GMZ, assigned the call HS1AEY in Thailand, is the second YL to be licensed there.

In September 1973, Kaeka Witte passed the amateur radio examination in West Germany receiving the call DK9QZ. Kaeka is the first Japanese YL to receive an amateur radio license in West Germany, not on a reciprocal basis; rather, she took the exam in German.

Morse-Continental YLs

The international regulations specify that either American Morse, or Continental Code may be used on the air, and it is not unusual to find nets on both 80 and 40 meters using the landline American Morse.

Linda Pettit, WB6ZSE, a member of the West Coast Morse Net, was introduced to the old landline code by W6FZZ, Samual F.B. Morse, III, who roused her interest in the "dots, lines, and dots and spaces" or the original code although she was unable to read it. Later, W7IEH in Washington, taught her this code in an on-the-air series of practice sessions. Linda is one of several YLs who have learned the old code on the air, and are as comfortable on the Morse Code Nets as they are in the more familiar continental code.

New French YL Operators

Looking for more DX calls to add to the growing list of women who make up the worldwide picture of amateur radio? The July-August 1973 issue of *Ondes Courtes Informations*, lists three new YL calls in France. F1SCV, Mme. Claude Mougeolle; F1CSW, Mme. Andree Lescour; and F6BDL, Mme. Hugette Leroy.

WA2WHE – Gretna Longware

It all came about because Gretna's OM put CB equipment in his truck for business communications and a neighbor, listening to her excited description of all the states she heard said the magic words, "Why don't you get an amateur radio ticket like mine?" That was all she needed to earn her WA2WHE.

The YLRL International Correspondent is a member of ARRL, YLRL, A-1 Operator Club, is an active member of the Red Wagon Widows, and in March, 1965, was named Operator of the Month.

An avid cw operator, Gretna rarely leaves the key for a phone contact. She spends most of her time on 80, and 15 meters rag chewing, actively participating in the YLRL sponsored contests, especially the YL-OM and hunting DX.

Gretna finds through her YLRL duties that there are so many people who want to work DX YLs but that it is difficult to find them unless the feminine voide identifies the gal. It is her hope that a list of DX YLs with their operating frequencies could be compiled, and available for those who make feminine contacts in other countries.

When she isn't on the air or writing to the DX members of YLRL, Gretna is busy as a Secretary, and a mother of four daughters.

YLRL International Correspondent Gretna Longware whose duties include assigning the DX YLs under the club's "Adoptee" program.

Feedback

QST, September 1973, "YL News and Views," listed the call of Ron from St. Croix incorrectly. It should have been KV5GP. Picture captions in *QST*, December "YL News and Views" had WA6ISY, Myrtle Cunningham, and WA8VXE, Rosemary Davidson reversed. QST

VHF QSO Party *(Continued from page 75)*

W7PQF/7 212- 53- 4-AB
W7DNU/7 (+K7IPQ W7s FHZ GLS) 5160-339-15-ABCD
K7LED/7 (K7CAI WA7s NAN NIW UEW) 1872-231- 8-ABCD

8

Michigan

WB8BGY 10,176-209-48-ABD
K8HWW 2025- 64-27-ABCD
WA8PIE 1625- 65-25-B
WB8ELY 1449- 63-23-AB
WA8ZCO 330- 32-10-BC
WA8YUZ (WB8CKW, opr.) 168- 24- 7-B
WA9ULU/8 152- 19- 8-AB
WB8CKW 96- 16- 6-B
WA8MOA 48- 6- 4-C

Ohio

K8III/8 6913-223-31-B
W8KEL/8 3666-141-26-A
WA8HPY 2940-105-28-AB
WA8ZUQ 2160-108-20-A
K8SUB 1452- 66-22-A
WB8GFY 1260- 60-21-AB
K8UQA 938- 33-14-DE
K8CKY 341- 31-11-A
WB8NTY 20- 20- 1-B
WA8PLZ (WA3LBI WB4YIH W8s KBC KPY WA8s DZU LSR LTA MCH MSF PAR SVV YRA WB8s FNH ORJ QUC G3PAC SM6DGU) 44,019-657-67-AB
W8CCI (K8s CLF TCR W8s AYB OGW ULC WA8s MUA WMH WXT) 26,532-385-67-ABCD

West Virginia

W4PSJ/8 2860-109-26-ABC
W8QOB 490- 26-14-BC

9

Illinois

W9YYF 1450- 58-25-B
K9UYK 663- 47-13-BCD
W9ABA 470- 47-10-AB
W9IVI 408- 51- 8-B
W9OTE 329- 47- 7-AB
WB9CLN 288- 32- 9-B
WB9JFT 198- 22- 9-A
W9DJZ 136- 34- 4-B
W9RVG 136- 34- 4-AB
K9DTB 132- 22- 6-AB
K9KQR 119- 17- 7-B
K9DNW 87- 29- 3-AB
K9JFN 21- 21- 1-A
K9HMB (+K8s BBN GMR WA9EJD) 9964-193-47-ABCD

Indiana

K9UVJ 4598-110-38-ABC
K9DZS 658- 47-14-AB
W9HTF 315- 21-15-B
WB9AOU 196- 28- 7-B

Wisconsin

WA9SUJ 1449- 69-21-AB
K9REE 390- 39-10-A

Ø

Kansas

WBØBBC 888- 74-12-AB
WBØITA 595- 85- 7-AB
WBØCTQ 126- 18- 7-A
WAØVJF 40- 8- 5-A

Minnesota

WØOHU 848- 49-16-BD
WBØIWG 264- 24-11-A
WBØGDB 156- 39- 4-AB

Missouri

WØKC 217- 31- 7-AB
WØIE (WAØERD, opr.) 16- 8- 2-A
WAØLEM 16- 8- 2-A

South Dakota

WBØELN 30- 6- 5-AB

Check Logs

W1AY, K2DTQ/am, W2FMX

Disqualification

K8LEE QST

"Current" Theories

(Continued from page 69)

32. Storage batteries are found in this means of transportation
34. Ultraviolet _____ of the sun cause ionization in the atmosphere
35. What this primer hopes to do for you
36. Don't give up because you think you are poor in this (abbrev.)
37. Measure of conductance
40. The word "current" comes from the Latin word meaning to _____
41. If you put an equal sign between the first two letters, you have a power formula. Without the sign, you have a favorite American dessert.
42. Are "power supply" and "primary source of power" different?
44. AC gets changed to DC so you can_____ it in the rig. QST

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* W7JNK

Universal EME Window

IN MUCH the same way that calling frequencies are useful in promoting vhf activity, a "universal window" could be of great value in promoting EME activity. The phrase "universal window" used here means a selected area of the sky which EME enthusiasts agree to use as a primary target for aiming antennas.

For EME to be enjoyed by the greatest number of operators, stations with the facilities should be encouraged to build the largest possible antennas. These stations could furnish EME contacts to stations with much smaller arrays. Unfortunately, at the present time anyone who builds a large array which is fixed or partially steerable, might find his window not shared by many EME stations. With such a limited prospect of success, only the most courageous have invested time and money in massive EME antenna construction projects. The existence of a universal window would give confidence to operators building large fixed arrays that their efforts would be rewarded by access to many EME stations, with or without steerable arrays. Another advantage of a universal window is the simplification of moon tracking problems. Any practical antenna could be oriented in a fixed position within the window and yield several moon-days per month.

Which point in the sky should be chosen for the universal window? The slot now used for European EME schedules has been suggested by Bob Sutherland, W6PO, as a window offering several advantages over other choices.

First, it is being used for regular schedules by several stations, which implies an antenna aimed at this window can expect some measure of success almost immediately. The window corresponds to a meridian crossing near the middle of North America. All stations in the continental United States would have high antenna elevation angles when aiming at the window. High elevation angles ease problems of ground-level obstructions such as trees and hills, reduce interference from local stations, minimize TVI, and enable antennas to be mounted near ground level for easy access and short feedline runs. The window indcludes the region of maximum northerly lunar declination. Since the moon changes declination sinusoidally, it remains near its maximum declination for several days, optimizing the number of moon-days per month available to fixed-position antennas. With this choice, even very high gain antennas need only azimuth steering to further extend the number of monthly moon-days. Stations on all continents except Asia and Australia can access this window; no single opening is accessible from all continents.

It is proposed only that this window be a primary target. Every EME station should insure his array can be aimed at this window in addition to any other directions he might desire to use. If the concept of a universal window is accepted by a majority of EME stations, those with massive arrays have WAS within their grasp, and the city dwellers with small antennas can still participate in moonbounce communication.

This is the proposal specifically of W1FZA, but is supported by others in the quickly-growing moonbounce field. Certainly it has merit, permitting the fellow with less-than-optimum location and antenna to enter the field and to further dispel the notion that EME is for only the select few. With the growing interest in moonbounce communication, I would suspect that in these pages, we will address ourselves to building EME systems more and more in the months ahead.

For a wealth of 432-MHz information, we recommend the series of "EME Notes" by Joe Resiert, W6FZJ. The complete set (Notes 1, 2, and 3) will be sent on receipt of a stamped self-addressed envelope. Joe lives at 2614 Media Way, San Jose, CA 95125. A reprint of all significant EME material from *QST* is similarly available from Bob Sutherland, W6PO, courtesy of Eimac.

*Send reports and correspondence to Bill Smith, W5TVB, ARRL, 225 Main St., Newington, CT 06111.

Oscar active DJ6RD/W9 is closing in on satellite-WAS from Indiana using a modified Motorola fm strip for a transmitter. Juergen's wife Kathy holds WB9KTV.

Comet Kohoutek

Comet Kohoutek is creating much interest with the public and in scientific circles, not the least of which is with amateur astronomers and vhf operators. Whether the comet will produce a spectacular meteor shower many times the magnitude of the Leonids in the mid 60s remains to be seen. Many vhf operators believe that Kohoutek will, and are prepared for what would certainly be the opportunity of a lifetime.

Kohoutek was discovered this past March by Dr. Lubos Kohoutek at the Hamburg Observatory when it was 465 million miles from Earth. At its closest approach to our planet, Kohoutek will still be some 75 million miles in space, but will afford the greatest space show to living man and it may be thousands of years before it returns.

There are two major theories about the origin of comets. First says comets may be the waste material from the formation of our solar system. The second is that a comet is composed of material drawn from outer space flown back and forth between our Sun and the sun of a distant planetary system, but finally captured by our Sun. It is these theories that scientists will be exploring in the weeks ahead as Kohoutek comes within 13 million miles of the Sun December 28 and streaks past at 250,000 miles per hour. Our Skylab astronauts have a front-row seat to the spectacular and will spend much time studying Kohoutek.

If Kohoutek produces a major meteor shower, surely the news will spread quickly through the media and we will be interested in learning of amateur radio observations.

OVS and Operating News

50-MHz continued to demonstrate life during the fall with suggestions of F_2 and several sporadic E openings as well. Around the country, here is what was reported. WA1DFL, Revere, Mass., caught E the evening of October 21 working 4s, 8s, and 9s for about two hours. WA4IAX, LaFollette, Tennessee, caught the same opening working stations from VE1KL to Florida, Texas and Nebraska. John says the opening lasted some seven hours. K4LZU, Roanoke, Va., worked the opening on 52.525 fm making contact with four stations in the Kansas City area. In the west, K7BBO, Tacoma, worked Colorado, Utah, New Mexico, Oklahoma and Wyoming during a three hour opening October 17. Earlier this year we reported that W7UQ/WA7FSI would be active from Idaho. Gary *was* active, passing out many Idaho contacts, and while doing so worked 48 states with a Swan transceiver and 4-element Yagi. At Bend, Oregon, K7HSJ worked aurora September 10 for about 30 minutes and further reports the usual scatter-type contacts on other days. Near Portland, K7ZCB says six meters has slowed to its winter pace with some minor E in September, most notably the 7th to Wyoming and Colorado, and in October to Arizona, New Mexico, Colorado and South Dakota on the 16th.

K5ZMS/5, San Antonio, says he is told by 8P6EN that VP2LAW is active from St. Lucia in the Windward Islands. Ray, and several other fellows, have organized a club similar to the now-established 10-10 club of ten meter operators, but designed to promote six meter activity especially during non-favorable propagation seasons of the year. According to K5ZMS the membership is taking hold and the organization is offering awards. The organization is known as SMIRK, Six Meter International Radio Klub, and further details are available from Ray Clark, 7154 Stone Fence Drive, San Antonio, TX 78227.

As far as band openings from K5ZMS are concerned, Ray noted F_2 activity from the Caribbean and South America September 27, hearing VP2LAW. Sporadic E was heard or worked October 3, 13, 14 and 17 with the F-layer muf being near 50 MHz October 19. The evening of October 21 produced widespread E, as reported by others, from San Antonio to 3s, 4s, 8s, 9s and 0s. October 22 Ray noted a carrier on 49.994 from the south southeast with F_2 characteristics, around 4 P.M., Texas time. About one hour later a difficult-to-understand cw signal was identified as OA6CW calling CQ and after several attempts, Ray managed a contact. It was the first for K5ZMS with Peru and OA6CW gave his address as P.O. Box 335, Tacna, Peru.

Ray's neighbor, WA5IYX, reported much the same as K5ZMS, but says that without E noted on television during September, the month would have been one of the worst Pat has noted on six. On television, Pat saw E signals several times from Latin America as high as channel 4, likely El Salvador. It is too bad there is not consistent amateur 50 MHz activity from that area. Pat ponders if there might be a source of used 50-MHz equipment that could be well-placed in Latin America. October 14 was another of those days that brought much TV channel E into San Antonio from Latin America. Six meter stations from Florida to Arizona were worked. October 16 found an E opening to South Dakota and Minnesota around noon and later to 7s and 8s as new clouds generated and shifted across the country.

WA5WVK, Van Buren, Ark., writes that I am in error for not printing exact frequencies and mode of operation of the stations reported in this column. The same subject came up at a recent ham convention I spoke before. Aside from fm operation on all bands, most six meter activity is ssb between 50.10 and 50.40, with some a-m activity still intermixed within that range and above 50.4 MHz.What cw activity there is on six meters is usually between 50.00 and 50.110. The latter frequency is a good place to look for weekend morning scatter contacts. On two meters, cw and ssb activity takes place generally between 144.10 and 144.20 and 145.00 and 145.10. On the 220-MHz band look between 220.00 and 220.10 and 222.00 and 222.10, all modes, and in the 420-MHz band, look for cw and ssb activity just above 432.0. These suggestions are obviously generalizations in the day of VFOs and local operating schemes.

WA9MEM, Indianapolis, caught a 2-1/2 hour E opening the evening of October 21 and worked stations from New England to Colorado while

running 22 watts of a-m. WBØIWG, Minnesota, caught the same opening plus another on the 17th, working 4s and 5s.

From Japan, Hiro Ebihara, JA1LZK, who is the vhf editor of *Ham Life Magazine*, writes that 20 countries were worked from Japan during Cycle 20, including the United States and Argentina. Those contacts were made two years ago and reported in this column. Hiro says more than *one thousand* JAs are active on six meters, many of them using ssb and the remainder am. Hiro reports recent DX conditions from Japan have been poor, but that lobal activity is high. Thanks much for the interesting letter, Hiro, and don't let the language problem prevent you and your colleagues from writing future letters. I am always pleased to hear from overseas vhf operators.

Another letter from *Ham Life*, sent to ARRL, inquires about the authenticity of a reported 50-MHz contact between JR1BHS and W6JRN, Nov. 2, 0140 to 0148 GMT. Anyone with knowledge of this please write Ed Tilton, W1HDQ, Box 137, Canton CT 06019. Ed will relay to the Japanese publication.

144 MHz brings a number of reports from throughout the U.S. and two from Canada. K4GGI/1, who has done much to create vhf interest on several bands in the Boston area, is now signing W1GXT. W1JSM, N.H., writes to report his 30th state on 144, South Dakota, worked during the August Perseids. Don also caught tropo openings September 27 working 8 states in the 3rd, 4th and 8th call areas, and to Maryland October 2. Nice to hear from you again, Don. K1PXE, Ct., worked South Dakota also during the Perseids reaching 29 states, and on September 26 Pete worked a good tropo into W8s. W2CRS (also K1UGQ) operating from New York added two states during the Perseids, South Dakota and Arkansas, bringing his total to 34 states worked. Doug still needs North Dakota and Kansas for, as he puts it, "easy ones under 1400 miles."

W4LNG, Atlanta, rests at 21 states worked following an excellent November 2 tropo over a 700-mile path to Houston and WA5VAJ and W5UPR. Ruddy thanks K4FRH for the tip that the band was open. K4EJQ is active again, but having his usual problem in finding contacts. Bunky did find *E* on 144 October 22 between 1 and 1:45 am (!) hearing the VE3SAR repeater on 34/94 retransmitting W9 and WØ signals. Bunky wants especially 144 and 432 schedules. His new address is Bunky Botts, Route 5, Box 267A, Blountville, TN 37617. He may be telephoned at 615-323-5454. Nice to have you back on vhf, Bunky.

In Arkansas, K5MWH is active with a kilowatt and 44-element array at Rogers, in the northwest part of the state. Mike watches near 144.10. Also in Arkansas, WA5UNL now claims 40 states worked. WA9QZE/5, in a Plano, Texas apartment house, worked WØEYE, Colorado, via meteors October 21 during the Orionids shower.

At Tacoma, K7BBO used Orionid meteors for contacts October 20 and 22 with WA6GUY, near Los Angeles, both times on ssb. Dave reports W7CNK was married September 28 and is living in Puyallup, Washington. In Tucson, WA7BBM, using all homebrew equipment has gathered 11 states in four call areas with a best DX of 1397 miles. John's fine station includes a kilowatt, phase-lock receiver and diversity reception off an array of eight 5-element Yagis and a single 16-element Yagi. Glen, WA7FPO, Phoenix, says ssb activity in Arizona is doing well for that area with at least six stations scattered across the state active. Glen will soon place a pair of 4CX250Bs on the band and is always available for schedules. His charming wife, Ruth, is most understanding. Your writer knows that, first hand.

WB8MXU, Cincinnati, reports growing DX interest in fm simplex. I've heard from other sources that some excellent simplex DX is being worked, but not reported. Kilowatts and 44-element arrays are not uncommon, as are 20 to 30 state totals. K9KQR, now living in Libertyville, Illinois, reports tropo to 2s and 3s September 9. Dick's new address is 636 Valley Park Drive, Libertyville, IL 60048, telephone 312-367-1102.

For you fellows looking for Kansas activity, we would suggest KØDAS at Manhattan. Rod is active with 50 watts of ssb, but promises a pair of 4CX250Bs after the first of the year following his graduation from Kansas State. He has future plans for 432, but may be moving to Iowa.

Guy, VE2ADE, is active from Valleyfield making his first contact August 23. He now has 10 states and two provinces running about 100 watts and a 13-element Yagi. VE3FKX stands at 18 states worked, the most recent being K1BKK, Vermont, on aurora.

220-MHz brings word from Pete, K1PXE, in Connecticut, that he now has 15 states, adding K9UVJ, Indiana, and W3UJG, Maryland, on late summer tropo. Pete says New England stations are active Tuesday nights on 220. W2CRS boasts 16 states on 220, the most recent two being W4UCH, Virginia, and K9HMB, Illinois. Doug runs meteor schedules with K4IXC, Florida, hoping to add that state before long. WB6NMT is back on the air after a move and is building gear for 220, 432, 1296 and 2300. Louis may be written to at 4519 Narragansett Avenue, San Diego, CA 92107.

432-MHz and Up news comes this month from several areas. K1PXE, Ct., says that New England 432 activity seems to be down some with many of the fellows turning attention toward 1296. Pete runs 350-mile over-mountain schedules with K2LGJ yielding 95 percent success, and on September 26 worked tropo to 3s and 8s. On 1296 Pete now has 11 states adding K8UQA, Ohio, September 26 following a similar contact on 432. Pete thanks WA2LTM and WA1SFC for assisting in squeezing the last possible dB out of his 1296 system now firing 50 watts into a 29-inch dish. Pete says 1296 is really coming of age.

Dick, W2IMU, says the Crawford Hill group, W2NFA, had a successful 1296 moonbounce contact with VK3AKC in early October. W2NFA has also had numerous contacts with PAØSSB on 1296 EME. K2LGJ added state number 15 to his 432 list

(Continued on page 113)

Operating News

GEORGE HART, W1NJM
Communications Manager
ELLEN WHITE, W1YL
Deputy Communications Mgr.

ASST. COMMS. MGRS.: *DXCC*, R. L. WHITE, W1CW; *Hq. Station*, C. R. BENDER, W1WPR; *Contests*, F. D. NISWANDER, WA1PID; *Public Service*, W. C. MANN, WA1FCM.

New Appointment Criteria. Effective Feb. 1, 1974, three new criteria will be applied to our appointment structure, based on results of the CD Bulletin Poll last July and a more-recently-conducted SCM poll. While the latter is not quite complete at this writing, we do have responses from 46 SCMs indicating overwhelming support of (1) an ORS appointment for novice licensees, (2) appointments for two years instead of one, and (3) an increase in OO appointment requirements in Classes I and II. SCMs may start applying these criteria to their appointments commencing the first of February. Here are the details:

1) *Junior ORS.* This will be officially designated ORS-II. It will have the same requirements as ORS-I (the present ORS) except for code speed requirement, which will be 10 wpm instead of 15 wpm. While both ORS-I and ORS-II will be known generally as ORS without any "class" distinction (e.g., for CD Party purposes), an ORS-II who upgrades to General Class or higher does not receive an automatic "promotion" to ORS-I. At the time he upgrades, his ORS-II is invalid, and he must then qualify for ORS-I – a simple matter of getting his code speed up to 15 wpm, in most cases. SCMs, as always, use their discretion and judgment in making such appointments. Normally, an amateur who qualifies for ORS-II needs only the 5-wpm increase in code speed to make ORS-I, or "full ORS."

Technician licensees will automatically be eligible for ORS-II if or when they get cw privileges.

2) *Two-year appointments.* Effective Feb. 1, all SCM appointments will be in effect for two years instead of one, as at present. This will help cut down on paper work, since the SCM will no longer be required to submit an annual endorsement for each of his appointees. The SCM may, of course, cancel any appointment for cause at any time. There has been considerable laxity about endorsement of appointments in the past. With the advent of two-year appointments, we intend getting a little inquisitive about appointments not endorsed or cancelled at the end of a two-year term. The two-year appointment term will help appointees to remember to seek endorsement, and help SCMs remember to endorse, because appointments made by a new SCM when he takes office will expire at the same time the SCM's term of office expires. We hope this will increase the "togetherness" between an SCM and his appointees.

Planning a Class?

An *Instructor's Guide to Amateur Radio Licensing Class* is now available for distribution. Its' basic purpose is to aid the instructor and/or club in organizing his class and to provide guidelines for the actual "teaching" of the material. Copies are available without charge, requiring an addressed 10 × 12" envelope and three postage units for first-class mailing.

3) *Increase OO Requirements.* The current requirement is accuracy to within 1 kHz and 5 kHz on 14 MHz for Classes I and II respectively. Effective Feb. 1, the requirement will be 500 Hz for Class I and 2.5 kHz for Class II. This figures to 36 ppm for Class I and 179 ppm for Class II – duck soup for the average FMTer, still possible on any modern well-calibrated communications receiver.

ARRL literature already in circulation of course reflects present criteria, and some of that being sent out now and in the immediate future will also continue to do so. This is notice of change. The various literature will change to the newer standards as it is revised. We don't throw scads of literature in the trash can because parts of it are slightly out of date. We hope the gradual changeover will not be too inconvenient or confusing.

The Lessons of History. Probably there is nothing more irritating to the younger element among amateurs than to have old timers waste time on meandering reminiscenses. There is something to be said for this youthful reaction: our destiny lies ahead, not behind, and in a rapidly-changing world many feel that the "good old days" are not germane to the problems at hand today and

IN A COMMUNICATIONS EMERGENCY, MONITOR W1AW FOR SPECIAL BULLETINS AS FOLLOWS (times in GMT).

Phone: On the hour.

RTTY: At 15 minutes past the hour.

CW: On the half hour.

W1AW NOTE

In the event that Daylight Savings Time becomes effective prior to April 28, W1AW will revert to the Spring-Summer schedule as shown on page 107, October 1973 *QST*. This means, for example, that the nightly 10-13-15 wpm W1AW code practice will continue to occur at the same local "clock time," (i.e. 4:30 PM Pacific/7:30 PM Eastern).

tomorrow and next year. Our thinking and planning should lie in *that* direction, not in looking back at what happened 10, 25 or 100 years ago.

The dictates of logic indicate that there is truth in the first clause of the concluding sentence above, but not necessarily in the second. No doubt philosophers through the ages have all observed that we live in a world of change, but it is a matter of changing scenes only, not of permanent, non-repetitive change. After all, there are only a finite number of changes possible before we find ourselves back where we started. While scenes and situations and circumstances change, there is one thing that does not – the basic nature of the human animal. Whether this be good or bad, or a mixture of the two, it is something we have to put up with and live with. Meanwhile, the changing scenes of civilization are a thin veneer that historians can see through and often, through examination of the past, accurately forecast the patterns of future events. And so all of our sophisticated modern technology is a mere effect, a small part of the ever-changing scene which is here today, forgotten by most and recorded only in history tomorrow.

The history of amateur radio since its inception has been but a split second in the history of mankind, but already we are entering into a cyclic pattern, as man's history has been doing for centuries. New methods and techniques have evolved, been enthusiastically pushed. Some have become standard, others have flopped, sometimes only to be revived, then reflop. Those that have become standard have run their course, evolved into obsolescence and then into obsoletion, to be replaced by newer and more wonderful techniques which themselves will eventually obsolesce – and so it goes, from one generation to the next, from one era to another, and nothing really changes except the scenery as our planet gradually deteriorates, runs dry of resources and eventually dies, probably a part of a larger cyclic pattern our brief history does not tell us about because it is outside man's total experience.

New A-1 Operators

W1YRC WA2DMK W4LXL WB8IMI WB8JAD W9OFO DJ2RT HA5JI 8P6AU

Very few people are still living who remember the excitement created by Marconi's "stunt" of sending intelligent communication across the Atlantic. More will remember the early spark sets and the enthusiasm generated among the experimenters with this fascinating method of communication using the "ether" as the medium. Then came cw, and spark died away. Then came voice modulation, and its adherents proclaimed the end of cw. Then along came "sideband," and enthusiasts pushed for elimination of a-m. RTTY enthusiasts demanded recognition of this "new" mode. Repeater enthusiasts have just recently come to the fore. ATV is gradually collecting adherents, and space communicators are demanding their share of the limelight. Each of these specialties has zealots who know little else in amateur radio or could care less, who feel that theirs is the only real amateur radio and others should cease to exist or be drastically downgraded.

And while the zealots are foaming at the mouth, the old timers are ho-humming because it has all happened before and will happen again through the same inexorable process of evolution of human nature. What's to get so excited about?

Yet, excitement at new developments is a desirable thing. Let the old timers live in the past, and let the fanatical young zealots pressure for recognition. Those in the middle must exercise the moderation required to keep the vehicle of amateur radio progress on the track. It is necessary to know and understand the lessons of history and to apply them to planning for the future, but those who do nothing but reminisce are not contributing to progress, and those who consider only the present and immediate future all too often are tangential to progress. If we repeat an experience of the past that failed, we are fools, either through ignorance or rashness. If you ask the question "Has anything like this been done before?" you will most likely find, in historical records, that it has. If you look deeply enough to see the similarities. If what resulted then was basically caused by the idiosyncrasies of the human animal, the same thing is almost sure to happen again. Why learn the lessons of history the hard way? *Know* your history, and apply it to your plans for the future.

ARRL publishes two historical books – *Two Hundred Meters and Down*, and *Fifty Years of ARRL*, both of which deal in depth with the history of Amateur Radio Operating, from the beginning right up to the sixties. They are worth reading by any amateur. – *WINJM*.

NOVEMBER 10 FMT RESULTS

The November 10 ARRL Frequency Measuring Test brought in a total of 94 entries representing 1233 individual measurements. Entries received after the announced date of November 21 are not listed (that's the date W1AW started carrying the results of the test). The umpire measured frequencies for the early run at 3528.204 and 7074.203 kHz. No measurements were made on 20 meters. The late run checked out at 3560.432, 7084.750 and 14,070.799 kHz. Interested in an appointment as an ARRL Official Observer? If so, check with your SCM (p. 6, this issue). Plan now to participate in the February 10 FMT, full rules in Operating Events, this issue. – *W1YL*.

W1AW FALL-WINTER SCHEDULE
(OCTOBER 28—APRIL 28)

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EST, Saturday 7 P.M.-1:00 A.M. EST and Sunday 3 P.M.-11:00 P.M. EST. 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 Nov. 22, Dec. 24-25, Jan. 1, Feb. 18, April 12.

Times/Days GMT	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	.....	CN[6]	RTTY BULL.[3]	CN[6]	.....	.....
0030	← CODE PRACTICE (10-13-15 wpm) DETAILS BELOW →						
0100	.....	← CW BULLETIN[1] →					
0120-0200[4]	.....	.....	3.7 Nov.[5*]	14.080*	14.080*	7.15 Nov.[5*]	14.080*
0200	OSCAR[10]	← PHONE BULLETIN[2] →					
0205-0230[4]	.....	.....	3.990*	50.190*	145.588*	1.820*	21.390*
0230	← CODE PRACTICE[1] (35-15 wpm TThSat, 5-25 wpm MWFSn) DETAILS BELOW →						
0330-0400[4]	.....	.....	3.580*	.....	1.805*	.....	3.580*
0400	RTTY BULL.[3]	.....	← RTTY BULLETIN[3] →				
0430	PHONE BULL.[2]	.....	← PHONE BULLETIN[2] →				
0435-0500[4]	.....	.....	7.290*	3.990*	7.290*	3.990*	7.290*
0500	CW BULL.[1]	.....	← CW BULLETIN[1] →				
0520-0600[4]	.....	.....	3.7 Nov.[5*]	7.080*	3.900*	7.15 Nov.[5*]	3.580*
1340	.....	← OSCAR[9] →					.....
1400	.....	CODE PRACTICE[1] (5-25 wpm MWF, 35-15 wpm TTh) DETAILS BELOW					.....
1800-1900	.....	21/28cw[7*]	21/28ssb[8*]	21/28cw[7*]	21/28ssb[8*]	21/28cw[7*]	.....
1900	.....	← OSCAR[9] →					.....
2000-2100	.....	7.080*	7.290*	14.095 RTTY*	7.290*	7.080*	.....
2100-2130	OSCAR[11]	21/28ssb[8*]	21/28cw[7*]	21/28ssb[8*]	21/28cw[7*]	21/28ssb[8*]	.....
2130	.....	.....	CW BULL.[1]	.....	CW BULL.[1]	.....	.....
2200-2230	.....	7.15 Nov.[5*]	21.1 Nov.[5*]	7.15 Nov.[5]	21.1 Nov.[5*]	7.15 Nov.[5*]	.....
2230	.....	.....	RTTY BULL.[3]	.....	RTTY BULL.[3]	.....	.....
2300	.....	CPN[6]	7.095 RTTY[4*]	3.625 RTTY*	14.095 RTTY[4*]	CPN[6]	.....

[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, 14.290, 21.390, 28.590, 50.190 and 145.588 MHz.
[3] RTTY Bulletins, on 3.625, 7.095, 14.095, 21.095, and 28.095 MHz. Bulletins repeated when time permits.
[4] Starting time approximate, following conclusion of bulletin or code practice.
[5] W1AW 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, 21.1, 28.02, 28.08, 28.1 MHz.
[8] Operation will be on one of the following frequencies: 21.260, 21.390, 28.590 MHz.
[9] When an OSCAR satellite is in orbit, daily updated orbital data is sent at 18 WPM on cw frequencies.
[10] OSCAR orbital data for the coming week, on RTTY frequencies.
[11] OSCAR orbital data for the coming week, on cw frequencies.
* General contact period.

W1AW CODE PRACTICE

W1AW 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.

Speeds	*Local Times/Days*	*GMT*
10-13-15	7:30 PM EST dy 4:30 PM PST	0030 dy
5-7½-10-13-20-25	9:30 PM EST SnTThS 6:30 PM PST	0230 MWFSn
5-7½-10-13-20-25	9:00 AM EST MWF 6:00 AM PST	1400 MWF
35-30-25-20-15	9:30 PM EST MWF 6:30 PM PST	0230 TThS
35-30-25-20-15	9:00 AM EST TTh 6:00 AM PST	1400 TTh

The 0230 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 W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT datess and *QST* practice text (from the issue 2 months previous) to be sent in the 0230 GMT practice on the following dates:

Jan. 11: It Seems to Us
Jan. 15: Correspondence
Jan. 21: League Lines
Jan. 31: ARPS
Feb. 4: World Above
Feb. 6: YL News

HONOR ROLL

This top listing is the standing of the frequency measuring leaders. In consideration of the minimum possible error due to doppler and other unavoidable factors, we accredit as of equal merit all those reports computing 4/10ths parts per million (or higher) accuracy. A participant must submit a minimum of 2 measurements to qualify for Honor Roll listing.

W1BGW W1PLJ K1VHO W3BFF K3LPP W4AAD/K3WIK K4LO W4NTO WA4YVQ WB5CKM W5EMO W5IJW W5QIV/W5ZIN W5QLO WB6AAI. WA6CKD K6KA WB6MZP W8CUJ WA9UFN W9VOX W9ZTK WBØBAM WØCFY KØVQM

In the following tabulation, error percentage can be determined by moving the parts-per-million decimal point (the figure shown in parentheses) 4 places to the left. Currently, Class I OOs must demonstrate an average accuracy of better than 71.4 parts per million. Class II OOs must show at least 357.2 ppm. Effective February 1, revised qualifications for Observers will require Class I candidates to measure within 500 Hz at 14 MHz (36 ppm) and Class II prospects to measure within 2.5 kHz at 14 MHz (179 ppm).

(.5) W6CBX, (.6) W4LDF K4BF W6OQI W9KO, (.8) W8OMY Ireland, (.9) WØIHI, (1.1) K4RTA, (1.3) W8DPW, (1.4) K9GSC, (1.5) W6ML, (2.0) WWMDI., (2.1) K8JBF, (2.4) W7DNQ, (2.5) K8RAY, (3.2) WA8VWX, (3.7) WA5RIO, (3.9) W6RQ, (4.2) K9BGL, (5.2) K6BI, (5.7) WA1FBE, (6.4) W4RQS, (6.6) WAØCUS, (6.8) W1PL, (7.4) W1DDO, (10.5) WA4LPX, (11.0)

DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings – October 1-31, 1973

New Members

UB5WF	321	DL3TN	146	OK3TCA	114	K2QOV	107	WB9MSV	104	WA2BWF	101
JA1MCU	314	WØNUH	144	VE7DT	112	K9MKC	106	WØIYR	104	WA3NHG	101
SM6DHU	302	SP1BNS	141	DK1QQ	110	HB9ASL	105	JA1ATF	103	DK2KN	100
JA6BSM	260	EL2DF	140	W4GHV/5	110	JA8JN	105	K7GRQ	102	SMØDL	100
JA2WK	222	K2LQQ/1	138	W8KFL	110	YU3SJK	105	KX6BB	102	W4NNF	100
SM3RL	214	W2DRM	131	W6SHY	109	SM6EHP	104	WB2PWS	102	WB6UIA	100
VE4IE	163	9Q5RD	124	JH3JPM	108	WA7QCN	104	W9AQZ	102	WA9BHH	100
YU2RIO	147	PY2EWB	118	W2GLE	108	WA8GRR	104	KP4DMJ	101		

UB5WF	303	JA6BPA	170	5T5DY	120	HC2TV	109	K9KWK	106	UK9AAN	101
SM6DHU	287	UA3HR	167	9Q5RD	120	UA9KAI	109	IT9GCQ	105	WØNUH	101
JA1MCU	281	DJ9ZV	157	HPSO	115	UW6NQ	109	DJ1QK	102	KA2QW	100
OE2GKL	242	WB4FEV	136	JA2WK	115	WA1EUO	108	JA8JN	102	W4BAA	100
UA3FU	233	JA4DLP	129	JA7FPO	115	W3JZJ/8	108	JH3JPM	102	W4EZR	100
WA5RXT	211	IT9UVA	128	UW3DH	110	WB2HJW	107	WØVUA	102	WB4VBL	100
CE3AEV	182	W6OSK	120	G3ZTM	109	DK4CQ	106	KØUBP	101	WA9BHH	100
										WAØVAQ	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.

W5MMD	340	OE8RT	290	W6VBI	260	KØSGJ	220	K4VZI	180	YU2DI	160
K4MQG	325	VS6DR	290	W9ALI	260	WB4FJO	220	K6ELX	180	YU2RAZ	160
UA1CK	325	W9HZ	290	WA2CLQ	250	W5SBX	220	K6RK	180	YU3CM	160
W1MIJ	320	DJ6RX	280	WB4SIJ	250	WB6MVK	220	WA2DNY	180	JH3HPX	140
W2GDX	320	G3JAG	280	W5RO	250	YU4HA	220	W3ZSR	180	K3NYI	140
JA8AA	315	IIBUP	280	W8DUA	250	ZE3JO	220	YV5CWO	180	W4WFL/1	140
OH2QQ	315	W6OL	280	HB9AT	240	K4FCT	200	HB9AQW	160	W4BAA	140
YV5BZ	315	W9MYD	280	HB9RX	240	K4PRT	200	I7TGT	160	WØMHK	140
DJ7CY	310	EA4CR	270	K4LDR	240	K4TBN	200	K1CSB	160	WAØGFW	140
PY1MB	310	KV4AM	270	OH3MK	240	SM6EVE	200	K5DUT	160	YU2BOP	140
W4REZ	310	W1KGH	270	W2ABL	240	WA2BAV	200	K6NL	160	DJ1YH	120
I2LAG	305	WB2AMO	270	W2REH	240	W6INH	200	W2QXA	160	DLØDX	120
JA8ZO	305	WB6HDG	270	W3TVB	240	WØJYE	200	W3DS	160	HB9AJU	120
WA3HUP	305	W9VCQ	270	WA3MBQ	240	WAØOMA	200	WA3NXW	160	HS3AIG	120
YU1AG	305	YU2CAW	270	W4KN	240	YU2GB	200	W4TZX	160	K9KWK	120
K4EEK	300	DJ5GG	260	WAØTLT	240	YU2QZ	200	W6RQ	160	K9VTD	120
VE3AGC	300	K6UJS	260	DL5BR	220	YU4EBL	200	W3JZJ/8	160	KA2PJ	120
W1HGA	300	K8UNG	260	JA8KB	220	OH2LU	180	WØKZJ	160	KA6WS	120
W9NVJ	300	OH2BGD	260	K2UFM	220	VE1CD	180			KR6TQ	120
K2KGB	290	W2MB	260	K4FJC	220	VE4OP	180			VO1KE	120
K9PQG	290									W1GNC	120
										WA1NNC	120
										W9UDK	120

ZP5ET	320	K4CFB	280	OZ6RT	260	KØSGJ	220	K6RK	180	WAØYZN	160
K4MQG	315	K6GA	280	XE1J	260	OE1GHC	220	WB6HDG	180	DL3RA	140
PAØEEM	315	WB2VEG	280	WB4SIJ	250	W4MKB	220	WA7HCQ	180	JH3HPX	140
CT1BH	305	WA4WTG	280	W5RO	250	W4RKN	220	YV5CWO	180	WA8VXE	140
I2LAG	305	W9HZ	280	WA8OGR	250	WB6MVK	220	9X5VA	180	WA9AUM	140
6W8DY	305	I2SM	270	W9MYD	250	K2GBC	200	I7TGT	160	YU2RAZ	140
W1HGA	300	K6MOO	270	KV4AM	240	OH2BGD	200	KR6LY	160	DL6SW	120
PY1MB	300	K6RXZ	270	WA3MBQ	240	W9LW	200	LU1SE	160	KR6TQ	120
W4REZ	290	K9PQG	270	W9VCQ	240	XE1CI	200	VE7AGT	160	PY2OY	120
IIBUP	280	VE3AGC	270	CT1UD	220	DL1MM	180	W1TIV	160	SP5XM	120
IIUW	280	W6USG	270	JA8ZO	220	EA8GK	180	W3ZSR	160	Z56BLK	120
K2BK	280			K2UFM	220			W4TZX	160		

W7FIS WA8ETX, (11.9) K3NEZ, (13.0) K6GG, (14.4) WA8NPV, (15.3) W9AG, (16.1) W1AYG W3ADE, (16.7) W8BU, (17.0) W4HU, (17.8) W9MNY, (18.0) W6CLM, (19.2) W3KEK/K3TXG, (19.6) WØKH, (20.7) W1QV, (21.5) W4YOK, (21.8) VE3FVW, (24.3) W6AUC, (28.5) W6FRW, (32.0) K7ISL, (32.3) W1JB, (33.7) W6AEE, (35.1) WB2CMO, (36.3) W2JDC, (44.5) K6ASK/6, (46.4) W4LNN, (50.0) WA1HUR, (51.0) WA7HGB, ((58.0) WAØVEI), (62.8) WA2LLF, (65.5) W9TGN, (67.4) WA1GGN, (84.4) WA2JRX, (93.6) W9REC, (102.7) WB4FLW, (145.0) W2MDM, (149.5) WA1RFT, (164.4) W7CHI, (225.3) W5PW, (281.3) W1IG, (369.1) WA3BGC, (407.4) WA3ELE.

October CD Party – High-Claimed Scores

The following are high-claimed scores. They read, from left to right: call, score, QSOs, sections, hours of operation. Final scores will appear in the January CD Bulletin. – *WA1PID*

CW

WA2UOO	262,975-	778-67-20	
W6PAA	255,645-	734-69-19	
W2GUH	234,630-	711-66-19	
W9AQW/8	225,060-	682-66-20	
W2FVS	200,970-	604-66-17	
WA2CNE	200,655-	630-63-18	
WB2RKK	198,330-	594-66-18	
WA1NNC	196,625-	600-65-20	
W2AZO	179,400-	547-65-18	
W9PJT	169,290-	508-66-13	
VE3AWE	152,320-	470-64-16	
W5QGZ	152,000-	468-64-12	
K9HDP	148,800-	460-64-16	
WA2CXY	138,165-	453-61-17	
WB9HAD	132,675-	431-61-12	
K1QFD	132,615-	417-63-17	
WA3PWL/Ø	127,260-	400-63-14	
VE3GFN	124,000-	395-62-	
W5RUB	121,200-	400-60- 9	
K4FU	120,900-	365-65- 9	
WB8KZD	117,740-	400-58-18	
K3DZB	116,510-	377-61-13	
K6QHC	115,940-	374-62-10	
W3ABT (WB2FWW, opr.)			
	115,200-	380-60-11	
WAØURW	110,720-	340-64- 9	
W6PRP	107,880-	344-62-10	
WA1NLD	106,880-	375-56-13	
K1ZND	106,200-	347-60- 5	
W5RE	103,820-	351-58- 9	
K7NHV	102,660-	341-59-	
W4KFC	102,610-	324-62- 4	
W5TXA	102,375-	318-63-10	
KØAZJ	102,000-	336-60- 7	
W1AW (WA3JSU WA9AUM)			
	207,360-	642-64-17	
KH6RS (K2SIL W6DQX)			
	115,200-	354-64- 9	
W1AX (+K2HK)			
	101,370-	320-62- 5	

PHONE

WB8IJI	206,500-	585-70-20
W2GUH	202,515-	587-69-19
K4PUZ	159,705-	500-63-20
W6PAA	156,240-	489-63-16
WA3RDU	148,800-	461-64-14
WB9HAD	144,625-	441-65-19
W5QGZ	121,520-	385-62-15
WB8AYC	112,850-	366-61-10
K9HDP	104,920-	339-61-16
K1ZND	103,500-	338-60- 8
K3DZB	96,800-	320-48-11
WA9BWY	95,410-	325-58- 6
WB2RKK	93,280-	345-53-12
W8DQL	93,025-	299-61- 6
WA1NLD	92,400-	330-56-12
K4FU	85,550-	283-59- 9
K3HXS	80,825-	301-53-13
WA3GJU	77,840-	278-56- 5
WA1NNC	77,550-	277-55-12
W6DKQ	72,105-	230-57-10
K6QHC	65,880-	216-61- 7
W2AZO	60,250-	236-50- 6
WAØTKJ	58,000-	200-58- 6
KØGXR	56,180-	212-53- 5
WA2LUF	54,240-	223-48-18
WA3AFQ	52,275-	200-51- 4
W8EDU (WA2THV, opr.)		
	51,230-	216-47- 5
W5RE	50,225-	198-49- 7
WA1ABV/1	47,025-	205-45- 5
W6PRP	46,665-	179-51- 5
WA2AOG	45,900-	200-45- 6
WB8KXV	45,500-	179-50- 8
W9PJT	44,325-	192-45- 5
K6QPH	44,250-	173-50- 7
WA2CNE	43,920-	176-48- 5
WAØTAQ	43,405-	175-49- 5
WBØLHY	42,960-	179-48-
W6INL	42,750-	165-50-14
WA2UOO	42,550-	178-46- 3
W4DQD	41,605-	154-53- 5
W8SQO	41,210-	120-46- 3
K4KZP	39,780-	148-52- 7
W2ZQ (K3CPF, opr.)		
	39,560-	172-46- 9
WA1HYN	37,170-	173-42- 6
W3JPT	36,000-	150-44- 7
K3ORW	35,045-	160-43-14
WA7MHP	34,875-	150-45- 6
WØNYG	33,120-	141-46-12
K3KNL	32,800-	155-41-10
W4KFC	32,430-	134-46- 2
K7ICW	31,920-	133-48-20
W6OKX	31,725-	135-47- 8
W1RML	31,280-	130-46- 6
WA1PHF	28,560-	133-42- 7
WB4FDT/5	27,510-	125-42- 4
WA1QLV	27,125-	155-35- 6
WAØDYZ/Ø	25,650-	111-45- 5
WA3NUL/3 (WA3s EOP FYZ)		
	109,740-	351-62-18
K3CR (WA3s GUL JIH)		
	41,595-	170-47- 6
W1AW (WA3JSU WA9AUM)		
	41,160-	190-42- 5
W6DGH (+WB6ZVC)		
	25,155-	110-43- 2

QST

5-BAND AWARDS

(Updating the December 1973 listing.)

5BDXCC: (Starting with number 286), YU4EBL 18YRK VE2WA DL8LH.

5BWAS: (Starting with number 163), WAØZOL.

World Above

(Continued from page 108)

by working W9BTI and W9GAB, both Wisconsin, on tropo October 23. K2OVS says W2BMQ and K2BF are new on 432 and that WA2LTM has 110 watts on 2304. K2UYH had quite a night October 13. Al first worked W5ORH, Oklahoma, on moonbounce and later the same evening G3LTF, England, for Al's first European contact on 432. On the 15th a CQ via moonbounce brought a reply and contact from VE7BBG, and later that evening K2UYH had EME contacts with WØYZS and WAØJMC, both Missouri. It was the latter two station's entry to EME and gave Al state number 25 on 432. Says Al, "All in all it was a very successful weekend." Fine work, Al, and keep the interest going. K2YCO adds Vermont to his 432 standing. W1GGM/1, September 8. That was state number 15 and as Chuck noted, ties him with WA2LTM's 1296 total. That is tough competition in New York/New Jersey!

W3OMY, Pennsylvania, has worked 11 states since July on 432 and is a welcome addition to the band. WA9QZE/5, Texas, is preparing for 432 tropo work. K7BBO, Tacoma, has some 60 watts output on 432 and has worked VE7BBG and W7TYR, Oregon. W8HVX, Ann Arbor, Michigan, added West Virginia and Minnesota to his 432 totals in late summer climbing to 20 states worked. Bill runs a kilowatt and 64-element collinear and says, "Good grief, heard ssb signals in the first 20 kHz above 432 during one summer opening. It hardly seems that over-population should be a problem on 432!"

Some closing notes: In the May 1973 column we reported the inverted Doppler "find" of WØLER and WØMJS on 432 and 400 MHz. Those experiments are continuing using several 399.968 MHz satellites and now WØLER says evidence of sporadic *E* has been noted. John reports several other operators are logging the 400 MHz satellites adding to the information. I'm sure John would welcome reports from others regarding possible *E* at these frequencies.

W6FZJ has forwarded information new to me on the July Pacific tropo opening between Hawaii and California including two near contacts on 432, July 26 and 28, between himself and KH6BZF. KH6BZF copied Joe for several minutes July 28 before a relay failure at W6FZJ prevented what would have likely been a successful contact. We'll examine this information in more detail next month. In the meantime, I regret that Joe's call appeared incorrectly in the November report.

And finally, if this month's column seems somewhat short, it may well be. This column was written in Oklahoma City, Kansas City, Phoenix, Dallas, New Orleans and on several jetliners above 30,000 feet as your writer's boss, W5KHT, keeps him busy.

Good DX in '74, fellows! QST

Operating Events ..... de WIYL

JANUARY

2 *W6OWP Qualifying Run* (W6ZRJ, alternate) 10-35 wpm at 0500 GMT on 3590/7090 GMT. This is 2100 PST the night of January 1. Please note that dates are always shown at least 2 months in advance and times are always the same local "clock time," i.e. 9 PM local Pacific time (whether standard/daylight times in effect). Underline one minute of the highest speed copied, certify copy made without aid and send to ARRL for grading.

5-6 *VHF SS*, p. 55 Dec.

9-10 *DX-YL to Stateside YL Contest* cw, p. 174 Nov.

12-13 *CD Party*, cw. This is a quarterly event open to all ARRL appointees/officials, notified separately by bulletin. (The July Parties are open to all ARRL members.) The event starts at 2300Z Jan. 12 and ends 0500Z Jan. 14, same time period standard/daylight time. Contact your SCM, p. 6, to see if you can qualify for an appointment. *CW QRP Contest*, *YU DX Contest*; p. 83, Dec. *GI Special Activity Weekend* (also Jan. 19-20) to enable overseas stations to work the ten GIs required for the GI6YM Golden Jubilee and Marconi/Kemp 75th Anniversary Award. All bands 80-10, am/cw/ssb.

15-17 *OOTC QSO Party*, p. 83 Dec.

16 *WIAW Qualifying Run* (10-35 wpm at 0230 GMT) on 1.805 3.580 7.080 14.080 21.080 28.080 50.080 and 145.588 MHz. This is 2130 EST (9:30 PM EST) the night of January 15. (If on daylight time, run takes place 9:30 PM EDST. 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.

19-20 *CD Party*, phone. *GI Special Activity Weekend*, see Jan. 12-13 listing.

23-24 *DX-YL to Stateside YL Contest* phone, p. 174 Nov.

26-27 *Simulated Emergency Test*, p. 57 Dec. *French Contest* cw, p. 83 Dec.

29-31 *OOTC QSO Party* phone, p. 83 Dec.

FEBRUARY

2-3 *DX Competition* phone, p. 54 Dec.

2-10 *Novice Roundup*, this issue.

7 *W6OWP Qualifying Run.*

9-10 *QCWA QSO Party*, full period GMT, sponsored by the Chicago Chapter. Contacts with QCWA members only, each QSO worth 1 point. Repeat contacts on other bands/frequencies do not count. One multiplier for each state, province, country, call area (e.g. G1, G2, etc.). Special calls such as GB2 do not count. Suggested frequencies: cw, 3550 7050 14050 21050 28050; phone, 3900 7240 14270 14340 21390 21435 28600; RTTY, 3595 7095 14095 21070 28070 kHz. Exchange contact no., QTH, name, QCWA membership number. Log info should contain numbers exchanged, date/time(Z), call state, province or country, freq., name, QCWA no., plus two columns for noting each valid contact and each valid multiplier (show page totals). Special tokens (wooden nickels!) to the top 350 scorers provided they send s.a.s.e. with entry. Mail by March 11 to Ken Hedrick, W9KO, 122 East Slade St., Palatine, Illinois 60067. *Ten-Ten International Net annual QSO Party*, full GMT period. Exchange name, QTH, 10X no. Score 1 point for each member contacted, 1 extra point for each of the following: DX member, YL-XYL, Chapter Head. Awards to members only. Logs go to Grace Dunlap, K5MRU, Contest Mgr., Box 445, La Feria, Texas 78559, and must be received by March 15. Enclose an s.a.s.e. for results.

10 *Frequency Measuring Test*, open to all, begins with a callup at 0230 and 0530 GMT February 10. In the event daylight savings time is in effect, times will be 0130/0430 GMT. (Please remember that this is the evening before, local time.) The periods for measurement start at 0237 (80 meters), 0245 (40 meters) and 0253 (20 meters); for the late run, 0537 0545 and 0553 respectively. Each measuring period lasts 5 minutes. Submit your AVERAGES for each 5-minute period which will be compared with the umpire's averages during the same period. (The umpire is a professional frequency measuring laboratory.) Tell how many readings you took to form your averages. Approximate frequencies for the early run are 3530, 7088 and 14,108 kHz. Late-run frequencies are 3557, 7075 and 14,082 kHz. Your entry must be received by February 21 to qualify for the *QST* report of the competition. WIAW will start transmitting the official readings February 22.

16-17 *DX Competition* cw, p. 54 Dec.

23-24 *YL/OM Contest phone*, *French Contest phone*, p. 83, Dec. *Vermont QSO Party*, sponsored by the Central Vermont Amateur Radio Club, open to all. The contest will be held during the 28-hour period from Sat. Feb. 23 2100Z (4 PM EST) to Mon. Feb. 25 0100Z (8 PM Sun. Feb. 24). Three points per Vermont station worked, multiplied by the total no. of Vermont counties worked on each band equals final score. VT stations get 1 point per QSO and use the no. of ARRL sections plus countries worked for their multiplier. QSO credit may be earned for working the same station on different bands. Also, the same station may be worked on different modes for QSO credit. Vermont mobile stations may be worked considering each new county they enter as a new station. Appropriate certificates/awards. Send QSO no., RS(T) and County (for VT); others use section/country for location. Suggested frequencies for congregating: 3685 3932 3909 7060 7265 7290 14060 14325 21060 21375 28100 28600 50260 50360, 144-144.5, 145.8. Logs or facsimiles together with an s.a.s.e. by March 31 to Peter Kragh, W1AYK/K2UPD, 170 Summit Avenue, Ramsey, NJ 07446. The W-VT Award is still available and sponsored by the CVARC with W1EPS as custodian, 2 Marlboro Ave., Brattleboro, VT 05301.

MARCH

2-3 *DX Competition* phone, p. 54 Dec.

9-10 *YL/OM Contest* cw, p. 83 Dec. *Worldwide VHF Activity*, sponsored by the Itchycoo Park Amateur Radio Society.

16-17 *DX Competition* cw, p. 54 Dec.

18 *CWA High-Speed Qualifying Run.*

23-24 *BARTG Spring RTTY Contest.*

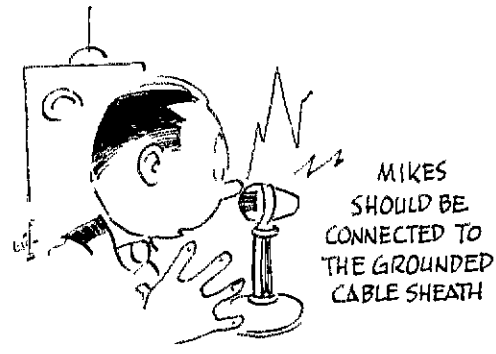
24 *WAB HF CW Contest.*

June 8-9, VHF QSO Party.

June 22-23, Field Day.

ALL SPONSORS OF THE ABOVE ACTIVITIES ARE REMINDED TO SEEK ALL POSSIBLE AVENUES OF PUBLICITY FOR THEM, ESPECIALLY METHODS OF LETTING THE GENERAL PUBLIC KNOW WHAT IS GOING ON.

Strays



SCM AREC ORS CP SEC OBS TCC OO

Station Activities

OVS AIOPR EC DXCG CLUBS RM OPS RCC

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/SEC, Roger E. Cole, W3DKX – PAM: WA3GSM. RM: W3EEB. Nov. endorsements: WA3GAY and WA3OVC as OPSs. PSHR: WA3DUM 61, K3KAJ 40. Sad news for Del. amateurs – W3HYS became a Silent Key. K3NEZ has completed graduate work in Biomedical Engineering in St. Louis and has added 2-meter fm to his 80-10-meter operating. Election results. Delaware ARC: K3YHR, pres.; WA3BZT, vice-pres.; WA3AVD, secy. Delaware Repeater Assn.: WA3QID, pres.; K3GUW, vice-pres.; WA3QBD, secy.; WA3Q4U, corr. secy.; WA3OPX, treas. WA3RCI and WA3EOP, Md., WB4DOF, Va. and WA4TWF, NC are regulars on the DTN. Nets: DTN: QNI 200 with 45 different stations, QTC 72. DEPN: QNI 50, QTC 11. Traffic: WA3DUM 98, K3KAJ 69, W3EEB 40, W3DKX 38, WA3QFF 16.

EASTERN PENNSYLVANIA – SCM, George S. Van Dyke, Jr., W3HK – SEC: W3FBF. RMs: W3EML, WA3QLG, K3MVO, K3PIE. PAMs: K3BHU, WA3PZO. OVS reports from W3ZRR, W3CL, WA3HIT, WA3BJO. OO reports from W3NNC, W3KCM, K3RDT, W3KEK, W3CL, K3NSN. OBS reports from W3CL, WA3AFI, K3BHU, K3SLG. BPLs: K3NSN, W3CUL, W3VR, W3ABT. PSHR: K3PIE, W3ABT, WA3PZO, WA3ATQ, K3OIO. Back to school is taking its toll of traffic handlers again this year. We need more active stations in the nets and to act as liaison between the nets.

Net	*kHz*	*Operates*	*QNI*	*QTC*	*RM/PAM*
EPA	3610	7:00 P.M. Dy	376	420	K3PIE
PEN	3960	5:30 P M-F	505	623	K3BHU
PTTN	3610	6:30 P Dy	69	26	WA3QLG
EPEPA PN	3917	6:00 P Dy	350	101	WA3PZO

Novice WN3UPX is really gung fn! 28 states in two months is active in traffic nets, built his own gear and has an article already accepted for future QST publication. W3EAG sent in a very nice report on recent RACES and ARPSC action. W3GMK has the high water licked, rig is on pontoons and he wears rubber gloves. Card from W3BNR shows he is traveling again! WN3PLM now WA3PLM and a big A ticket too. WN3VDO would like to see more Novices check into the Middle Atlantic Region Net 3715 kHz daily 9:30 P. The gang that could attend had a nice meeting at the Country Kitchen. Temple Univ. ARC now operational on 10 - 40 meters. Antennas are up 160 feet! U of P ARC now operational on 2-meter fm. W3EML back on sick list in hospital, a speedy recovery Bill. PAM WA3PZO active from Temple U station WA3TVT. WA3ATQ will visit SS Hope when she arrives in Wilmington soon. W3WRE gave a talk at the Delaware Valley Chapter of QCWA. She now has 198 keys and what a collection. She also has quite an interesting history to tell about them. Saw one key donated by our W3ADE! K3KNL announced a new jr. op at his QTH. W3BUR will be vacationing in W4-W5- and XE-Land while XYL recovers from her recent illness. WA3OLG needs help on PTTN, how about it fellas! W3EU says nothing is working so conditions will be good while he is down! WA3RKJ reports 4 new Novices have passed their tests. Of all people W3WRE reports trouble with her keyer! I forgot I had one more month to write this report so this is it. HI 73 & 30. Traffic: K3NSN 4375, W3CUL 2232, W3VR 915, K3PIE 286, WA3QYY 274, W3ABT 242, W3EML 214, K3DZB 196, WA3PZO 144, WA3ATQ 128, K3OIO 121, K3BHU 67, K3MVO 54, WA3CKA 44, WN3VDO 35, W3HIF/3 28, WA3UKZ 27, W3VA 15, W3ADE 13, K3LTH 11, W3BNR 10, K3KNL 9, WA1DJC/3 7, W3BUR 7, W3CL 7, W3LC 5, WA3QLG 5, W3HK 4, WA3BJO 2, W3EU 1, W3GMK 1, W3KEK 1, WA3RKJ 1, W3WRE 1.

MARYLAND-DISTRICT OF COLUMBIA – SCM, Karl R. Medrow, W3FA – SEC: K3LFD. RM: W3QU. PAM: K3TNM. NCM: W3LDD. W3JZY is active on the MARS circuits with a new dipole. WA3MJF is doing his thing at the U of Md. WA3MSW points out my error. He is at John Hopkins. WA3RCI keeps racking up the BPL cards. W3BHE getting a new kick out of an old Super Pro. W3QU has 21 states confirmed through Oscar. W3CKN is QRL at the ITU conferences. W3CDQ made the YLAP CW hash. WA3FYZ is getting mighty accurate in the FMT. W3EOV is still battling the 10- and 15-meter antenna problems. K3TEZ reports the arrival of a YL Jr Op along with plans to move to Frederick. PG Wireless Assn., has K3BRS, pres.; WA3QIA, veep; K3CAV, secy.-treas.; WA3TGI, activities. The MEPN names W3ADQ and WA3GXN as toppers along with W3DKX, WA3IIV, W3LDD and WØYLU/3. The top brass for MDD was K3KAJ, WA3IYS and W3EEB. The D3RN reps WA3IIV, WA3RCI and WA3EOP report a QTC of 182 with 94% participation in Oct. WA3AFQ is as ready as he is going to be for the SS. WA3URV is active with the American U ARC, and happy that WA3MLD loaned them the transmitter. WA3RVU has new NCS duties on MDD. W3FCS keeps it all moving from Baltimore. W3ADQ delivers the goods in Southern Md. W3LDD reports he has finally worked all counties. K3JYZ is now WSTWT and plans to win LA section in the SS. K3ORW says overtime high activity low. WA3QDH admires his beautiful beam at 40 feet. The Nights of the Roundtable Club is rapidly expanding. The Antietam Amateur Radio Society provided communications for the Hagerstown Al-SATIA mummers parade. K3DIP is getting back into the swing of things. With the nets MDD met 59 times QTC of 233, QNI average 7.1. MEPN met 21 times QTC of 112, QNI average 25.1 and MDCTN met 17 times QTC of 47 with QNI average of 15.9. K3LFD is pushing for better AREC reporting and SET activities this Jan. Traffic: (Oct.) WA3RCI 668, W3QU 239, WA3EOP 122, WA3AFQ 67, WA3MSW 60, W3FCS 44, W3FA 43, WA3IIV 36, K3TEZ 34, W3LDD 28, W3BHE 22, WA3RVU 21, WA3URV 15, W3EOV 11, WA3FYZ 6, WA3QDH 6, K3ORW 5, W3ADQ 4, W3EWP 4, W3IZY 2. (Sept.) WA3FYZ 2.

SOUTHERN NEW JERSEY – SCM, Charles E. Travers, W2YPZ – Acting SEC: W2YPZ. PAM: WA2TRK. RM: W2JI.

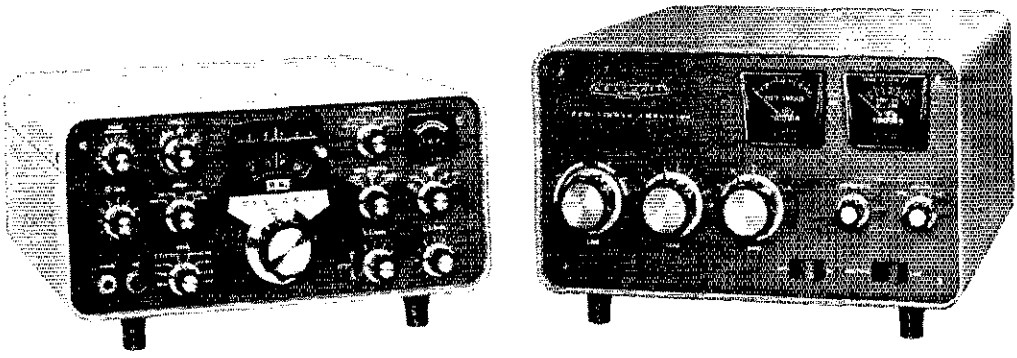
Net	*Freq.*	*Time(PM)*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJSN	3730	8:15 Dy	28	130	70	WB2RKK
NJPN	3950	6: M-S	28	568	178	WA2FVH
NJPON	3930	6: Su	4	79	30	WB2FJE

WA2SEA, EC Gloucester Co. and WA2MEM and WA2OLS as assistants, report 40 AREC members with 9 net sessions for Oct. and tie-in to the NTS circuits through NJPON. Local nets maintained on 6 meters and Novice Net on 21.11. This is the time for AREC programs to make preparations for the coming season. EC WA2SEA has done an excellent job in this program. WB2FJE is a member of the Wilmington Repeater Group Board of Dir. The Cherry Hill HS ARC, W2MBC, elected WB2FNK, pres.; WB2EIK, vice-pres.; WN2PKW, secy.; WA2PFD, sgt-at-arms. The club is equipped with a model 19 and an ST-6 running the Collins S Line on RTTY. Affiliated clubs are requested to submit activity reports as regularly as possible. DVRA ARC W2ZQ has installed a repeater tower and console. The Oct. meeting included the ARRL slide and sound show about the Oscar amateur satellite. This station is a recent ORS appointment. Heavy winds have played havoc with antennas. Your contribution to the AREC program is solicited. Contact your SCM immediately so this very important program can be improved and expanded for whatever emergency. Traffic: WB2VEJ 261, W2ZQ 101, K2EFA 50, W2JI 41, WB2ECD 40, WB2FNK 35, WB2FJE 34, WA2TRK 23, W2YPZ 19, WA2KIP 17, WB2SFX 12, WA2HIF 10, W2CDZ 4, W2ORS 4, W2IU 3, K2PWK 3, W2MBC 2, W2ZI 2.

WESTERN NEW YORK – SCM, Richard M. Pitzeruse, K2KTK – Asst. SCM: Rudy Ehrhardt, W2PVI. SEC: W2CFP. RMs: K2KIR, W2FR, W2MTA, W2RUF. PAMs: K2KQC, WB2YFM. A WNY welcome to W2GUH who moved three miles from ENY. Congratulations to WB2IWM and WB2JRX on their new Generals. WB2JRX is the son of Rochester FC WB2EDT. Former K2JAD is now K4BAM down Atlanta way. WB2EPL's new EPM 300 puts out a real nice signal. W2RUF was guest speaker at RAWNY, topic being the National Traffic System. Unbelievable, but more than 50 true and trusted hams were able to keep the secret of W2RUF surprise party at Syracuse without a word to Clara – dinner honored Clara's

(Continued on page 118)

Our two hot runners when you put on



Build the Heathkit SB-102 and SB-220 and set new DX track records!

Here's exceptional stability and dial linearity — made possible by an all solid-state linear master oscillator with 1 kHz calibration. The SB-102 stabilizes itself in a fast 10-minutes, drifts less than 100 Hz per hour after initial warm-up. The receiver section delivers an S+N/N ratio of less than 0.35 uV for 10 dB — with front-panel selection of built-in 2.1 kHz SSB crystal filter or optional 400 Hz crystal filter. And there's a dial resettable to 200 Hz; 180 W PEP SSB input, 170 W CW input; switch selection of upper or lower sideband and CW; built-in sidetone for monitoring; built-in 100 kHz crystal calibrator; triple action level control to reduce clipping and distortion; built-in VOX, and complete metering.

The SB-102 is the value leader because you build it yourself to save on initial investment and service. Simple circuit board/wiring harness construction gets it all together. Order your hot runner now — the famous Heathkit SB-102 SSB/CW Transceiver. Combine it with the SB-220 Linear for the ultimate long-distance runner.

Kit SB-102, 24 lbs. **385.00***
Kit SB-600, 8 ohm matching speaker with mounting space for AC supply, 7 lbs. . **19.95***
SBA-301-2, 400 Hz CW crystal filter, 1 lb. **22.95***
Kit HP-23B, AC supply, 19 lbs. **51.95***
Kit HP-13B, DC supply, 8 lbs. **69.95***
SBA-100-1, mobile mount, 6 lbs. **15.95***

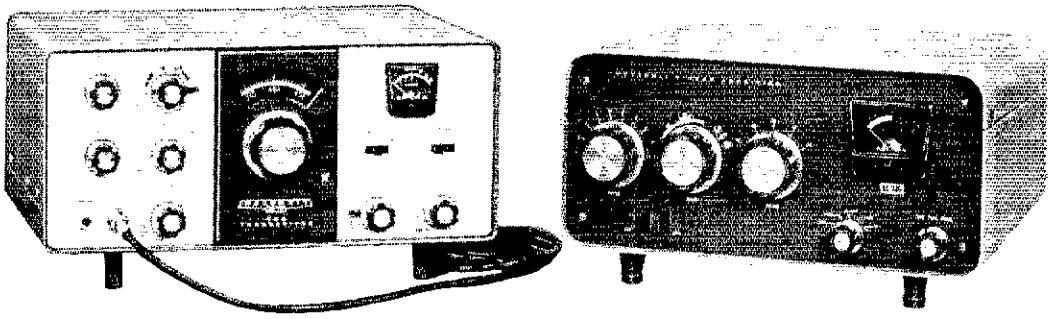
The Heathkit SB-220 is the linear amplifier that the competition tries to measure up to. Two conservatively rated Eimac 3-500Z's in a grounded grid circuit offer up to 2000 W PEP SSB input, or a full 1 kW on both CW and RTTY. The broad-band pretuned pi-input delivers maximum efficiency with low distortion over 80-10 meters. Only 100 watts of driving power is needed to produce full-rated input.

SB-220 features include a built-in solid-state 120/240 V power supply; circuit breaker protection; zener diode regulating operating bias to reduce idling current for cooler running and extended tube life; a large quiet fan; ALC to the driving unit to prevent overdriving; front panel switch selected monitoring of grid current; relative power and high voltage. The SB-220 offers a clean, compact design with the liberal use of internal shielding for extra strength and component isolation. Its green table-top cabinet complements all your SB-series gear.

To tune-up, you simply set the band switch, push the CW-Tune/SSB rocker switch to the CW-Tune position and adjust the Load & Tune controls for maximum relative power. Push the rocker switch to the SSB position and you are ready to set a new DX track record — with 2kw PEP input, or a full gallon on CW and RTTY.

Kit SB-220, 70 lbs **369.95***

get stronger yet, the long-distance shoes



Build the Heathkit HW-101 and SB-200 and run with a 1kw kick!

The HW-101 has improved receiver circuitry and dial drive and added front-panel SSB/CW filter selection. Sensitivity better than 0.35 uV for 10 dB S + N/N. Image and IF rejection better than 50 dB. 36-1 knob to dial ratio in a ball bearing drive mechanism. Thermal stabilized FET VFO with 5 kHz readout. Built-in 100 kHz crystal calibrated and zero reset button. Front panel crystal filter selection. Optional SBA-301-2 crystal filter installs in minutes. CW filter offers razor sharp 400 Hz selectivity. Built-in SSB crystal filter delivers 2.1 kHz selectivity at 6 dB down.

Kit HW-101, 23 lbs. **259.95***

Kit HP-23A, AC power supply, 19 lbs. **51.95***

Kit HP-13A, DC power supply, 7 lbs. . . **69.95***

SBA-301-2, 400 Hz crystal filter, 1 lb. . . **22.95***

Brawny partner in the Economy Kilowatt pair, the SB-200 is a completely self-contained, compact desktop rig with built-in solid-state power supply that sets you up with 1200 watts SSB, 1 kW CW with 80 through 10 meter hand coverage. And since it requires only 100 watts PEP drive, it's the ideal mate for the Heathkit HW-101 and almost all other popular transmitters and transceivers. A pair of 572B/T-160-L are used for amplification, fan cooled and shielded for maximum TVI protection. Other noteworthy features include a pre-tuned cathode input circuit for efficiency, low distortion; ALC output for automatic exciter control; circuit breaker protection; built-in SWR meter and antenna relay that automatically switches to the exciter when the linear is off; 120/240 VAC operation.

Kit SB-200, 50 lbs. **229.95***

Visit your nearest Heathkit Electronic Center... or send for FREE Catalog

HEATH ELECTRONIC CENTERS
Units of Schlumberger Products Corp.
ARIZ.: Phoenix; CALIF.: Anaheim, El Cerrito, Los Angeles, Pomona, Redwood City, San Diego (La Mesa), Woodland Hills; COLO.: Denver; CONN.: Hartford (Avon); FLA.: Miami (Hialeah); GA.: Atlanta; ILL.: Chicago, Downers Grove; IND.: Indianapolis; KANSAS: Kansas City (Mission); KY.: Louisville; LA.: New Orleans (Kenner); MD.: Baltimore, Rockville; MASS.: Boston (Wellesley); MICH.: Detroit; MINN.: Minneapolis (Hopkins); MO.: St. Louis; N.J.: Fair Lawn; N.Y.: Buffalo (Amherst), New York City, Jericho; L.I.: Rochester; OHIO: Cincinnati (Woodlawn), Cleveland, Columbus; PA.: Philadelphia, Pittsburgh; R.I.: Providence (Warwick); TEXAS: Dallas, Houston; WASH.: Seattle; WIS.: Milwaukee.

HEATH
Schlumberger

HEATH COMPANY, Dept. 9-1
Benton Harbor, Michigan 49022

☐ Please send FREE Heathkit Catalog.
☐ 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-292R

dedication to Public Service work and her training of others for this type of activity. W2RUT has QSYed to Fulton. WA2LUF has a new Advanced, congrats. K2KTK has a new harmonic, a girl conveniently born the week end between the DX contest and Sweepstakes. W2SD is on the lookout for charter QCWA members, Buffalo chapter. K2SWG has QSYed to South Cheektowaga. ESS handled 92 pieces of traffic with 369 check-ins in Oct. BPL this month goes to old faithful, W2OE. Walt is mgr. of the Mike Farad Net and Hit and Bounce Net. WB2JRX is mgr. of the Mid-Atlantic Region Net. K2LGJ is up to 15 states on 432 MHz, latest being Wisc. K2LWR, well known low band DXer has added 2-meter fm to his hilltop QTH and now keeps the repeaters East of the Miss. busy on week ends. New officers for the Chemung County AREC Assn. are K2HNM, pres.; WB2DHR, vice-pres.; WA2SMM, secy.-treas.; K2DNN, EC/trustee. Traffic with * indicating PSHR: W2FR* 290, W2OE* 281, WA2AYC 217, W2RUF* 183, WB2ADW* 163, WB2JRX* 125, W2MTA* 106, WB2VND 95, WA2TPC 77, WA2HSB 67, W2HYM 50, WA2PUU 49, K2UIR 40, WA2TLB 33, K2KTK 30, WA2DRC 28, W2MSM 25, W2PVI 25, W2RUT 24, W2EAF 20, WB2JWM 20, K2OFV 16, WA2LUF 10, WB2NRK 10, W2RQF 9, WA2ABL 8, WA2AIV 4, WA2KTM 3, WA2TSR 3.

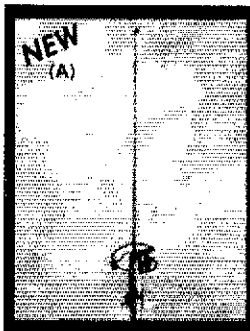
WESTERN PENNSYLVANIA – SCM, Robert E. Gawryla, W3NEM – SEC: W3KPJ. PAM: K3ZNP. RMs: W3KUN, W3LOS, WA3PXA. WPA CW Net meets daily on 3585 kHz at 7:00 P.M. KSSN meets daily on 3585 kHz at 6:30 P.M. Both local time. It is with our deepest regrets that we announce the Silent Keys of W3LIF and W3QHS. WA3GUL and WA3RVJ have advanced to Extra Class. WA3QNQ, WA3SNG, WA3UBJ and WA3VFL have advanced to General Class. Congrats men and a tip of the hat. Two Rivers ARC new officers for the coming year are WA3FSH, pres.; W3DJ, vice-pres.; WA3SOZ, secy.; WA3NLE, treas.; K3CHD, act. Indiana County ARC also has new officers with W3CTR, pres.; K3VMS, vice-pres.; K3JSV, secy.-treas.; K3JDU and K3SPI, dir. The Penn State ARC reports WA3HPF is conducting inverted Doppler tests on Oscar 6. The PSARC also provided communications for the local elections on election day. WA3GUL pushed the K3CR DXCC QSO number over the 100 mark. The Nittany ARC reports nice comments received on the Pa. QSO Party held in Sept. but log returns were down from other years. The NARC went all out this year trying for a large Penna. turnout. K3LVO is "Ham of the Month" at NARC for Oct. The U. of Pittsburgh at Bradford ARC held an all day exhibit at Hamsher House for recruiting on Oct. 18. Also handled messages. PSHR for Oct.: WA3SWF 44, K3ZNP 40, W3NEM 39, K3CB 34, W2KAT/3 34, W3LOS 30. WPA had 31 sessions, 397 stations QNI and handled 323 messages. K3CR again made BPL. Traffic: W2KAT/3 423, K3CB 231, K3CR 229, WA3SWF 215, W3NEM 102, W3LOS 91, W3KUN 82, WA3TTS 77, K3ZNP 61, WN3SZX 49, K3VQV 32, WA3EJO 26, WA3RWO 12, WA3LDA 11, K3SJN 8, WA3TMR 7, WA3SWC 4, W3YA 4, W3IDO 3.

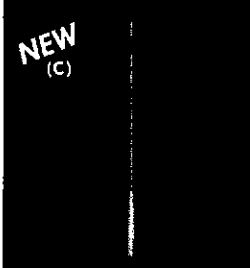
CENTRAL DIVISION

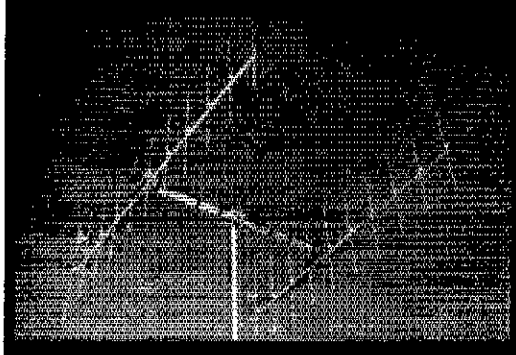
ILLINOIS – SCM, Edmond A. Metzger, W9PRN – Asst. SCM: Harry Studer, W9RYU. SEC: W9AES. RM: W9MUC. PAMs: WA9LDC and W9PDI (vhf). Cook County EC: W9HPG.

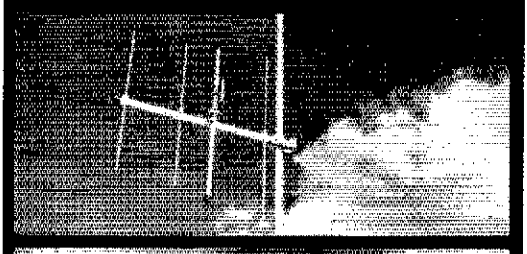
Net	*Freq.*	*GMT/Days*	*Tfc.*
IEN	3940	1400 Su	no report
ILN	3690	0030 Dy	no report
		0400 Dy	
NCPN	3915	1300 M-S	65
		2300	88
Ill PON	3915	2245	278
		1430	
Ill PON	145.5	0200 MWF	0
Ill PON	50.28	1200 M	0
ILNN	3720	0000 Dy	no report

The 9RN passed a traffic count of 376 during the month. W9LDU reports the Lee County repeater should be ready and on the air by Dec. 15. It will be controlled by phone lines and auto patch in their mobiles. K9ZTV is back from a vacation in Europe. New General licensees heard were: WB9KZO, WB9LBC. K9ZWU, K9DKI, WA9RIJ, K9ZWV, B. Thuma, WA9BWB, WA9RER and W9RVG were elected officers for the coming year of the Six Meter Club of Chicago, Inc. The highlight of the W9DXCC banquet was the talk by Father Marshall Moran, S.J., 9N1MM from Katmandu, Nepal. New appointments this month include WB9JWH as EC for Rock Island County, WB9DED and WB9FWO as ORS. WA9TAS is in charge of the new novice class for the Cenois Amateur Radio Club, with W9FLF and W9EYV assisting him. K9OVM is hospitalized in St. Lukes Hospital in Milwaukee. The new officers of SYNTON Amateur Radio Club, Univ. of Ill. for 1973-74 are WB9EYZ, WA9VGX, WB9GWO and WB9ITN. On Oct. 30 and 31, 15 members









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 antennas. Give peak gain, and efficiency, instant assembly and installation.

AR-2	100 watts	135-175 MHz		$14.50
AR-25	500 watts	135-175 MHz		18.50
AR-220	100 watts	220-225 MHz		14.50
AR-450	100 watts	420-470 MHz		14.50
AR-6	100 watts	50-54 MHz		19.50

(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		$46.50
AFM-24D	1000 watts	220-225 MHz		44.50
AFM-44D	1000 watts	435-450 MHz		42.50

(C) **FM MOBILE:** IMPROVED Fiberglass ⅝ wave mobile antenna with new molded base and quick grip trunk mount. Superior strength, power handling and performance.

AM-147T	146-175 MHz mobile		$26.95

(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		$56.50

(E) **4-6-11 ELEMENT YAGIS:** The standard of comparison in VHF/UHF communications, now cut for 2 meter FM and vertical polarization. 4 & 6 Element models can be tower side mounted.

A147-4	1000 watts	146-148 MHz		$11.95
A147-11	1000 watts	146-148 MHz		19.95
A220-11	1000 watts	220-225 MHz		17.95
A449-6	1000 watts	440-450 MHz		11.95
A449-11	1000 watts	440-450 MHz		15.95

(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

AMATEUR ELECTRONIC SUPPLY USED GEAR

★ 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 !

ALLIED RADIO
SX-190 Receiver $175
A-2515 Receiver 59

AMECO
CN-50 (14–18) $ 29
CN-80 (30,5–34,5) 29
CN-144 2m conv. 29
PS-1 AC supply 9
CLB 6m mob.conv. 15
TX-62 VHF Xmtr 75

BTI
RF-2000/PS-2000 (table model) $469

B&W
5100 Transmitter $119

CENTRAL ELECT.
20A Exciter $ 99
MM-2 Analyzer 69

CLEGG/ SQUIRES-SANDERS
22'er 2m Xcvr $139
66'er 6m Xcvr 119
99'er 6m Xcvr 59
Thor 6 (RF only) 85
417 AC sup./mod. 65
418 DC sup./mod. 35
Interceptor Rec. 225
22'er FM series 25 219
22'er Mk II AM 199
FM-27B 2m FM 329

COLLINS
75A-3 Receiver $269
75A-4 (ser. #513) 325
75A-4 (ser. #1713) 349
75A-4 (ser. #2091) 375
75A-4 (ser. #2146) 375
75A-4 (ser. #2652) 375
75A-4 (ser. #3801) 395
755-1 Receiver 375
755-3B Receiver 595
R-390 Receiver 695
312B-4 Stn.Cont. 169
KWM-1 Transceiver 239
KWM-2 Transceiver 595
KWM-2/blanker 695
312B-5 PTO cons. 375
516F-1 AC supply 75

COMM. TECHNOLOGY
Magnum Six RF Speech Processor (wired for Drake) $89

R. L. DRAKE
2A Receiver $159
2AQ Spkr./Q-mult. 25
2AC Calibrator 9
2B Receiver 189
2BQ Spkr./Q-mult. 25
2BS Speaker 9
2C Receiver 189
2CS Speaker 9
2CQ Spkr./Q-mult 29
2NT Transmitter 109
TC-6 6m xmit conv 175
R-4 Receiver 275
R-4A Receiver 289
R-4B Receiver 339
MS-3 Speaker 12
MS-4 Speaker 15
R-4C Receiver 399
SC-2 2m Conv. 69
4NB Noise blanker 39
SC-6 6m Conv. 59
CC-1 conv. console 39
CPS-1 Supply 12
SCC-1 VHF calib. 19
SCC-4 xtal calib. 19
TR-3 Transceiver 339
AC-3 AC supply 65
DC-3 DC supply 75
TR-4/NB Xcvr 479
TR-4 Transceiver 419
DC-4 DC supply 89
T-4X Transmitter 299
T-4XB Transmitter 375
TR-22 2m FM Xcvr 159
L-4B Linear Amp 575
ML-2 2m FM Xcvr 219
MN-2000 ant. match 149
SNB Blanker 49

DYCOMM
500-C 2m FM amp. $ 39
500-E 2m FM amp. 49

EICO
753 SSB Xcvr $119
752 DC supply 49
717 Keyer 49

ELMAC
AF-67 Transmitter $ 49
PMR-7 Receiver 49
PSR-612 DC supply 19

GELOSO
G-209 gen. cov. Rec. $99
G-209 Ham band Rec. 99

GLOBE/GALAXY/YRL
6-2 VFO $ 34
Galaxy 300 Xcvr 139
FSA-300AC/clock 49
VX-1 VOX 9
Galaxy V Xcvr 239
Galaxy V Mk II 259
Galaxy V Mk III 279
AC-35 AC supply 65
DC-35 DC supply 65
AC-400 AC supply 75
RV-1 Remote VFO 49
VX-35 VOX 9
CAL-35 calibrator 9
SC-35 Speaker 12
DAC-35 Dlx. console 69
CAL-25025 kHz cal. 12
F-3 300 cy. filter 24
2000 Linear/supply 275
Duo-Bander Xcvr 99
Duo-Power 300 69
GT-550 Xcvr 325
SC-550 Speaker 19
RV-550 Rem. VFO 59
RF-550 Wattmeter 49
GT-550A Xcvr 375
SC-550A Speaker 15
RV-550A Rem. VFO 69
AC-210 AC-DC supply/booster 19
R-530 Receiver 549
SC-530 Speaker 25
AC sup. for rejector 4

GONSET
Comm II 6m $ 75
Comm III 2m 99
Comm IV 6m 119
901A AC supply 39
910A 6m Xcvr 199
911A AC supply 39
GSB-201 Linear 199
GSB-201 Mk III 249
GC-105 2m Xcvr 119

HALLICRAFTERS
S-38A Receiver $ 39
SX-71 Receiver 99
SX-101 Mk III Rec. 139
SX-101A Receiver 179
S-108 Receiver 79
SX-110 Receiver 99
SX-111 Receiver 139
SX-117 Receiver 189
S-120 Receiver 29
SX-130 Receiver 139
SX-146 Receiver 175
R-46 Speaker 9
R-46B Speaker 9
HT-32 Transmitter 199
HT-32A Xmtr 225
HT-32B Xmtr 289
HT-37 Transmitter 179
HT-40 Transmitter 59
HT-41 Linear 175
HT-44 Transmitter 169
HT-46 Transmitter 219
SR-150 Transceiver 275
SR-160 Transceiver 169
PS-150-120 AC sup. 75
PS-150-12 DC supply 65
SR-400 Transceiver 475
HA-20 Remote VFO 149
P-500AC AC supply 89
PS-500A AC supply 75
SR-2000 Xcvr/sup. 895
FPM-300 Xcvr 395
MR-300 AC supply 15
SR-42 2m Xcvr 89
SR-42A 2m Xcvr 99
HA-8 splat. guard 19

HAMMARLUND
HQ-100A Receiver $139
HQ-110 Receiver 109
HQ-110C Receiver 119
HQ-110A Receiver 139
HQ-110AC Rec. 149
HQ-110A/VHF 199
HQ-140XA Rec. 129
HQ-160 Receiver 189
HQ-170 Receiver 149
HQ-170C Receiver 159
HQ-170AC Rec. 199
HQ-170A/VHF 259
HX-50 Transmitter 175

HEATHKIT
MR-1 Receiver $ 49
MT-1 Transmitter 39
SB-300 Receiver 209
SB-301 Receiver 229
SB-303 Receiver 289
XC-2 2m conv. 25
XC-6 6m conv. 25
HS-24 Speaker 9
DX-20 Transmitter 29
DX-60 Transmitter 59
DX-100 Transmitter 89
HW-16 Transceiver 99
TX-1 Transmitter 99
SB-10 SSB adaptor 75
HX-10 Transmitter 179
HA-10 Linear 175
HX-30 6m Xmtr 149
HW-12 75m Xcvr 75
HW-22A 40m Xcvr 85
HW-32 20m Xcvr 75
HW-32A 20m Xcvr 85
HW-101 Xcvr 269
HW-16 Transceiver 99
HW-17A 2m Xcvr w/FM adaptor 149
SB-100 Transceiver 325
SB-101 Transceiver 349
SB-102 Transceiver 375
SB-400 Transmitter 225
SB-200 Linear 219
SB-610 Sig.monitor 69
SB-620 Scanalyser 119
HG-10B VFO 39
HW-29A (Sin'er) 34
HW-30 (Two'er) 39
GP-11 DC supply 9
VHF-1 (Seneca) 6-2 89
HP-13A DC supply 54
HP-10 DC supply 24
HP-13 DC supply 49
HP-20 AC supply 24
HP-23 AC supply 49
HP-23A AC supply 54
HRA-10-1 calibrator 7
HO-13 Hamscan 69
SB-650 freq. counter 169
HW-17A 2m Xcvr 119
SB-500 2m Xverter 175

JOHNSON
Challenger $ 54
Ranger I 89
Valiant I 139
500 Transmitter 275
Pacemaker 139
Invader 200 225
Invader 2000 475
6N2 VHF Xmtr 89
Phone Patch 19

KENWOOD
R-599 Receiver $249
T-599 Transmitter 299
CC-69 6m conv. 19
CC-29 2m conv. 19
TS-511S Xcvr 289
PS-511S power sup. 79
VFO-5SS Rem. VFO 79

KNIGHT
R-100 Receiver $ 59
R-100A Receiver 69
X-10 calibrator 7
T-150A Xmtr 69
V-44 VFO 19
C-577 speech comp. 9

LAFAYETTE
HE-45B Xcvr $ 75
HE-61 VFO 19
HA-460 6m Xcvr 75
KT-320 Receiver 89
HA-225 Receiver 79

MOSLEY
CM-1 Receiver $ 99

NATIONAL
NC-98 Receiver $ 89
NC-155 Receiver 119
NC-183 Receiver 89
NC-190 Receiver 139
NC-270 Receiver 125
HRO-50T-1 Rec. 125
NCX-3 Xcvr 169
NCX-5 Xcvr 325
NCX-5 Mk II Xcvr 349
NCX-A AC supply 75
NCXA AC supply 75
NCXD DC supply 75
200 Transceiver 229
AC-200 AC supply 69
NXC-500 Xcvr 239
NCL-2000 Linear 375
AC-500 AC supply 75

P&H
LA-400C Linear $ 69

POLYTRONICS
PC-2 2m Xcvr $129
PC-62 6-2 m Xcvr 149
PC-62B 6-2m Xcvr 199

RME
6900 Receiver $169
VHF-126 converter 75

RAYTRACK
DX-2000L Linear $375

REALISTIC
DX-150A Receiver $ 89

REGENCY
HR-2A 2m FM Xcv $169
HR-2S 2m FM Scanning Xcvr 239
HR-6 6m Xcvr 169

ROBOT
Model 70 slow-scan Monitor $239

ROBYN
Digital 500 Xcvr/supply $475

SBE
SB-33 Transceiver $189
SB1-DCP Inverter 25
SB-34 Transceiver 279
SB2-XC calibrator 12
SB2-MIC Mike 9
SB-144 2m FM Xcvr 179

SIGNAL/ONE
CX-7A with standard & deluxe CW filt. $995

SINGER
PR-1 Panadaptor $ 79

STANDARD
SR-C851T 2m FM $289
SR-C826M 2m FM 199
SR-C806 2m FM 99
SR-C146 w/case 169

SWAN
SW-140 Xcvr $ 75
SW-175 Xcvr 75
250 6m Xcvr 229
250C 6m Xcvr 339
270 Transceiver 329
260 Transceiver 299
210 6m VFO 59
400 Transceiver 169
406 VFO 49
420 VFO 69
NB-500 Blanker 49
117B AC supply 65
412 DC supply 75
117B AC supply 69
350 Transceiver 279
SW-117C AC supply 75
512 DC supply 25
22 VFO adaptor 19
500 Transceiver 329
500C Transceiver 359
117XC AC supply 85
14-117 DC supply 100
14A DC module 29
14X DC module 39
117X Basic AC sup. 65
NS-1 noise silencer 19
FM-1210A 2m FM 225
WM-1500 wattmeter 35
AF-800 CW aud. filt. 19
Mark I Linear 395
VHF-150 Amplifier 199
1200-W Linear amp. 199

TMC
GPR-90 Receiver $225

TAPETONE
XC-50 (14–18) $ 29

TEMPO
502 2m Amp. $ 79
Tempo One 289
AC/One 75

TEN-TEC
PM-2A Transceiver $ 39
PM-2B Transceiver 49
PM-3 Transceiver 49
PM-3A Transceiver 59
Argonaut 199
250 AC supply 39
210 AC supply 19
TX-100 Xmtr 59
RX-10 Receiver 49
S-30 Signalizer 29
KR-5 Keyer 24
KR-40 Keyer 59

UTICA
650A 6m Xcvr/VFO $59

VARITRONICS
PA-50A 2m Amp $ 59
FM-20BM AC supply–amp 49
HT-2 Mk II 2m FM walkie-talkie 109
FDFM-2A 79

WATERS
359 Compreamp $ 19

YAESU
FTDX-400 Xcvr $375
SP-401 Speaker 12

10/10/73

NEW EQUIPMENT SPECIALS & CLOSEOUTS

Due to the low prices and limited quantities of the merchandise listed below all prices are for "Payment in Full With Order—No Trade".

CLEGG

	reg.	NOW
22'er FM series 25	$384	$269
22'er Mk II AM	389	269
FM-27B New Demo	479	379
FM-21 220Mc FM Xcvr	299	199

COLLINS

	reg.	NOW
75S-3B Rec.-New display	$1101	$880
32S-3 Xmtr-New display	1330	1064
351D-2 mob.mt.-New display	337	137

COMCRAFT

	reg.	NOW
CTR-144 2m FM/AM Xcvr	$489	$389

R. L. DRAKE

	reg.	NOW
L-4B Linear-New Display	$825	$649
TC-6 6m xmt. converter	278	248
CC-1 Converter console	49	49
CPS-1 Power supply	20	19
SCC-1 VHF calibrator	27	26
ML-2 2m FM AC/DC	329	249
TR-22 6 ch 2m FM Portable	219	179
AA-22 Amplifier & Preamp	149	129

EICO

	reg.	NOW
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

	reg.	NOW
RB-550A Rotor & control box	$229	$179
R-530 Receiver – NEW	895	795
R-530 Rec. – New Display	895	745
GT-550A New Display	595	450

HALLICRAFTERS

	reg.	NOW
SR-400A 80-10m Xcvr	$995	$795
PS-500 AC supply	129	100
FPM-300 80-10m Xcvr	625	525

HENRY

	reg.	NOW
2K ULTRA – New Display	$845	$745
3KA – New Display	1080	980

HY-GAIN

	reg.	NOW
HB254 4 stacked 2m Halos	54	19
400 Rotor	229	189
TH-6DXX torn carton (repaired)	189	159
14-AVQ torn carton (repaired)	55	45

KENWOOD

	reg.	NOW
R-599 Receiver	$389	$319
T-599 Transmitter	429	359
CC-69 6m Converter	31	29

LINEAR SYSTEMS (ADCOM)

	reg.	NOW
350-6 6v DC supply	$25	$ 15

MOSLEY

	reg.	NOW
CL-33 shipped to customer in error	$153	$129

PENWOOD

	reg.	NOW
100B-24H 24-hour clock	$ 16	$ 12

ROSS & WHITE

	reg.	NOW
FM-144-10J 2m FM Xcvr with tone encoder	$329	$229

SBE

	reg.	NOW
SB-36 Transceiver – New	$969	$669
SB-SV Scanvision Monitor and Camera – New	999	599
SB-144 2m FM - new display	759	199
SB-450 450Mc FM Xcvr	399	299
SB-2MIC Mike (dynamic)	16	12

STANDARD

	reg.	NOW
SR-C826MA – New Display	$398	$279
SR-C14U – New Display	595	476
SRC-146A hand-held – Demo	289	239

SWAN

	reg.	NOW
1m-2X 2m FM Transceiver	$299	$229

VARITRONICS

	reg.	NOW
PA-50A 2m FM Amp 12v	$129	$ 79*
FM-208M Base Amp/supply	235	65*
FM-20M Mobile Amp	150	45*

* – with 90-day AES warranty

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

IMPORTANT! – Please Be Sure to send all Mail Orders and Inquiries to our Milwaukee store, whose address is shown above. The following Branch stores are set up to handle Walk-in business only.

17929 Euclid Ave.: Cleveland, Ohio Phone (216) 486–7330
621 Commonwealth Ave.: Orlando, Florida Phone (305) 894–3238

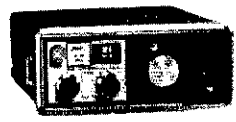
AMATEUR ELECTRONIC SUPPLY

is the Best Place to purchase your new

DRAKE *gear for the following reasons*

TR-72 2m FM Xcvr, 12vdc, 23 ch.	$299.95
TR-22 Portable 2m FM Xcvr	219.95
AA-22 Rec./Xmtr. Amplifier	149.95
MMK-22 Mobile Mount	9.95
AA-10 10 watt 2 meter Amplifier	49.95
AC-10 supply for TR-22/AA-10, TR-72	39.95
Extra crystals for TR-22, TR-72 each	5.00
DSR-1 Digitally synthesized Receiver	2195.00
Rack panel adaptor for DSR-1	125.00
2C Receiver	$295.00
2AC Calibrator for 2C	18.75
2CS Speaker for 2C	22.00
2CQ Speaker/Q-multiplier for 2C	49.00
2NB Noise Blanker for 2C	26.95
R-4C Receiver	499.95
4NB Noise Blanker	65.00
Filters: 250, 500 cycle; 1.5, 6.0 kHz	50.00
MS-4 Speaker for TR-4C, R-4C, SW-4A	22.00
TR-4C Transceiver for 80-10 Meters	599.95
34PNB Noise Blanker	100.00
RV-4C Remote VFO for TR-4C	110.00
FF-1 Crystal cont. adapt. for TR-4C	46.95
AC-4 AC supply for TR-4C, T-4X	99.95
DC-4 12vdc Supply for TR-4C	125.00
MMK-3 Mobile Mounting kit for TR-4C	6.95
MC-4 Mobile Console for TR-4C	69.00
2NT CW Transmitter	175.00
T-4XC SSB Transmitter	530.00
L-4B Linear Amplifier	825.00
MN-4 Antenna Match Network	99.00
MN-2000 Antenna Match Network	195.00
W-4 RF Wattmeter (2-30 Mc)	61.95
WV-4 RF Wattmeter (20-200 Mc)	73.50
C-4 Station Control Console	395.00
SW-4A AM Shortwave Receiver (tube)	335.00
AL-4 Loop Antenna – BC Band	29.00
AN-5 Short Wave outdoor antenna	8.80
TV-42-LP 100w Low-pass Filter	8.95
TV-1000-LP 1000w Low-pass Filter	18.75
TV-300HP High-pass Filter	6.95
LN-4 Line Filter, 120v, 5 amp	8.00
Crystals for 2C, R-4C, SW-4A, T-4XC	5.00
Fixed-Frequency Crystals	7.50
7295RD Microphone with plug	19.95
SPR-4 Programable Receiver	579.00
ACCESSORIES FOR SPR-4	
SNB Noise Blanker	$ 65.00
DC-PC DC Power Cord	5.00
TA-4 Transceive adaptor for SPR-4	25.00
SCC-4 Crystal Calibrator	20.00
RY-4 Teletype adaptor	10.00
DIAL Crystal Selector - plain	2.35
CRYSTAL KITS FOR SPR-4	
Aeronautical Overseas – 7 crystals	$ 32.00
Amateur Bands – 6 crystals	27.00
Citizens Band – one crystal	5.00
Marine Bands – 11 crystals	49.00
MARS – 5 crystals	22.00
Teletype Commercial – 4 crystals	18.00
Time & Freq. Std. WWV – 5 crystals	22.00

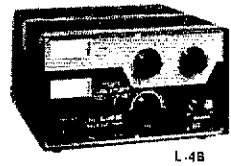
TR-72



TR-22

Order Today
Direct from this Ad

R-4C



L-4B

your
BANKAMERICARD
welcome

Ray Grenier, K9KHW
Mgr. Mail Order Sales

- **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.
- **GECC Revolving Charge Plan.** Only 10% Down, LOW Monthly Payments – for Examply: $10 a month finances up to $300; $20 up to $610. Write for complete information and credit application.

SAVE up to $100.

If you purchase any of the new Merchandise listed below at the Regular Price and Without a Trade-in, you may take the "Bonus" Credit indicated below toward the purchase of other merchandise (such as power supplies, antennas, towers, microphones, crystals, linears, accessories, etc.)

TR-22 2m FM	$10 Bonus	SPR-4 Receiver	$40 Bonus
TR-72 2m FM	$20 Bonus	TR-4C Xcvr	$50 Bonus
R-4C Receiver	$40 Bonus	C-4 Console	$40 Bonus
T-4XC Xmtr	$40 Bonus	L-4B Linear	$100 Bonus

SIX EZ-WAYS TO PURCHASE
1. CASH
2. C.O.D. (20% DEPOSIT)
3. MASTER CHARGE
4. BANK AMERICARD
5. AMERICAN EXPRESS
6. GECC REVOLVING CHARGE

master charge
THE INTERBANK CARD

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

IMPORTANT! – Please Be Sure to send all Mail Orders and Inquiries to our Milwaukee store, whose address is shown above. The following Branch stores are set up to handle Walk-in business only.

17929 Euclid Avenue; Cleveland Ohio Phone (216) 486-7330
621 Commonwealth Ave.; Orlando, Florida Phone (305) 894-3238

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 (20% Deposit) ☐ 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

of the Arlington Heights Civil Defense organization participated in Gublin Patrol using RACES frequency of 147.3 for communications. The Starved Rock Radio Club is planning big things to celebrate their 40th year of ARRL affiliation. Contact W9LIG for details. New officers of the Rockford Amateur Radio Assn., Inc. are WN9MMM, WB9IED, WB9KOR, WN9IST. The Jacksonville Area Amateur Radio Club, Inc. are putting the finishing touches on their repeater and will be heard soon. W8KRR, senior engineer of the Heath Co presented his "Heath Night" at the Oct. 26 meeting of the York Radio Club with approximately 80 in attendance. WB9HAD reports that he is getting close to his 5 band WAS. K9MWA is the only BPL recipient this month. Traffic: K9MWA 451, WB9JPS 240, W9NXG 179, W9AES 116, W9OYL 104, W9LNQ 95, WB9FWO 85, K9AVQ 65, W9IXV 50, WA9LDC 39, WB9KZO 35, K9ZTV 30, WB9DED 20, WB9ZTK 16, WB9ELP 11, W9HOT 10, W9PRN 10, W9RYU 10, K9BGL 8, K9UCG 6, WA9ULP 4, W9JR 2, W9LDU 2.

INDIANA SCM, William C. Johnson, W9BUQ SEC: WA9YXA. PAMs: WB9FOT, (vhf) W9HWR, W9PMT. RMs: WB9LHI, W9HRY, WB9KVN, WA9EED.

Nets	*Freq.*	*GMT/Days*	*Tfc.*	*Mgr.*
ITfcN	3910	1330-2300 Dy 2130 M-S	452	WB9FOT
QIN	36.56	0100-0400 Dy		
IPON	3910	1300-2130 Su 2000 S	8	WB9AHJ
IPONVHF	50.7	0100 M-F	15	WA9ULH
IPONCW	3712	0000 Dy	42	WB9KVN
IPONSSB	50.2	0200 Dy	13	WB9CYU
Hoosier VHF			16	W9PMT

With deep regret I report WB9CBX and K9FUI as Silent Keys. Amateur TV & UHF Club held their fall meeting at Ft. Benjamin Harrison Oct. 27 with 78 present. Home Brew contest won by WA9MFF, WA9HPK, W9EUD, W9NIP, WA9FIZ, W9AFV, W9DNN, K3YWJ/9, K9FHE. 436 MHz is the frequency used by local TV amateur. Spring Mill Hamfest was the largest in the state this year with over 1000 present. Indianapolis Radio Club helped out the Hoosier Canoe Regatta Oct. 13-14. WA9YCA, W9PSE, WA9VPU, WN9KWS, W9AI furnished 2 fm. On Oct. 14 K9LZJ gave a talk and presented slides covering electronic equipment used in the Community Hospital. Southern Indiana AREC furnished communication for the Jeffersonville dime walk-a-thon, WA9FCM, WA9TJS, WA9TMM, WA9WME, WA9LPA, W8KTF/9. W9NTP and W6MXV will soon have a Slow-Scan to Fast-Scan converter (& reverse). Lake County Annual Banquet will be Feb. 9, 1974. Contact W9EGQ for details. WB9CAC is going from Hi-tower to dipole. PSHR: W9EI, WA9EED, WB9FOT, W9FWH, WB9KVN, W9KX, W9QLW. Traffic: WB9NJA 279, WA9EED 205, WB9FOT 200, W9FWH 160, WB9KVN 155, WB9CAC 112, W9BUQ 102, WB9EAY 102, W9QLW 82, K9HYV 75, W9UEM 60, W9KX 54, WA9TJS 53, K9EQT 40, K9PSL 37, K9YBM 31, W9DKP 30, K9RWQ 28, K9JQY 23, K9CBV 19, K9RPZ 18, W9DZC 17, WB9ECI 17, WA9OAD 17, WB9BAP 12, W9PMT 12, K9ILK 10, W9UOZ 9, WB9AMB 8, W9RTH 8, WA9YXA 8, K9DIY 7, WA9ULH 7, W9KWB 6, WA9OKK 6, K9IU 5, WB9BEE 3, W9BDT 2, W9HWR 2, K9QWK 2, WB9TWY 1.

DAKOTA DIVISION

MINNESOTA – SCM, Casper H. Schroeder, WAØVAS – We regret the passing of KØICG, Madison Lake. The New officers of the Viking Amateur Radio Society are WAØJGT, pres.; WØOLW, vice-pres.; WNØJZP, secy.-treas.; WAØMJF, act. mgr.; WØOFZ, trustee. Net reports: MSN no report. MJN mgr. WBØGKH – sessions 23, QNI 103, average 4.5, QTC 13. MSPN (Noon) PAM KØFLT – sessions 31, QNI 798, QTC 82, high 35, high 13, low 13, low 0, average 25.7, average 2.65. MSPN (Evening) PAM WAØVYB – sessions 31, QNI 974, QTC 118, high 44, high 30, low 19, low 0, average 31.5, average 3.8. PAW mgr. WAØYVT – QNI 3804, 173 hours operating time, average 21.99, QTC 216, 81 phone patches. Traffic: WAØVAS 665, WBØHOX 328, WAØYVT 237, KØCSE 189, WAØTEC 130, WAØGRX 111, WAØVTZ 97, WAØONE 87, WBØFTL 73, WAØVYB 68, KØZRD 57, KØFTI 55, WBØFVY 44, WAØURW 42, KØFLT 40, KØPIZ 40, KØZBI 40, WAØCCA 26, WAØIIB 22, WBØCYM 21, WAØYAH 15, WØIRJ 8, KØJTW 8, KØWXH 8, KØZXE 8, WAØVYV 5, KØSXQ 3, WØUMX 3.

NORTH DAKOTA – SCM, Harold L. Sheets, WØDM – SEC: WAØAYL. OBS: KØPVG/Ø. RM: WAØMLE. OO: WØBF. The Bismarck 2-meter repeater WRØACJ became operational on Nov. 5. WAØSUF sixty miles away says its like a local. Congrats! WØWWL spent some time in the hospital as did WØCDO. OT WØYCL gets on at times. WBØFDT went to Jamestown and came home with an

Advanced Class ticket. Ex-7 WØOUX is on quite frequently. WØOFL took off for the West Coast to visit family and dropped in on W6IfWN in Redding. WBØBMG is doing a nice job as PON mgr. since WAØSIB departed. She also made the PSHR this month. Congrats. WAØRWK presented WAØRWM and WAØVIG with a new granddaughter. WAØSUF and WAØMLE have been checking into the Tenth Regional Daytime net on 7265 kHz. We can use some more on that SSB Net. Contact WAØMLE if interested. KØGGI busy repairing a beam. Two meter work has slowed down somewhat in the Grand Forks area. Location of repeater and licensing problems beset the Fork Amateur Radio Club. The Valley Jr. HS Club, Grand Forks has a new antenna up. WØDM has several Novice classes to run it and several beginners in the new Novice class. WØDM, a graduate of Jamestown College recently presented the Raugust Library with a set of ARRL publications as a memorial to Professor T.W. Jackson who ran a KW Spark outfit under the call 9FX in the early twenties.

Net	*kHz*	*CST/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
Goose River	1990	0900 S	4	84	2	WØCDO
PON	3996.5	0900 S				
		1830 S-S	12	265	28	WBØBMG
YL WX Net	3994.0	0730 M-F	13	219	196	WAØGRX WAØRWM
RACES	3996.5	1730 M-F	26	554	82	WBØATJ
		1830 M-F				WAØSUF

Traffic: WAØMLE 155, WAØSUF 98, WØDM 30, WBØBMG 22, WØWWL 18, WØCDO 10, WBØBMH 7, WØMXF 6, KØPVG/Ø 4.

SOUTH DAKOTA – SCM, Ed Gray, WAØCPX – WAØOLP is putting up a new fold-over tower to be used for VHF work; especially Satellite work, 220 MHz ssb and hopefully some moon bounce. The Sioux Falls ARC held a successful auction. WAØYRI, KØCUT and WØSMV were auctioneers. Part of the funds raised will go to the hospital ship HOPE. WAØFUZ has been our section representative on tenth regional daytime traffic system net and doing a fine job. WBØGID recently received his ticket and has been active on 75 meters. SEC WAØRIO is actively working with ECs and clubs on county and state emergency planning. Net reports: Morning Net – 480 check-ins and 28 formals; NJQ – 574 check-ins and 17 formals; Early Evening – 426 check-ins and 22 formals; Late Evening – 1216 check-ins and 21 formals. SDN CW remains active. Traffic: WAØUEN 110, WØHOJ 106, WAØFUZ 24, WØMZI 21.

DELTA DIVISION

LOUISIANA – SCM, Robert P. Schmidt, W5GHP – Asst. SCM: John R. Souvestre, WA5NYY. SEC: K5SVD. RM: WA5ZZA. PAM: WB5EKU. VHF PAM: WA5KND. We regret to report the passing of W5EA, Monroe. Leo was very active in traffic work, and in Army MARS. He will be missed by all LAN members. The Lafayette Club getting ready for the Delta Division Convention which is scheduled for Mar. 1-3. K5DPG is general chmn. WB5EKU reports increased activity on LTN, the phone net. WA5ZZA advises that LAN CW net needs reps. in West and North La. New appointments. WB5EKU EC for Area 1, Southeast La. WB5CIQ EC for Area 2 Eastern La. WA5OVN EC for Area 8 Northeast La. W5SKW EC for Area 5 Southwest La. K5WOD EC for Webster Parish. W5OVV EC for Iberville Parish. K5RNM EC for Caddo Parish. W5MYL EC for East Baton Rouge Parish. W5EXI EC for Lafayette Parish. W5GZR EC for Iberis Parish. K5BLV EC for East Feleciana Parish. WA5EID again active on LAN. WB5IDV temporarily inactive while returning to college. Congratulations to W5FMO for again making the PMT Honor Roll. Congratulations also to Thibodaux ARC and Lafayette ARC for fine scores in Field Day.

Net	*Freq.*	*Time(CST)*	*QTC*	*QNI*	*Mgr.*
LAN	3615	6:30 & 10:00	123	180	WA5ZZA
LTN	3910	6:45 P.M.	114	218	WB5EKU

Traffic: W5GHP 389, WA5ZZA 367, WB5EKU 35, WA5OVN 34, WA5NYY 25, WA5EID 23, W5HGT 15, WA5WBZ 1.

MISSISSIPPI – SCM, Walker Coffey, W5NCB – Asst. SCM: Gene McGahey, WA5JWD. SEC: WA5FII. RMs: WA5YZW, WB5DLW. PAMs: W5JHS, WA5KEY, WAØGVO/5, WB5DCY. New appointees: WB5DCY, PAM at large and WB5DLW RM of MNN. Thanks to fromer RM WB5EIN for a fine job. Please help us with the SET. SEC WA5FII, and his ECs should be contacted for plans. Congrats to WB5GKJ now General Class. ECHO repeater changed to 28/88. Natchez working on a 31/91 repeater. WA5GYM arranged for a preview of Skywarn at a recent ECHO Assn. meeting. Good to hear WA5UDO back on the air. W5BW records TV programs missed while being NCS. WB5FML has WAS confirmed on 40 meters. How about checking in on the MTN cw net and helping WA5YZW, W5SBM, WA5THM/5, WB5BNV, WB5FML, WB5DLW, K5YTA,

W5EDT, W5WZ and W5AMZ carry the load. Are you competing for the 6 Miss. Section awards?

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
MTN	3665	0045 Dy	129	108	WA5YZW
MNN	3733	0100 TThS	—	—	WB5DLW
GCSBN	3925	0030 Dy		—	W5JHS
CGCHN	3938	0100 Dy	1635	208	WB4RCF
MSPON	3970	2345 MS	284	38	WA0GVO/5
MSBN	3987.5	0015 Dy	1016	110	WB5BKM

Traffic: W5SBM 160, WB5DLW 117, WB5PML 84, WA5YZW 79, W5EDT 71, W5NCB 70, W5WZ 60, K5YTA 30, WA0GVO/5 20, WA5THM/5 19, WB5BKM 16, W5BW 13, WN5HYR 10, WB5BUE 3.

TENNESSEE – SCM, O.D. Keaton, WA4GLS – SEC: WB4DYJ. PAMs: W4PFP, K4MQI, WA4EWW, WA4NEC. RM: W4ZJY.

Net	Freq.	Time(Z)/Days	Sess.	QNI	QTC	Mgr.
TPN	3980	1145 M-F 1300 SSuH	51	1569	34	W4PFP
TSSBN	3980	2330 M-S	25	1205	21	K4MQI
FTPN	3980	1040 M-F	20	509	10	WA4EWW
TPON	3980	2330 Su				WB4HHZ
TN	3635	2300 Dy	22	628	87	WB4YCV
TNN	3707.5	2300 Dy	15	41	11	WB4NIR
ETVHFN	50.4	2300 MWF	12	108	0	W4SGI
LTVHFN	145.2	2300 TTh	8	26	0	WB4DZG
ETTMN	28.7	0100 WF	48	45	0	WA4NTI
MTTMN	28.8	0100 TTh	8	48	0	W4EAY
KVHFN	50.7	0000 T	4	19	0	WB4MPJ
TCN	3980	0200 Th	4	29	0	WB4MUZ
ACARECN	146.28 146.88	0000 M				WA4BXK

The Memphis Hamfest was a success as usual, certainly glad to have V. Pres. Charles Compton and OSI Asst. Tech Ed. Robert Myers with us at the Section Convention, also, W5NCB, SCM Miss., W5MUG, Past Dir. and those other amateurs from our neighbor states. First prize went to WA4VVX and 2nd to WB4TER. W4WXV was the winner of a two meter rig at the Music City Hamfest. W4RUW has been appointed PAM of the Tenn. Phone Net which now is the combination of the three nets which meet on 3980 kHz; W4PFP, K4MQI and WA4EWW are now net mgrs. of the various sessions. Certainly glad to report WB4BHZ is recovering nicely from recent heart attack. An NCS is needed for the TRN RTTY Net; contact W4ZJY if you can help. WN4FFW is welcomed to this section. Traffic: K4CNY 243, WB4YCV 195, W4ZJY 79, WB4DJU 44, WA4AVD 29, WB4DCO 26, K4VVE 19, WB4MPJ 17, WA4GLS 16, W4RUW 11, WN4FOY 9, WB4DYJ 8.

GREAT LAKES DIVISION

KENTUCKY – SCM, Ted H. Huddle, W4CID – Endorsements: K4UNW as OO; WA4VZZ as ORS.

Net	QNI	QTC	Net	QNI	QTC
KRN	235	31	KYN	296	159
MKPN	698	48	KNTN	162	95
KPN	1221	160	KPON	72	36

Owensboro AREC has recently been active with a walk-a-thon, speedboat tests and a lost plane. Active were W4EWM, W4EWL, W4OYI, WB4ANL, WB4TNZ, W4LUB, WA4MXD, K4UDZ, WB4IZX, WA4IQE, K4IZ, W4MMY, WB4ZSA and WA1KAT/4. WB4BVT has a new nine-element 6-meter beam. W4GSH, W4MOP, K4KZH and WA4VUF have been working Oscar 6 from Louisville while W4VOA is looking for schedules via Oscar from Ashland. New Owensboro Club officers are K4UDZ, pres.; W4FWL, vice-pres.; WB4ZSA, secy.-treas. WA4GLG is a new one in Ashland. Louisville area EC K4ISI conducted a very successful seminar on emergency communications. Attending were reps from ARRL, AREC, MARS, CAP, Red Cross and Civil Defense. A good idea for other areas! Traffic: WA4IQS 337, WB4ZMK 145, W4BAZ 121, K4UNW 111, WB4WCM 83, WB4EOR 75, W4CID 62, WB4ZML 62, WN4EXO 45, WB4AUN 44, WA4VZZ 41, WN4ECB 33, WB4VBG 33, WA4GHQ 28, WA4AVV 23, W4IQZ 22, WA4FAE 20, W4CDA 12, K4AVX 10, WB4YQS 9, W4BTA 8, K4DZM 8, W4OYI 7, W4YOK 6, WB4NHO 4, WB4ZSA 3.

MICHIGAN – SCM, Ivory J. Olinghouse, W8ZBT – Asst. SCM: A.L. Baker, W8TZZ. RMs: W8JYA, W8WVL, W8RTN, K8KMQ, W8GLC, WB8IMI. PAMs: W8GVS, W8NDI. VHF PAMs: K8AEM, WA8WVV.

Net	Freq.	Time/Days	QNI	QTC	Sess.	Mgr.
QMN	3663	2400 Dy	1193	387	93	W8JYA
WSBN	3945	0000 Dy	693	89	30	W8GVS
BR/MEN	3930	2330 Dy	741	92	31	W8NDI
OPEN	3920	2230 Dy	527	43	34	WB8IEH

This book is a *must* for the fm buff as well as the operator just breaking into fm and repeaters. Everything is covered! Fourteen chapters include: mobile installation, transmitters, receivers and antennas for mobile and base, and fm test equipment. Special sections treat alignment and troubleshooting gear as well as repeater technical problems and cures. Club organization, repeater location planning, and operating under the new regulations are all covered. If you operate fm or are just becoming interested, you cannot afford to be without this book.

Available at your dealer's or postpaid from ARRL. **$3.00** in U.S.A. **$3.50** elsewhere.

The **AMERICAN RADIO RELAY LEAGUE, INC.**
NEWINGTON, CONN., U.S.A. 06111

GLETN	3932	0230 Dy	747	124	31	WB8CHE
PON	3955	1600 Dy	1040	346	31	K8LNE
PON/CW	3645	2400 M/S	130	20	26	VE3DPO
Mi-6M	50.7	0000 M/S	190	27	25	WA8VXE
Mi NOV	3720	2230 Dy	128	65	30	WB8JAD

SCM W8ZRT is home from the hospital. New asst. SCM W8IZZ is off to an early start with this month's report. 2-Meter Catfish Net as reported by WA8WVV had 4 sessions with 44 QNI. K8ZWR reports the 6-meter Weather net had 5 sessions with 53 QNI. W8CVO and WA8WVV report the S.W. Mi. 2-Meter Net had 5 sessions, 87 QNI and 2 QTC. K8AEM reports the Wolverine 6-Meter SSBN had 5 sessions with 32 QNI. WB8APN has a new HR-212. WA8ENW and W4VOL/8 are new on 2 meters. K8HFW moved to Allegan. WA8LMF now on RTTY and SSTV, 80 through 2, and looking for contacts. WN8OWN has an HW-101. W8TBP back home after visiting in Las Vegas. W4VOL/8 passed the Extra Class exam. Sept. PON Amateur of the Month is K8IAG, Ingham County Cancer Hike-A-Thon had communications furnished by CMARC with K8ACO in charge. He was aided by WB8LOA, WB8ILF, K8ZLP, WA8QCW, W8CRP and WB8QPE using 2 fm. Lansing area hams hosted the second meeting of the Michigan Repeater Council. Grayling hams have started a local net on 146.94. Oak Park ARC having their 5th annual Swap-N-Shop on Jan. 13 from 9 A.M. to 4 P.M. at Frost Jr. HS. WB8IMI is acting mgr. of the 0200Z session of QMN. New secy. for the GLETN is WB8MJI. K8TNZ is the new Delta County Club pres. Motor City RC elected W8TZZ, pres.; re-elected WB8IFD, vice-pres.; WA8YPY, secy.; W8FMO, treas. 1974 officers for Milford ARC are WB8HEO, pres.; W8VPD, vice-pres.; WA8TMP, secy. Michigan State Univ. ARC officers are WB8BRL, pres.; WA8ZAV, chief op.; WB8AEV, secy.-treas. SEMARA 1974 board of dir. are WA8RQI, pres.; WA8SIX, secy.; W8HID, treas.; WB8DMC, W8KAZ, WA8BHW, sgt.-at-arms. Election results for the QMN are W8JYA, general mgr.; WA8PIM, secy.-treas. WA8IMI is in the hospital. Silent Keys are K8SKZ, W8YWT, K8BMU, W8IXU and W8GXH. Traffic: (Oct.) WB8ITT 320, WA8WZJ 285, K8KMQ 220, K8DYI 178, WB8JAD 151, WB8MJI 104, W8UBX 95, K8LNE 95, WB8EBG 84, WB8UFS 81, K3SJL/8 80, W8IZZ 71, W8ZBT 67, W8GCL 65, W8NOH 64, WA8PIM 64, W8OW 59, W8EOI 51, K8JED 50, WA8LXY 50, WB8NCD 50, W8IYA 47, WA8ENW 44, WB8BYB/8 41, K8IJS 40, W8NDI 35, WB8IMI 33, W8GVS 32, W8MO 32, W8WVL 32, WA8OII 30, K8GXV 28, K8TAK 28, WB8EEU 27, WB8NII 24, WB8DJS 23, WA8FXR 18, W8FU 17, K8WRJ 17, WB8DKQ 16, K8SWW 15, WA8CUP 14, W8IUC 14, WA8HKL 12, WB8GKB 10, W8VXM 10, K8AEM 9, W8BEZ 9, W8DCN 9, WB8MFG 9, K8JHA 8, K8TIY 8, WA8WVV 8, WB8APN 7, K8PYN 7, K8ACO 6, W8ACW 6, W8FZL 6, K8MJK 6, WB8MKU 6, W4VOL/8 6, WR8AAA 5, WB8EKA 5, WN8ONW 5, W8YIQ 5, WB8HIB 4, W8OKW 4, WB8EUN 3, WB8KWI 3, WB8ANR 2, W8TBP 2, WN8ONX 1. (Sept.) WB8MJI 72, W4VOL/8 6, W8SH 6, W8BEZ 3, WB8AFV 2, W8TBP 2.

OHIO – SCM, William E. Clausen, W8IMI – Asst. SCM: Kenneth L. Simpson, WA8ETX. SEC: WA8COA. RM: WA8WAK. PAMs: K8UBK, WA8YLW. VHF PAM: WA8ADU.

Net	*QNI*	*QTC*	*Sess.*	*Freq.*	*Time(Z)*	*Mgr.*
OSSBN	2554	861	54	3972.5	1530/2100/2345	K8UBK
BN				3577	2345/0300	WA8WAK
O6MtrN	475	81	31	50.16	0200	WA8ADU
OSN	344	103	31	3577	2310	WB8KKI
ONN	191	43	31	3940	2330	WB8MZZ
BNRTTY	155	36	31	3605	2300	K8NCV

New appointees: WB8APD, EC-Lake Co.; WA8SSI, EC-Fairfield, Perry, Hocking Co.; K8MLO, OBS; WB8EMW, OVS; WA8GUG, OPS. Renewals: WA8UPI, ORS/OPS/OO; W8AQ, WB8JGW, WA8YLW, OPSs; WA8KPN, OVS/OBS; WB8JD, ORS; K8MLO, ORS/OPS/OVS. EC K8CKY reports that 12 Highland and Ross County hams provided 2-meter fm communications for the Cancer Society Bikathon. K8MLO won the Ohio prize in the Wash. State QSO Party. WB8OWM has a new General Class ticket. K8IKO spoke to the Columbus ARA on ship-to-shore radio. WA8YUH was on the prime Skylab recovery ship, operated from atop Mt. Whitney, passed his Extra Class exam, and is headed for duty in the Antarctic. SEC WA8COA and I visited the Intercity Radio Club at Mansfield. W8QCU reports the following PON schedules: National, FS at 0300Z on 7043 and 0330Z on 3597; Ohio, Sun. at 1300Z on 3935 and Tue. at 2300Z on 3952.5. OO W8DPW says he had a Marconi Spark Coil just like the one on the new six cent Progress in Electronics stamp. OO W8BU reports that his brother, who was licensed in 1915, has a new WB8OYZ ticket. Apricot Net furnished mobile communications for Cleveland's Columbus Day Parade. The Buckeye Belles now have 97 members and are trying for 100. K8ONV is pres. W8RZO is the new pres. of the Critical Bias RC.

Meet the 2 meter SSTV Gang.

From left Bill Arrasmith, W6TEZ, Judge William Ritzi, W6ONC, Judge Pearce Young, WB6HWY
Byron Paul, WA6RNG (Executive Producer of the New Dick Van Dyke Show)

that's right... 2 meter SSTV

Shown above are four hams who have had so much fun working SSTV on 2 meters and 220 that we asked them if they'd make a few comments about it for one of our ads.

We went up to Los Angeles (where they all operate) and chatted with them a bit. They all agreed that one of the biggest enjoyments of working 2 meter SSTV is the new dimension it adds to 2 meters, far more interesting and creative than operating radio alone.

They noticed a steadily increasing SSTV activity on 2 meters, observing that there must be 50 or more operators working SSTV on 2 meters or 220 in LA alone.

One observed that working DX doesn't offer the challenge it used to, since you can buy all the power you want, ... "So where's the challenge. SSTV is the new challenge!"

They work a schedule once a week or so, and have little problem in raising SSTV contacts. "In fact, everytime we get on the air," Judge Ritzi noted, "we have break-ins from a lot of hams wanting to know more about SSTV."

And a bit of information that hadn't occurred to us; their families really get interested in SSTV. They all enjoy it, and often work together preparing the art work and pictures for the production of their 'TV' shows.

We were very grateful for their comments, and, for the time they gave to us. Thank you gentlemen.

We can't guarantee that you'll appear in one of our ads when you begin working SSTV on 2 meters, but we're pretty sure we can guarantee you as much enjoyment as our "2 meter SSTV Gang" from Los Angeles.

For details, and complete literature on Robot's SSTV equipment just write to us.

See you at SAROC.

MODEL 70A MONITOR **$295**
MODEL 80A CAMERA **$295**
MODEL 61 VIEWFINDER **$239**

ROBOT

All Robot equipment carries a one-year warranty. Four easy ways to purchase: cash, C.O.D., Master Charge, BankAmericard

ROBOT RESEARCH INC. 7591 Convoy Court, San Diego, CA 92111 Phone 714 279-9430

The 1974 Dayton Hamvention will be Fri. through Sun., April 26-28. K8OGO spoke to the Greater Cincinnati ARA on UHF TV for the ham. New officers of the Canton ARC are K8MFO, pres.; WB8NUA, vice-pres.; W8KEL, secy.-treas. Central Ohio AREC provided communications for a road rally and participated in a Red Cross hospital exercise. Don't forget the annual Simulated Emergency Test Jan. 26/27. This is the winter version of Field Day, under the direction of your local AREC Emergency Coordinators and NTS. Call your EC today and offer to participate, then contact your section net manager and do the same. Need more info? contact SEC WA8COA. Traffic: WA8MCR 565, W8PMJ 255, WA8YLW 228, W8CUT 210, W8QCU 196, W8ENI 192, WB8JGW 164, WB8KZD 161, WB8KKI 160, WA8WAK 153, WB8FKZ 144, W8MGA 109, WB8KXV 102, W8SUS 94, K8UBK 85, W8GVX 84, WB8M2Z 78, W8JD 73, WB8JKA 70, K8MLO 65, WA8VWH 62, WB8AYC 60, WA8DWL 58, W8MOK 53, WB8IBZ 52, WA8YIB 49, WA8ETX 48, WB8QPC 43, WA8MAZ 40, W8OE 40, WB8MFD 33, WB8NRC 33, WA8ADU 31, W8CHT 31, WB8LNM 31, WA8ZNC 31, WA8SED 26, WA8TYF 26, K8BYR 23, W8LZE 23, W8PBS 20, W8QZK 20, W8WEG 20, WB8HWE 16, K8PBE 16, WB8LOL 14, WA8JSW 13, WA8ETW 12, WA8MHO 12, W8ZYE 12, WB8AJC 11, W8BHL 11, WA8SSI 11, WA8FSX 10, WB8GGR 9, WB8KWD 9, K8CKY 7, K8GRO 7, W8NAL 7, W8DCX 6, WA8UPI 6, W8ETU 5, WB8FIC 5, W8FGD 4, W8KOI 4, WA8MIH 4, WB8ITW 3, K8RXD 3.

HUDSON DIVISION

EASTERN NEW YORK – SCM, Graham G. Berry, K2SJN – Asst. SCM/PAM: Kenneth Kroth, WB2VJB. SEC: W2URP. RMs: WA2FBI, WB2IXW and K2DN for RTTY. Nets: See previous columns for days and times of cw, phone and RTTY nets. Soon after you read these words, the '74 Simulated Emergency Test is due. For the record, active ECs in the counties are W2PKY Schenectady; WA2EAH Albany; WA2ROT Rensselaer; WB2LPQ Dutchess; WA2JWL in Westchester; W2HO Orange; WA2WGS Ulster and K2YJL in Greene. K2CXO in Rockland. Get in touch with your county EC to participate, or with W2URP. Suggest Putnam check in with Westchester, Columbia with Albany in absence of own EC. All appointees – it's renewal time; stickers will be mailed at start of '74 to active stations; some others facing cancellation unless heard from soon. Regret to list WB2WWD and W2MD/4 as Silent Keys in Oct. Many ENY section members attended dinner honoring 40 years' Public Service of W2RUF in Oct. New pres. of Overlook Mt. RC in Kingston W2EWV. Look for W2ASI as /4 on 20 meters – permanent move South this month. And don't look for W2URP on 75 – wind took down tree holding one end of dipole. Plans already afoot for 1974 Dinner of ECs and staffs for March – watch for details. W2SZ at RPI has new 20-, 15-, 10-meter beams up and building rest of "farm." Schenectady ARA held its annual auction with W2AZH and WA2AHC "on the gavel"; member WB2BDB in charge of classes at Niskayuna HS Adult Education sessions. Westchester ARA heard member W2RP on 5-week tour of TF, G, PAØ, OE, I and HB, with pix. At Communications Club of New Rochelle, member WA2VYK covered trip to Russia. Harmonic Hills RL saw repeat showing of "Wide World" at open meeting with many non-ham guests. Albany ARA heard member W2GN on his Oscar VI activities – 300 contacts +, 46 States and 22 countries confirmed and some mobile! New club in section is Sand Creek Jr. HS, Albany, with WB2MRX as sponsor. Welcome aboard! BSA Center at Durland, Rye again sponsoring classes for newcomers. Many clubs already involved in planning National Convention for July '74. WA2CCF in NNJ already taking reservations. Be there – it's going to be a big one! NYS Phone and Emergency Net reports 9 months totals 11,751 check-ins, 1,785 pieces formal traffic handled, 302 hours of operation – average of 1,300 + QNI each month for an FB record. Traffic: (Oct.) WA2PJL 122, WB2EOO 48, WB2KDE 43, W2URP 37, W2SZ 22, WB2IXW 19, K2SJN 16, WB2SON 16, WN3UHH/2 15, WB2FQT 8, WA2EAH 3, WA2FBI 2. (Sept.) WB2IXW 24.

NEW YORK CITY-LONG ISLAND – SCM, Fred J. Brunjes, K2DGI – Asst. SCM: John Smale, WB2CHY. SEC: K2HTX. RM: WB2LZN. PAM: WA2UWA. VHF PAM: WB2RQF.

Bronx	28.64 MHz	50.35 MHz	146.88 fm
Kings	28.64 MHz	50.35 MHz	146.88 fm
Richmond			146.88 fm
New York	29.6 MHz	50.48 MHz	146.88 fm
Queens	29.6 MHz	50.20 MHz	146.88 fm
Nassau	28.72 MHz		148.68 MHz
Suffolk(West)	28.73 MHz(Hunt.)	50.46 MHz	145.59 MHz
	28.65 MHz(Smith)		147.21 MHz
Suffolk(East)			146.82 fm

TOMORROW'S RIG ...available TODAY!

The exciting all new INOUE IC-230!

TAKE A SLICE OUT OF THE FUTURE . . .

. . . and put 67+ CHANNELS* of 2-meter FM pleasure in the palms of your hands . . . with the SUPER COMPACT (2.3" x 6.1" x 9.7") IC-230.

Feature-wise . . . the IC-230 is *fully synthesized* (with the new exclusive *"Phase Lock Loop System")* . . . *all modular construction* (servicing is a snap—in and out) . . . a receiver that is *very* sensitive and selective as to what it hears (better than 0.4UV / 20db), with unique Inoue helical filters to eliminate intermod . . . plus a super E filter mosfet front end, making copy a pleasure.

* And not a crystal to buy with the exclusive *"Phase Lock Loop System".* (That's close to *$650.00 worth of xtals!*)

— GRAB HOLD OF THE IC-230 AT YOUR LOCAL DEALER TODAY —

Distributed by:

ICOM

— Dealerships Available —

ICOM WEST, INC.
Suite 232 - Bldg. II
300 - 120th Ave. N.E.
Bellevue, Wash. 98005
(206) 454-2470

ADIRONDACK RADIO SUPPLY
185 West Main Street
Amsterdam, N.Y. 12010

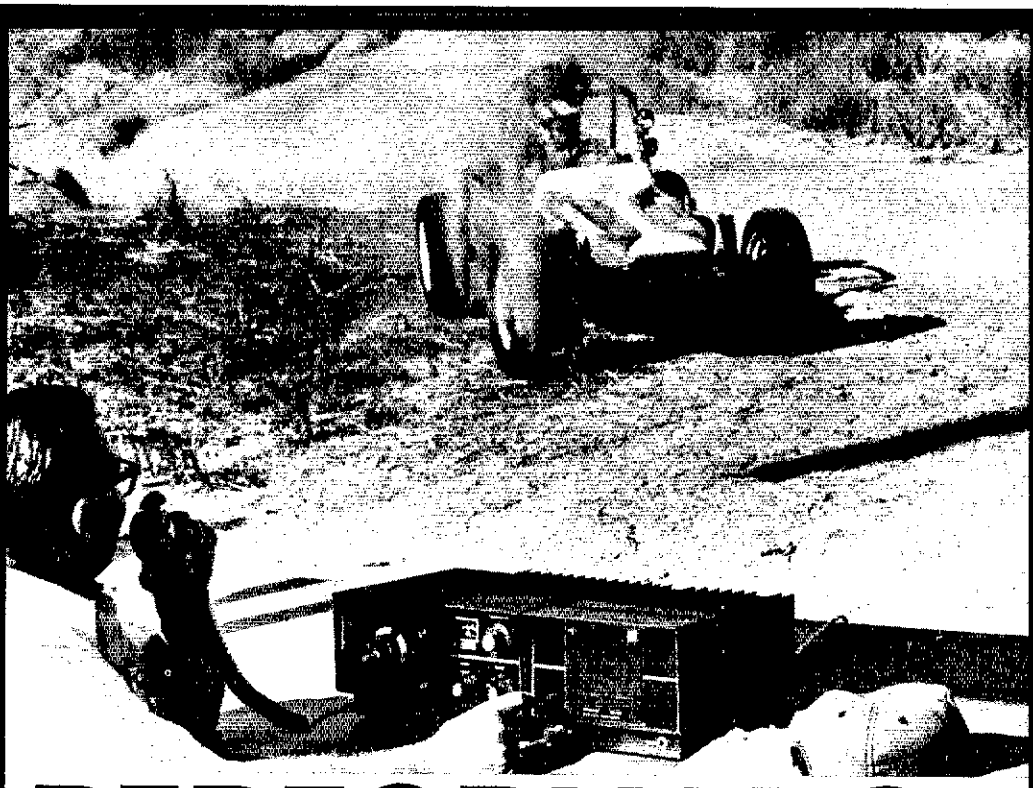
ICOM EAST
Div ACS, Inc.
Box 331
Richardson, Tex. 75080
(214) 235-0479

Note: Net times hewteen 2000 and 2100 local, Mon. This is my last report as your SCM: It wasn.t planned that way it just happened! Following my reading of a confirmation letter from ARRL of a new term as SCM for NLI, I was notified of a transfer to Tampa, Fla. and our Heathkit retail store newly opened, as Service Mgr. and to be there in 5 days. Needless to say it was rather short notice! I have enjoyed being your SCM and the work and associations it entailed (terrible pay!); I'm sure my successor will do a better job for you. Be advised this news is happening Nov. 15, 1973 and not Jan. 1974, due to a two month report lag. New club officers: Hall of Science RC, WA2HGG, pres.; WN2ZMA, vice-pres.; Frank Fucci, treas.; WN2SOM, secy. WB2OYV has a new TH6DX "bird roost" that he is trying out these days. WB2WFJ is sporting an IC2F on the 2-meter fm band these days. WA2KXE has acquired an HQ-110A/VHF which he is giving workout on the vhf bands. WB2UFG is operating /5 from Louisiana Tech. for the winter semester. WB2TRM is /5 at University of Houston. WA2PLI is in process of getting his antennas in shape after completing his HW-101. W2PF celebrated his 70th birthday at the Southwest Division Convention. Congratulations! WA2RRG has new receiving equipment for the ATV channels asks, "where is everyone?" K2KGB reports the 11DXA operated DX Contest from WA2BVU's QTH for an all out effort at high score. W2BCB is up and around again after his heart attack, and doing a lot of listening on the bands these days! WB2BYY reports a successful Goblin Patrol in the Smithtown AREC/RACES Halloween exercise. K2RPZ reports helping some new hams with their code and license efforts. 73 to all, and listen for me on the 40- and 20-meter bands shortly from W4-Land! Traffic: WB2LZN 193, W2EC 185, WB2OYV 139, WB2PYM 105, WB2CHY 65, WB2WFJ 26, WA2KXE 15, K2FV 10, K2JFE 10, W2DBQ 8, WB2UFG/5 7, W2PF 4, WA2PLI 4, WB2FIG 2, WA2LJS 2, WA2RGG 2, WA2JZX 2.

NORTHERN NEW JERSEY SCM, John M. Crovelli, WA2UOO – SEC: K2KDQ. RM: W2ZFP. PAMs: K2KDQ and WA2FVH.

Net	*kHzTime(PM)/Days*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJN	3695 7:00 Dy	31	416	211	W2ZLP
NJN	3695 10:00 Dy	31	234	94	W2ZEP
NJSN	3730 8:15 Dy	22	130	70	WB2RKK
NJPN	3950 6:00 M-S	31	568	126	WA2FVH
NJPON	3930 6:00 Su	4	79	30	WB2FJE

New appointments: WA2DNY as OO, Classes III and IV; WA2NRD as ORS; WA2BSU and WB2VFT as OPSs; WA2KXX as OVS. New officers for Tri-County ARC are WA2SGL, pres.; WA2KWP, vice-pres.; WB2OYT, treas.; WB2KWJ, secy. Elected trustees were W2IHA, W2IXU, WB2CFB, WA2MTR, W2OJ. The Kearny ARC elected W2IXD, pres.; WB2AJE, vice-pres.; WB2GYO, treas.; WA2OPY, secy. An excellent article and photographic essay featuring the Englewood ARA Field Day operation appeared in the Nov. issue of "Legion Magazine." WA2SHT passed the Extra; WA2DVE the Advanced; WA2OVE, WB2GWB, WN2ELF and WN2LFC their General Class exams. Congratulations! WB2AEH was elected Communications Manager for Rutgers ARC station WA2NPP as well as receiving his A-1 Operator Award. W2AMS operated as OK1KKH/W2AMS during recent European trip. Hudson Vice-Dir. W2IHA recently retired from Western Electric after 30 years service. K2AGZ received the DXCC 300 endorsement. W2DYS debugging his homebrew frequency counter. WB2CMO has gone QRP with a new Argonaut. W2WHB is using 1 watt on 40 and 20. W2PIX has a new 40-meter rotary dipole. WN2RPX is a new Novice. WA2UOO visited ARRq. while vacationing in New England. WA2MYZ and WB2RKK making good use of their new SB-220 linears. The Kearny ARC Net meets Tue. at 9 P.M. on 145.5. W2IXD, WA2OPY, WA2SLR and W2SWE sharing NCS duties. WA2SRQ trying a 40-meter vertical dipole. WB2NOM operating from American Univ. station WA3URV. W2GO spent the summer months operating from Ortley Beach. WA2TFH attending Case Univ. (W8EDU). K2FK did well in the Sept. FMT. WA2UJI reminds us all to switch to safety. Inform your family of first aid procedures for electrical shock victims. WB2HJW has a 203BA ready to go up. WB2TUL temporarily QRT in Cranbury. WA2QJU hopes to have his HW-101 in operating condition soon. WA2DIW active on NJN and NJSN. WB2IFC operated 2 fm while in South Carolina. WN2HSG was portable in Maine in Sept. WB2HSD has completed a new keyer. K2EQP and WA2ATO soon hope to be more active. Support your section and local nets during the Holiday Season. Belated Season's Greetings to all. Traffic: (Oct.) WB2RKK 510, WA2EPI 343, WA2SHT 180, W2ZEP 85, WA2UOOO 76, WB2AEH 70, WB2RJJ/2 54, WA2BSU 42, K2OQJ 42, K2ZFI 42, W2CU 41, W2CVW 37, WA2DIW 35, WB2NOM 28, WA2CCF 27, WA2EXX 26, WA2FVH 22, WA2CFT 19, WA2NPP 18, WA2OPY 16, WA2OVE 16, WA2CWS 9, W2WOJ 8, WA2CAK 7, WA2NRD 5, W2ABL 4,



PERFORMANCE
WHEN IT COUNTS

SWAN ELECTRONICS Equipment: Major choice of the **Baja Amateur Radio Racing Fellowship** operators who manned the communications network for the 1973 Baja 1000 Off-Road Race from Ensenada to La Paz, B.C., Mexico. More than 50% of the operators used SWAN gear. Among other units, a SWAN SS-200 completely solid-state 5-band transceiver and two FM-2XA 2-meter transceivers were in action at the finish line.

Officials and participants agreed that communications, for the gruelling 875 mile course, was the best in the history of off-road racing. Here are a few of their comments:

Valor Smith (Pit-Crew Chief for the "Baja Bug" class winner) — "We've had nine entries in Mexican races, and this is the finest communications we've ever had."

Ing. Alfredo Arenas (Executive Director of the Baja Sports Committee) — "I think the radio communications were very good. We're very grateful to all the people involved."

Driver Carl Adams (Winner of the "Mini-Pickup" class) — "We got correct answers every time we asked . . . and we went out to win . . . Without communications, it'd be a big guess."

Marilynn Greaves (Official Scorer and Time Keeper) — "Overall communications was exceptionally great . . . In spite of all the dust at the finish line, there was no problem with the SWAN FM-2XA . . . Communications between the radio room and the finish line worked out beautifully."

WHEREVER THE ACTION IS IN AMATEUR RADIO, YOU'LL FIND SWAN ELECTRONICS

SWAN MOBILE TRANSCEIVERS

designed for 12V DC power source

SS-200 (5-Band, 200 watts P.E.P.) **$779**
SS-15 (5-Band, 15 watts P.E.P.) **$579**
FM-2XA (2-meter, 10 watts P.E.P.) **$259**
PS-20 (SS-200 AC Power Supply) **$139**
PS-10 (SS-15 AC Power Supply) **$89**
FM-2XA Snap-Pack (AC Power Supply) **$39.95**

DEALERS THROUGHOUT THE WORLD
or order direct from

SWAN ELECTRONICS
A subsidiary of Pubic Corporation

Home Office: 305 Airport Road • Oceanside, CA 92054
Telephone: (714) 757-7525

THE BEST PRACTICAL DEVELOPMENTS IN AMATEUR RADIO

WA2QJU 4, W2JDH 2, WB2CMO 1, WA2FUO 1, WB2FWW 1, WA2QNT 6. (Sept.) WN2HSG 9.

MIDWEST DIVISION

IOWA – SCM, Al Culbert, KØYVU – SEC: KØCLI. It was pleasant to see so many Iowans at the Division Convention in Lincoln, the best part of all was watching WAØUVH fumble through all his pockets for that winning ticket (his XYLs at that) for the GT-550. WAØEFN reports 5 new Novices in the Clinton area. Noticed several Iowa calls with some nice totals in the Field Day results. WØHJV reports now having an HR-6 mobile. After umpteen years, the Iowa version of the old AM-SSB battle has been laid to rest with the amalgamation of the two net organizations into one net having two sections with separate NCS stations. WAØYJW is hard at work on his pilot's license, having soloed and getting ready for the private exam.

Nets	*QNI*	*QTC*
75 meter (noon)	1158	88
75 meter (eve)	1055	23
TLCN (cw)	145	34

Traffic: KØAZJ 170, WAØAUX 148, WØMOQ 49, WAØYJW 49, WØLCX 29, WØBW 7, WØWSV 7. KØYVU 5.

KANSAS – SCM, Robert M. Summers, KØBXF – SEC: KØJMF. RM: KØMRL PAMs: WØGCJ, WBØBCL. VHF PAM: WAØTRO. KØJMF reports 549 AREC members as of the Oct. report. We could use a couple of ECs in the East Central part of the state. Anyone interested contact either KØBXF or KØJMF. Oct. AREC activity – 14 zones reporting 557 QNI, 46 QTC in 72 net reports. Reports of the Clay Center Tornado activity have been received and forwarded to Hq. All who participated are to be commended for a job well done. Several amateurs in the Kansas City area will also be recommended for a PSA for the efforts put forth during flooding situations. Oct. net reports: KWN QNI 403, QTC 121 in 31 sessions. KSBN QNI 867, QTC 105 in 27 sessions. KPN QNI 206, QTC 18 in 17 sessions and QKS QNI 568, QTC 313 in 62 sessions. Manhattan Radio Club now meeting alternate Tue. at 8 P.M. The Arkansas City ARC meet the first Thur. Several repeater stations have received their new calls: Plainville WRØACI; Winfield WRØABZ. A lot of Kans. amateurs attended the Midwest Division Convention. Stories were told of renewed friends but probably the oldest renewed was between WØCHJ and WØFOB. Ole' pre WW2 ham buddies. Traffic: WØOYH 272, WBØHBM 159, KØMRI 144, WØHI 131, WØHR 88, WBØCZR 84, WBØCUY 74, WØCHJ 72, WØGCJ 55, WØPB 47, KØBXF 45, WØMA 40, WØQQQ 21, KØGII 16, WAØOWH 10, KØUVH 9, WAØKDP 4, WAØSRQ 4, WAØWJX 3, WØRBO 2.

MISSOURI – SCM, Larry S. Phillips, KØVVH – Asst. SCM: Clifford E. Chamney, KØBIX. SEC: KØBIX. New appointments: KØONK as RM; WBØELJ, WBØHDS, KØKUD as ECs. Appointments endorsed: WAØITU as OVS, WØUCK as OPS.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MOSSB	3963	0000 Dy	31	1115	125	KØPCK
MOPON	3963	2300 M-S	27	646	77	WAØTAA
H6N	7280	1805 M-F	24	348	22	WØGQR
MON	3585	0100 Dy	31	223	131	WØBV
ICN	7273	1830 MWF	14	181	11	WAØRAD
MON2	3585	0345 Dy	31	146	66	WØBV
PHD	50.45	0230 T	4	75	8	WAØKUH
MOAREC	3963	2345 M	5	64	1	KØBIX
IC2AN	146.28/88	0330 T	4	28	0	WAØRVT
WEN	28.6	0230 M	4	22	0	WA5KBH/Ø

Congratulations to KØONK as the new RM for Missouri Slow Speed Net. This net will meet daily at 2200Z (4 P.M.) on 3715 kHz. All are invited to attend. Our AREC report comes from 22 ECs with 128 members participating in 15 drills. Don't forget the SET. Anyone needing a Missouri state AREC emergency plan contact KØBIX. Congrats to WØFOE on new rig. New Novices are WNØLKG, WNØLLV, WNØLMK and WNØLMJ. All are products of the Trenton Junior College Novice class. Novice classes in the Kansas City area are being taught by WAØPFS. Contact KØVVH for Novice classes in the St. Charles area. Traffic: KØONK 1268. WØBV 153, KØBIX 102, WAØVBG 70, WØOUD 56, WAØFMD 54, KØVVH 52, KØPCK 38, WØEPI 33, WAØWQA 24, WAØFKD 22, WBØFND 21, WBØCKI 19, KØJPR 12, WØRTW 12, WBØFKY 7, WØGBJ 6, WAØKUH 6, WAØQWW 3, WAØEMX 2, WBØKCD 2.

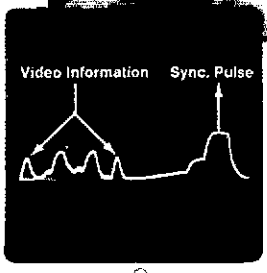
NEBRASKA – SCM, V.A. Cashon, KØOAL – Asst. SCM: Velma Sayer, WAØGHZ. SEC: KØODF. New appointments: WØLCE and WØAFG as OPSs. Endorsements: WBØDTH, WØDJO, WØGEQ, WAØHQQ, WAØJKN, WØMW as OPSs. WØDJO as OVS.

Net	*Freq.*	*GMT/Days*	*QNI*	*QTC*	*Mgr.*
NEB I&II	3700	0000/0245 Dy	32	2	WAØGHZ
NSN 1	3982	0030 Dy	934	54	WAØLOY

2nd generation slo-scan system

Venus Slo-Scan TV monitor

Actual unretouched photo taken from the Venus SS2 using a Polaroid Color Pack II Camera mounted on the Venus P-1 Camera Adapter



CAMERA ADAPTER Mounting Bezel

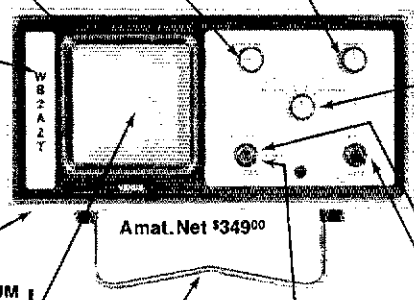
BRIGHTNESS Automatic CRT Burn Protection

CONTRAST Independent Contrast Control

SOURCE SELECT Rec., Tape, Camera Off & Instant On

PERSONALIZED IDENTIFICATION PLATE Your call sign

CABINET Zinc Die Cast Front with Extruded Alum Sides 10¾"Wx13"D x8½"Ht.



Amat. Net $349.00

OPTIMUM PICTURE 3¼" x 3¼" for POLAROID LAND reproduction

TILT STAND Collapsible Bail

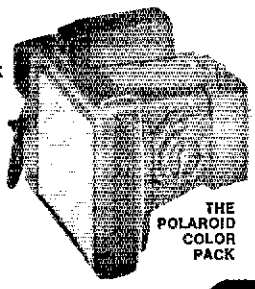
RE-SCAN Retrace Vertical

VIDEO/VOICE SELECT

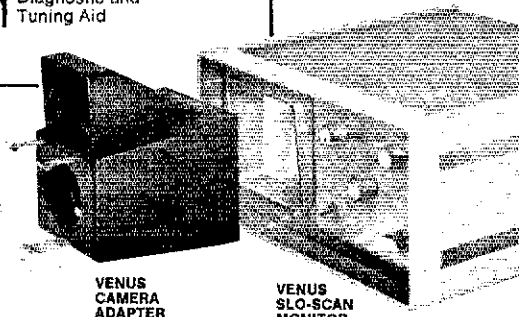
ACCU SYNC© Diagnostic and Tuning Aid

CAMERA ADAPTER P-1 enables you to take photographs "right-off-the-air" and accepts a Polaroid Color Pack or a Polaroid Square Shooter.

- **Allows photographing in a lit room**
- **Simple-snap mounting for quick and accurate picture taking**
- **Simultaneous hood viewing of picture being taken by camera**
- **Instant QSL via SSTV**
- **Amat. Net $34.50**

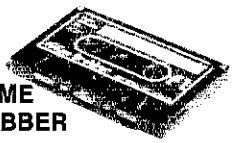


THE POLAROID COLOR PACK



VENUS CAMERA ADAPTER P-1

VENUS SLO-SCAN MONITOR



FRAME GRABBER

Venus' Cassette F and T Series are continuous loop cassettes that allow you to easily pre-record and send SSTV information

F1 *Single frame cassette* **Amat. Net $3.75**

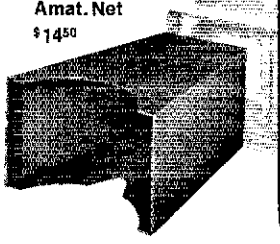
TG *Grey Scale Generator* **Amat. Net $6.50**

TC *Checkerboard* **Amat. Net $6.50**

V1 VIEWING HOOD

Uniquely designed for wide angle viewing by more than one operator.

Amat. Net $14.50

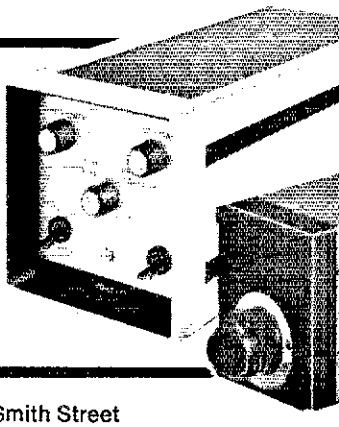


Coming in December

CAMERA AND SCAN CONVERTER CC-1

Projects your VIDEO real time on any conventional home TV while simultaneously scan converting to SSTV

- **Full, half and quarter frame**
- **Positive, negative reversal**
- **RF output for viewing on conventional home TV set**



ORDER DIRECT FROM FACTORY

Venus Scientific Inc.

The company that put high voltage on the moon, now brings you expanding amateur radio technology.

399 Smith Street
Farmingdale, N.Y. 11735
Phone 516-293-4100
TWX 510-224-6492

Neb. 160	1995	0130 Dy	25	14	WAØUBJ
NMN	3982	1230 Dy	1436	33	WAØJUF
WNN	3950	1300 M-S	469	10	WØNIK
AREC	3982	1330 Su	170	4	WØIRZ
CHN	3980	1730 Dy	992	15	WAØGHZ
SHN	3950	1830 M-S	199	9	WØDJO
NAN	3980	2000 M-F	473	14	WAØAUX
NSN II	3982	2330 Dy	1093	22	WAØLOY

The Lincoln RC sponsored very successful ARRL Midwest Division Convention. Congratulations on a job well done. Ak-Sar-Ben RC annual Hamfest/Steak-fry was enjoyable in spite of inclement weather. Ak-Sar-Ben RC members participated in Multiple Sclerosis Bike-a-Thon. WBØHGC has dropped "N" from his call. Beginning in Jan. 1974 WØFIR/WAØLLC will be new ARRL Midwest Division Dir. WØFZO and WAØKUH are in the running for Vice-Dir. at the time this report was prepared. WØMW received 25 year pin as ARRL member. Nebr. Chapter QCWA organized at the Convention. Officers are WØGEQ, pres.; WØDMQ, vice-pres.; WØFOB, secy.; WØVYX, treas. Nebr. QCWA Net has been formed and meets on 3980 at 1500 GMT Sun. with WØFOB as NCS. North Platte RC members participated in a simulated emergency. Speedy recovery wishes to WØHTA's XYL. Welcome back to WØLOD. Traffic: (Oct.) WØMW 46, WAØQEX 35, WAØCBJ 34, WØHOP 31, WØSGA 23, WØFOB 17, WAØPCC 14, WAØDXY 12, WAØIXD 12, WØGEQ 11, WAØGHZ 10, KØOAL 9, WØVYX 9, KØHNT 6, WAØHOQ 6, WAØYGZ 6, KØDGW 5, WBØFRG 5, WØDMY 4, KØFJT 4, WBØGAK 4, KØMUF 4, WØGKK 3, WAØZQC 3, WØIRZ 2, WAØLOY 2, WØNIK 2, KØPTK 2, WØATU 1, WAØEEI 1, WØFOW 1, WAØJKN 1, WØRJA 1, KØSDG 1.(Sept.) WAØUGC 2.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, John McNassor, W1GVT — SEC: W1HHR. RM: K1EIR. PAM: K1YGS. VHF PAM: K1SXF.

Net	*Freq.*	*Time/Days*	*Sess.*	*QNI*	*QTC*
CN	3640	1900 Dy 2200	62	450	365
CPN	3965	1800 M-S 1000 Su	31	573	265
VHF 2	145.98	2200 M-S	21	61	23
VHF 6	50.6	2100 M-S	23	83	4

High QNI: CN — W1BYW, W1CTI and W1KV. CPN — WA1LIR, W1LUH, W1NQO, WA1OPB and K1SXF. SEC W1HHR looking for heavy workload during the SFT Jan. 26 and 27. EC's should lead the activity in their area. Be sure to send in your report. Director W1QV again active on the nets after visit to KH6-Land, also attended the Pacific Division ARRL Convention. Be sure club members get the chance to read the Oct. Affiliated Club Bulletin. Meeting Rules of Order are well covered. 1RN Newsletter extends thanks to members by retiring Mgr. and Editor W1EFW and requests continued support for W1QYY new 1RN mgr; hope Newsletter continues also! With sincere regret we add W1FDO to the list of Silent Keys. Candlewood ARA Newsletter continues with much information for all members. Murphy Marauders Newsletter bigger and better! CN and CPN members will miss W1MPW very much during his stay in the hospital. Congratulations to: WA1FCM and WA1PHJ for Oct. BPL; WA1NRV and WA1KZE honored as the N.E. Hams of the Year; WA1KID, WA1LNQ and WA1NES for Extra Class; WA1NNC for Advanced Class; WN1PKS General Class; and to WA1JCN and WA1FCM for new Jr. Op.! Was the Conn. section report missing in your Dec. QST? Blame the Postal Service and request reprint from W1GVT please. Traffic: (Oct.) WA1PHJ 331, WA1FCM 319, WA1LIR 229. W1EJI 190, WA1GFH 165, WA1PHF 140, K1SXF 86, W1CTI 83, W1AW 72, W1KV 70, WA1NLD 60, K1YGS 48, KX1MUM 45, WA1QZH 43, W1GVT 40, K1EWP 25, WB2CHO/1 21, W1EFW 17, WA1IKN 11, WA1OPB 11, W1QV 10, W1KAM 7, WA1JCN 6, W1BDI 4, W1CUH 4. (Sept.) WA1LIR 335, WA1PHJ 261, W1EJI 230, WA1FCM 176, WA1GFH 172, W1MPW 120, WA1PHF 90, KX1MUM 81, W1KV 65, WA1QZH 62, WA1RZC 59, K1YGS 49, W1CTI 48, W1AW 42, W1GVT 39, WA1HYN 37, WA1NYU 34, WA1NLD 31, K1SXF 29, WA1MBK 21, W1QV 17, K1EPW 14, WA1OUI 12, WA1OPB 9, W1CUH 7, WA1IKN 7, WA1KID 6, W1BDI 5, WB2CHO 1. (Aug.) WA1FCM 107. W1HHR 1.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, W1ALP — SEC W1AOG received reports from ECs: W1s BAB, UJF; K1s NFW, ZUP, UAQ, CCW; WA1DXL. W1ALP in Halifax and on the air, W1BIO should be on soon. W1PEX, WN1RFD made BPL. WA1SEY has his Advanced Class license. WØPD is ex-W1HA in Colo. W2HHN is ex-W1LLY and on 80 cw from Winthrop, NY. W5UAG is ex-K1WQG in Tex. WA1AZR won a beam at Hyannis. New YLs: WN1SLL, WN1SOD, WA1SMM in Stow. T9 Club met at W1TJP's. New officers of N.U. RC, W1KBN: K1YCN, pres.; WA1PDM,

For FT-101, FT-101B, FTdx401, FTdx560, FTdx570

TRY A NEW WORLD OF PERFECTION.

If you haven't yet experienced the pleasure of direct frequency readout, you've got a big surprise coming.

As fast as you turn the dial, the readout displays actual transmit and receive frequencies. The numbers are bright, easy-to-read. The accuracy, pin-point. There's no room for confusion, no chance of operating out of band or on an unauthorized frequency. It, simply, brings a new order of pleasure and accuracy to amateur radio; analagous to the experience of going from monaural to stereo.

One significant, new development has made such a display practical and reliable for amateur use: The advent of TTL integrated circuits. Spectronics' DD-1 utilizes more than 20 of these advanced devices, in addition to some 70 signal and power diodes. Because of these digital logic devices the performance and reliability of this new unit is nothing short of amazing.

In addition to indicating operating frequencies, the DD-1 can be used to check VFO drift and linearity. The DD-1 utilizes a crystal time base for long term stability and accuracy to ± 100 Hz.

The best surprise about the DD-1, perhaps, is the price: It's just $169.95 completely assembled, calibrated and test run. Operation requires only a 117V AC power source in addition to a signal input from the VFO of the transceiver. No internal connections or modifications to the transceiver are required.

The Spectronics' DD-1 Direct Frequency Readout — a new experience in amateur radio.

SPECTRONICS INC.
Dept. Q, 1491 E. 28th, Signal Hill, Ca. 90806 (213) 426-2593

Please enter my order for the DD-1.

Enclose check or money order.
California residents add sales tax.

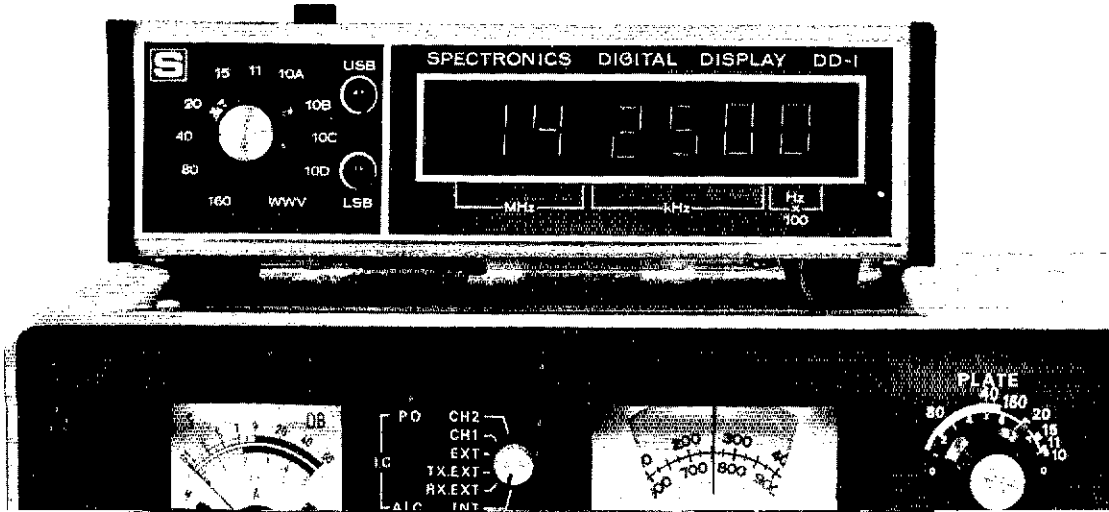
Type of transceiver _____

Name _____

Address _____

City _____ State _____ Zip _____

Master Charge and BankAmericard accepted.



vice-pres.; WN1RCA, treas.; WA1KBG, secy. Framingham RC Net on Wed. at 9 P.M. on 28.6 MHz. WØJVA visited W1NF. WA1MYK will be on at W1PUO. WN1RIM is mgr. of Eastern Area Daytime Net on 7115 kHz at 1:30 P.M. WA1MXV back to school. WA1FNM active in the Northeast Traffic Net. K1OUO in Ft. Pierce, Fla. WA1DJC/3 misses New England. W1GXT new call of K4GGL. WN1RIW passed General. W1LE vacation in Fla. W1EIH worked 4K1A, a Russian group at So. Pole and ZD3Z on 40 with 45 watts. WA1IFE worked W8s, W9s, W5 on 6. We hear that the fellows did quite a nice job during the very bad Chelsea fire, make sure everyone who helped out gets reported and given credit for his help. WA1JOJ is pres. of Harvard Wireless Club. W1AF says they have lots of equipment but not much manpower. W1DFS feeling better. K1HRV in Walpole. WA1OLV new EC for Norwood. Endorsements: K1EPL as OO, OBS, EC; W1PJ FC; W1GXT OVS; W1SMO, WA1KZE, WA1MXV ORSs; W1AQV, K1UMP, W1KGU OBSs; WA1KZE, WA1NRV, WA1MXV OPSs. Framingham RC new meeting place is Keefe Vocational School corner of Winter & Fountain Sts., Framingham on the 2nd Thur. of month. WA1s MSK, MFY gave a nice demonstration on LORAN System, they visited ARRL. W1OD is a Silent Key. New Generals: WA1s QDY, PYF. WA4HHP now living up this way. W1EQK won a prize at Hyannis. W1ECK, W1LM, W1ULJ on 2 fm. WA1s OEX, OEY gave a demonstration of facsimile machine at Massasoit RC. Capeway RC met at W1RGH's. W1UOH back to work after a trip to hospital. Chelmsford ARA had a trip to Lowell Tech Inst. Nuclear Center. W1CT spoke at the Middlesex ARC on Radio Propagation. W1AQV will be more active on the air. K9IMR/1 on air in Hudson. W1QYY is new mgr. of 1RN and I think we should all thank W1EFW for a fine job over the past years.

Net	*Freq.*	*Time/Days*	*QNI*	*QTC*	*Mgr.*
NEEPN	3945	0830 Su	91	9	K1EPL
EM2MN	145.8	2000 M-F	144	91	W1ABC
EMN	3660	1900/ 2200 Dy	213	395	WA1MSK

DL2AA/W1 gave a talk & slides on his Turk and Caicos DXpedition at the Chelmsford ARA. WA1MSK has a new IC-230 2-meter fm rig. Traffic: W1PEX 670, WN1RFD 337, WA1MSK 248, W1QYY 208, W1CE 137, WA1ROG 108, WA1OWQ 96, WA1PGY 83, WA1IGL 77, WA1MXV 46, W1EMG 45, W1UX 33, WA1FNM 29, WA1EYY 26, WA1IFE 19, W1AOG 11, K1EPL 10, WA1SJR 3, K9IMR/1 3, W1GXT 1, K1LCQ 1.

MAINE – SCM, Peter E. Sterling, K1TEV – SEC: K1CLF. PAM: K1GUP. RM: W1BJG. The Hosstraders Net again has started to run from 1600 local time to 1700 every Sun. on 3940. W1VLU announced that the Maine Post Office Net will run every Sun. at 1830 local time on 3940. K1ROE finally has his 100-ft. tower up and working all kind of DX, even on 160 meters. K1ZIL is back from trip to Italy; word is he will be moving to Fla. permanently. K1TEV, K1ROE, K1GAX, K1MTJ attended the ARRL convention in Hyannis; also W1CTR and XYL , a good time was had by all. K1ROE and K1TEV were accepted into Murphy's Marauders Contest Club. The Northeast Area Barnyard Net reports 27 sessions, 805 check-ins for Oct. New hams in Maine are WA1SML, WN1SMT, WN1SMD, WA1SMY. Congratulations, fellows. The 28/88 repeater is back in operation. W1BJG having trouble with his gear. W1BJG is looking for NCSs for the PTN. For more information please get in touch with him. WA1FQW reports WA1RNG is a new licensee from Milbridge. Your SCM attended feb EC meeting at Hyannis. K1OYB is in DL-Land on business. Traffic: W1GU 53, K1TEV 5, WA1NMW 2.

NEW HAMPSHIRE – SCM, Robert C. Mitchell, W1SWX – SEC: K1RSC. RM: W1UBG. Welcome to new hams WN1SLV, WA1SMU, WA1SMV, WN1SND, WA1SOO, WA1SOM and WA1SNF. The NHVT Net report by W1UBG shows 74 traffic, 80 check-ins and 25 sessions. K1YSD is on 2 meters and is building a tower. WA1SCF/K4NEH has a new NCL 2000 amplifier plus new antennas which he hopes will stay up in this northern weather. WA1JSD and family have been vacationing in Canada. W1CLS alias K4IKW is back in Amherst. Welcome back as OO ex-K1NBN, now W6MZW/1 awaiting new call. WA1JSD is endorsed for another year as OBS. Dave airs bulletins regular on 6 meters. W1UBG says that he, K1PQV, K1BCS and WA1MXT had a fine time at W1QYY's 1RN picnic. Remember save oil this winter by keeping your filaments on and operating often. Traffic: (Oct.) K1YMH 120, W1URG 50, K1PQV 23, W1MHX 8, K1YSD 5, WA1JSD 1, W1SWX 1. (Sept.) K1YSD 6.

RHODE ISLAND – SCM, John E. Johnson, K1AAV – RISN Sept. report, sessions 15, QNI 45, traffic 11. New appointments: WA1POI, ORS and RM. Endorsements: K1QFD ORS. K1QFD using her new HW-7 had a thirty minute QSO with G3GRL with two and a half watts input. WA1QOG has been working cw on 80

and 40 meters and building an RTTY demodulator for club station W1OP. WA1RFT operating a two watt 40-meter rig from the Univ. of RI and operates an NCX-3 on ssb when he returns home on week ends. WA1POJ our new RM would appreciate all interested in cw to contact him. It would be great to see an active CW Net added to the Rhode Island section in addition to the RISN. Traffic: (Sept.) WA1POJ 195, WA1RFT 20, WA1OOG 7, K1QFD 4. (Aug.) K1QFD 7.

VERMONT – SCM, James H. Viele, W1BRG – SEC: W1VSA.

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
VTSB	3909	2300 M-S 1230 Su	571	130	WA1IGL
VTPO	3909	2300 Su			K1BQB
Carrier	3935	1400 M-S	495	10	W2DSK
Green Mt.	3932	2200 M-S	342	23	W1JLZ
Vt. Phone	3932	1330 Su			W1KKM

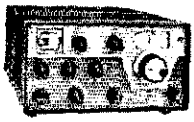
Welcome new amateurs WN1SLJ, WA1SMG and WN1SMP. New W1KOO repeater committee are W1VSA, W1DOO, W1OHU, K1BKK, W1KVK, W1ERO and K1PEB. Burlington Amateur Radio Club has 28 students in an amateur beginner's class. 450 MHz buffs listen for new 449.4 MHz down-link on W1KOO from 4200 foot elevation. WA1RUM, stationed at Plattsburg AFB leaving shortly for overseas. Traffic: WA2DGZ/1 8.

WESTERN MASSACHUSETTS – SCM, Percy C. Noble, W1BVR – SEC: WA1DNB. CW RM: W1DVW. 75 Meter PAM: WA1ITL. VHF/UHF PAM: W1KZS. WMEN held 4 sessions with QNI 63, traffic 4. WMN held 31 sessions with QNI 159, traffic 117. Top five in attendance: W1BVR, W1DVW, WA1LNF, WA1OUZ, WA1FBE. WMPN held 22 sessions with QNI 296, traffic 32. NCS: WA1ITL, WA1MJE, W1OJA, K1PKZ, K1RGQ. WMRA (AREC) held 23 sesions with QNI 135, traffic 21. NCS: WA1ORT, WA1DNB, WA1PLS, W1CSF, WA1IOB, WA1MYK. WA1LNF and WA1FBE did well on the Sept. FMT. Congratulations to WA1FBE on receiving a Guggenheim Foundation Fellowship (see Nov. QST, page 52). A goodly group from NOBARC (under the direction of K1JVM) provided back-up communication for the N. Adams Police during the Fall Festival Parade. K1VHO is a very active OO. WA1MJE is now OBS. WA1LNF made PSHR with 44 points. CMARA reports club again is providing code classes for the novice group. HCRA reports new members W1DVW, WN1RWV, WN1SBH, WA1BNB, W1POM, K1KBQ, WN1QHR. New officers for MARC: K1DKB, pres.; W1IBZ, vice-pres.; WA1MWF, 2nd vice-pres.; W1GUI, secy.-treas. NOBARC new officers: W1KSD, pres.; WA1RFA, vice-pres.-secy.; WA1KJI, treas.; WA1LUX, editor; WA1QDQ, co-ed.; WB2BXP, tech vice-pres. Sun. AREC Net is continuing at 2:00 P.M. (through K1FFK). Mt. Tom ARA reports N.E. Dir. W1QV presented QST Cover Plaque Award to K1ZJH. Thirteen members of the club provided 2-meter communication under the direction of W1HOD and K1LRB during the Holyoke Centennial Parade. Voice of Lincoln reports the Western Mass. AREC Net now meets at 1715 daily. During the last 11 sessions there was QNI 76, traffic 12. The SCM wishes to thank those clubs sending copies of their monthly bulletins. Traffic: (Oct.) WA1LNF 134, W1TM 101, W1BVR 91, W1DVW 82, W1KK 31, WA1LPJ 19, WA1OUZ 15, WA1FBE 10, WA1MJE 9, W1YK 8, W1ZPB 5, WA1QON 4, W1STR 1. (Sept.) WN1QHR 2.

NORTHWESTERN DIVISION

ALASKA – SCM, Roy Davie, KL7CUK – KL7CFX now back on the air. KL7GCH has a new vertical on 75. KL7HFM is busy organizing EC groups throughout Alaska. KL7HRK and KL7HMU busy managing the AKW and AKN nets. Please support these two cw nets we need participation to move more traffic. The Kodiak Snipers Net is now The Alaska Snipers Net. KL7DG reports lots of activity on his long distance racing. This year as last the amateurs of Alaska will support the 1000 mile dog race from Anchorage to Nome. KL7HNH reports his ssb rig inoperative. Glad to know KL7HMU is back on with his ssb rig. A new visitor to Alaska is WA2HSP stationed on Adak for a tour of duty, he intends to be active on our traffic nets. Welcome. The CD contest both phone and cw was plagued with bad conditions. KL7BZO has a new 20-meter beam. KL7BJW keeping everyone in line with his friendly OC notices. Traffic: (Oct.) KL7HFM 39, KL7BJW 19, KL7GCH 10 KL7JDO 10, KL7HMU 4. (Sept.) KL7BDC 2.

MONTANA – SCM, Harry A. Roylance, W7RZY – Asst. SCM Bertha A. Roylance, K7CHA. SEC: WA7IZR. PAM: WA7IZR. It is with regret that I report W7TYN has resigned from the post of SEC Joe has been my right arm for many years both when he was SCM and as SEC. I have appointed WA7IZR as SEC. Owen will be



There's a DRAKE DEALER *near you...*

Drake Dealers are dependable and friendly.
For a good deal, see your nearby Drake Dealer:

ALABAMA

Birmingham (35233)
Ack Radio Supply
3101 Fourth Avenue, S.
James W. Clary Co.
1713 Second Avenue, S.

ARIZONA

Phoenix
Henshaw Electronics
1644 E. McDowell (85006)

Tempe (84281)
Circuit Specialists
1110 N. Scottsdale Road

ARKANSAS

DeWitt (72042)
Mocry Electronics Co.
12th & Jefferson, Box 506

Wynne (72396)
Custom Builders Electronics
513 Forrest Street

CALIFORNIA

Burbank (91505)
Electronic City, Inc.
4001 W. Burbank Blvd.

Burlingame (94010)
Ham Radio Outlet
999 Howard Avenue

Fresno (93710)
Al Roach's Dymonds
46 E. Shaw

Los Angeles (90064)
Henry Radio
11240 Olympic Blvd.

Oakland (94603)
M-Tron
2811 Telegraph Avenue

Pasadena (91106)
Dow Sound City
1759 E. Colorado Blvd.

Sacramento (95825)
Selectronics
1512 Fulton Avenue

San Diego (92101)
Western Radio & TV Supply
1415 India Street, Box 1728
Barry Radio, Inc. (92111)
8199 Clairemont Mesa Blvd.

San Jose (95128)
Quement Electronics
1000 S. Bascom Avenue

Torrance (90505)
L. A. Electronix
23044 Crenshaw Blvd.

COLORADO

Denver
Burstein Applebee
800 Lincoln (80203)
CW Electronic Systems
1401 Blake St. (80202)

CONNECTICUT

Hartford (06114)
Harry Electronics
500 Ledyard Street

DELAWARE

Wilmington (19801)
Willard S. Wilson, Inc.
403-405 Delaware Avenue

D.C. *(See Maryland & Virginia)*

FLORIDA

Ellenton (33532)
Slep Electronics Company
2412 Highway 301 North

Miami (33137)
Amateur Radio Center, Inc.
2805 N.E. Second Avenue

Orlando (32803)
Amateur Electronic Supply
621 Commonwealth

GEORGIA

Atlanta (30309)
Ack Radio Supply Co.
554 Dearing Road
Specialty Distributing Co. Inc.
763 Juniper St. N. E. (30308)

HAWAII

Honolulu
Honolulu Electronics
819 Keeaumoku St. (96803)

IDAHO

Boise (83702)
Morton Electronics
2113 North 26th Street

ILLINOIS

Lincoln (62656)
AAA Sales
555 Woodlawn Road

Palos Heights (60463)
Green Mill Radio Supply
12111 South 68 Court

Peoria
Klaus Radio & Electric Co.
8400 N. Pioneer Pky (61614)

River Forest (60305)
Trigger Electronics
7361 North Avenue

INDIANA

Angola (46703)
Lakeland Radio Supply
525 S. West Street

Evansville (47710)
Castrup's Radio Supplies
1014 W. Franklin Street

Indianapolis
Graham Electronic Supply
133 S. Pennsylvania (46204)
Van Sickle Radio Supply
4131 N. Keystone Av. (46205)

South Bend (46624)
Radio Distributing Co.
1212 High Street

Terre Haute (47802)
Hoosier Electronics
Box 403, RR #25

IOWA

Council Bluffs (51501)
Hobby Industry
1530 Avenue G.

Davenport (52801)
Klaus Radio & Electric Co.
322 E. Fourth Street

Des Moines (50310)
Hunter Sales Inc.
3621 Beaver Avenue

KANSAS

Kansas City (66101)
Henshaw Electronics
1049 Minnesota Ave.

Overland Park (66204)
Associated Radio
6012 Conser

Wichita (67211)
Amateur Radio Equipment
1203 E. Douglas

KENTUCKY

Louisville (40209)
P & P Electronics
719 Manning Road

Morehead (40351)
Ferguson Electronics
137 E. First Street

LOUISIANA

New Orleans (70130)
Radio Parts, Inc.
1331 Prytania Street

MAINE

Lewiston (04240)
Down East Ham Shack
57 Main Street

MARYLAND

Baltimore (21211)
Amateur Radio Center
1117-19 W. 36th Street

Wheaton (20902)
EISCO
11305 Elkin Street

MASSACHUSETTS

Reading (01867)
Graham Radio Company
506 Main Street

MICHIGAN

Ann Arbor (48104)
Purchase Radio & Supply
321 E. Hoover

Detroit
Radio Supply & Engineering
85 Selden Av. (48201)
Rene Radio Co.
1314 Broadway (48226)

Flint (48507)
Shand Electronics Inc.
2401 S. Dort Highway

Grand Rapids (49503)
Radio Parts, Inc.
542 Division Ave.

Marquette (49855)
Northwest Radio
1010 West Washington

Muskegon (49441)
Electronic Distributors, Inc.
1960 Peck Street

MINNESOTA

Duluth (55802)
Northwest Radio
123 E. First Street

Minneapolis (55401)
Electronic Center, Inc.
127-3rd Avenue N.

MISSOURI

Butler (64730)
Henry Radio
211 North Main Street

Kansas City
Burstein Applebee Co.
3199 Mercier Street (64111)
Henshaw Electronics
7822 Wornall (64114)

St. Louis (63132)
Ham Radio Center
8342 Olive Blvd.

MONTANA

Great Falls (59401)
Electric City Radio Supply
2315 - 10th Avenue S.

NEW HAMPSHIRE

Concord (03301)
Evans Radio Inc.
Route 3A, Bow Jct.

NEW JERSEY

Camden (08102)
General Radio Supply Co.
600 Penn St. at Bridge Plaza

Clifton (07011)
Wattie Electric Co., Inc.
384 Lakeview Avenue

Eatontown (07724)
Atkinson & Smith Inc.
17 Lewis Street

NEW MEXICO

Albuquerque (87108)
Bowden Associates
4316 Mesa Grande St., S.E.

NEW YORK

Amsterdam (12010)
Adirondack Radio Supply
185-191 W. Main Street

Elmira (14901)
Chemung Electronics
601 E. Church Street

Farmingdale (11735)
Arrow Electronics Inc.
900 Broad Hollow Road
Harrison Radio
20 Smith Street

Lindenhurst (11704)
Delmar Electronics
101 Eads Street

New York
Barry Electronics
512 Broadway (10012)
Grand Central Radio Inc.
124 E. 44th St. at
Lexington Av. (10017)
Harvey Radio Co.
2 West 45th St. (10036)

Rochester (14614)
Rochester Radio Supply
140 W. Main Street

Syosset (11791)
Lafayette Radio Corp.
111 Jericho Turnpike

Williamsville (14221)
Hirsch Sales Company
219 California Drive

NORTH CAROLINA

Asheville (28801)
Frack Radio Supply
38 Baltimore Ave.

OHIO

Akron (44327)
Olson Electronics
260 South Forge St.

Cincinnati
Queen City Electronics
1583 McMakin Av. (45231)
United Radio Inc.
Summit & Reinhold Dr. (45237)

Cleveland (44112)
Amateur Electronic Supply
17929 Euclid Avenue

Columbus (43215)
Universal Service
114 N. Third Street

Dayton (45404)
Srepco Electronics
314 Leo Street

Toledo (43624)
Warren Radio Co.
1002 Adams Street

Youngstown (44503)
Armies Electronics
322 W. Federal Street

OKLAHOMA

Oklahoma City (73122)
Hood's Amateur Radio Equipment
2512 N. Donald

Tulsa (74115)
Radio, Inc.
1000 S. Main Street

OREGON

Albany (97321)
Oregon Ham Sales
409 W. First Avenue

Portland (97205)
Portland Radio Supply Co.
1234 S. W. Stark

PENNSYLVANIA

Drexel Hill (19026)
Kase Electronics
2502 Township Line Road

Pittsburgh (15222)
Tydings Company
933 Liberty Avenue

Trevose (19047)
Trevose Electronics
4033 Brownsville Road

Willow Grove (19090)
Ham Buerger, Inc.
66 N. York Road

RHODE ISLAND

Warwick (02888)
W. H. Edwards Co.
55 Electronics Drive

SOUTH CAROLINA

Columbia (29202)
Dixie Radio Supply
1900 Barnwell Street

SOUTH DAKOTA

Watertown (57201)
Burghardt Amateur Center
124 First Ave. N. W.

TENNESSEE

Knoxville (37901)
Bondurant Brothers
906 Sevier Avenue

Nashville (37203)
Electra Distributing Co.
1914 W. End Avenue

TEXAS

Corpus Christi (78404)
Douglas Electronics
1116 S. Staples

Dallas (75204)
Electronic Center, Inc.
2929 N. Haskell

Fort Worth (76110)
Ed Juge Electronics
3850 South Freeway

Houston (77002)
Madison Electronics Supply
1508 McKinney

Tyler (75701)
Cole Electronic Supply
335 South Bonner

UTAH

Salt Lake City (84115)
Manwill Supply Co.
2511 S. State Street

VIRGINIA

Annandale (22003)
Arcade Electronics
7048 Columbia Pike

Richmond (23225)
Electronic Equipment Co.
6540 Midlothian Turnpike

Roanoke (24016)
Radio Communications Co.
311 Shenandoah Avenue N. W.

Sandston (23150)
A & F Electronics
Rt. #1 La France Rd.

WASHINGTON

Seattle (98108)
Amateur Radio Supply Co.
6213 - 13th Avenue South

Spokane (99206)
HCJ Electronics
E. 8214 Sprague

Tacoma (98402)
C & G Electronics
2502 Jefferson Avenue

WISCONSIN

Madison (53713)
Satterfield Electronics
1900 S. Park

Milwaukee (53216)
Amateur Electronic Supply
4828 W. Fond du Lac Ave.

PUERTO RICO

Hato Rey (00918)
Jose Arturo Fernandez
208 Eleanor Roosevelt St.

CANADA

Alberta

Sherwood Park
Omnitek Electronics
227 Cottonwood

British Columbia

Vancouver 9
Rendel Paret Electronics Ltd.
2048 W. 4th Avenue

Manitoba

Winnipeg
Cam Bard Supply Ltd.
397 William Avenue

Ontario

Toronto 590
Ray Hunter & Assoc.
7 Westrose Ave.

Downsview
VE Amateur Radio Sales
3768 Bathurst Street

London
C. M. Peterson Co. Ltd.
575 Dundas Street E.

Quebec

Montreal 101
Payette Radio Ltd.
730 St. Jacques

R. L. DRAKE COMPANY — DRAKE®

540 Richard St., Miamisburg, Ohio 45342
Phone: (513) 866-2421 • Telex: 288-017

checking with you ECs in the near future and your cooperation with him will help strengthen our AREC. WA7UPI has moved to Cheyenne, Wyo. WA7HAG wintering in Las Vegas, WA7OBH is getting on from Hardin and participating in the OO program. WA7PZO living in Walkerville and can hit 4 of the Mont. 2-meter repeaters. Yes, we have a legal repeater, Butte is licensed as WR7ABY. K7MMZ has moved to Big Timber. Will be nice to have Big Timber on the air again. Mont. Traffic Net had 956 check-ins, 40 pieces of formal traffic and 22 sessions. IMN Net had 99 check-ins with 31 pieces of traffic and 23 sessions. K7IMZ has been reappointed as EC for Missoula. We still have a lot of room for league appointments. If you are interested please drop me a line. Traffic: WA7KMP 12, WA7IZR 5, WA7KHM 3.

OREGON – SCM, Dale T. Justice, K7WWR – SEC: W7HLF. RM: K7GGQ. PAM: K7RQZ. Section nets: WA7RWM reports for the AREC Net for Oct.: sessions 31, check-ins 430, traffic 4, contacts 50. K7OUF reports the OSN had sessions 31, traffic 65, check-ins 116. WA7NWV reports BSN had sessions 62, traffic 116, contacts 206, check-ins 1073. WA7EUQ reports the Portland Area AREC net had sessions 41 (am and fm), traffic 6, check-ins 159. WN7WWY is a new Novice in Salem. The Salem repeater is now WR7ABR. W7LT is using inverted vees on 20 and 15 with good results. Traffic: K7NTS 361, K7QEG 206, K7OUF 131, K7IFG 112, WA7NWV 71, W7ZB 41, W7DAN 40, K7WWR 25, WA7MOK 18, WA7MHP 13, WA7KRH 10, W7LT 8, WA7EUQ 6, W7MLJ 6.

WASHINGTON – SCM, Mary E. Lewis, W7QGP – SEC: W7IEU. RM: W7JWJ. PAMs: W7PWP, K7OUV. VHF PAMs: K7BBO, K7LRD.

Net	*Freq.*	*Time(Z)*	*QNI*	*QTC*	*Sess.*	*Mgr.*
WSN	3590	0145	305	123	31	K7OZA
NTN	3970	1830	1830	105	31	W7PWP
WARTS	3970	0200	1496	135	31	W7QGP
NSN	3700	0200	276	124	31	WA7OCV
NWSSB	3945	0230	820	94	31	K7OUV

Do you have a "ham" friend who would like to be in AREC but is not a member of ARRL or an ARC; he doesn't have to, but it would be advantageous. Contact your local EC or W7IEU. W7JWJ and W7QGP attended the Clallam County ARC annual dinner Oct. 19 in Sequim, a very good turn-out plus a very good dinner. It was very nice of you fellows to give the gals a night out for dinner and later dancing at the Elks. Mt. Baker ARC furnished communications for motorcycle endurance Oct. 28 and Pumpkin Patrol communication for Wa. State Patrol Oct. 31. HAMS ARC furnished communications for Marysville City Police Dept. Oct. 31. WN7VMS is new NCS on NSN. W7GRS working full time and taking 27 credit hours Everett Community College. W7DPW and MYL had a new jr. op. Oct. 17, report all well. K7EFB has 42 prefecture with 5 more left for WAJA Japan. K7BBO has been working K7HSJ Bend, Ore. on both 2 and 220 MHz. Condolences to W7UF on the passing of his wife. Also to WA7EKH and wife on the loss of their son and family in a tragic auto accident. Did you try the Frequency Measuring Test? It is from this list renewals for OO are checked and new OOs appointed. Traffic: W7PI 238, WA7OCV 156, W7DPW 115, K7OZA 97, WA7BDD 80, K7CTP 72, W7APS 69, K7OXL 56, W7BQ 36, W7IEU 34, WA7RCK 30, W7GYF 26, W7PWP 24, W7AXT 12, W7AIB 6, WA7GVB 4, K7VNI 3.

PACIFIC DIVISION

EAST BAY – SCM, Charles Breeding, K6UWR – SEC: WB6RPK. It is my sad duty to report K6DOQ has become a Silent Key. All those in Alameda County should have received an inquiry from RACES. The RACES program in the county is off and running. It is a great opportunity for all. It was my pleasure to attend the Mt. Diablo Club's Oct. meeting. It was good to meet so many. From all indications the Club's auction was a success. The Diablo Club's Novice classes are proceeding well, at a new location, College Park High School, Tue. 7 to 10 P.M. W6ZF is transmitting bulletins and Pacific Area propagation reports on the 1st and 3rd Mon. at 8 P.M. PST on 3540 kHz, at 22 wpm. The SARO held its Oct. meeting in Berkeley with 48 present. A fine talk was given by K6RI on the San Francisco FCC office. WA6BOB reports a new tower and tri-band beam are standing proudly. Our thanks to the Santa Cruz group for a fine Division Convention and arranging for such nice weather. Traffic: W6IPW 258, WA6BOB 6, W6ZF 3.

HAWAII – SCM, Lee R. Wical, KH6BZF – after a little over ten years, the time has come for me to bid my ALOHAs. It has been an interesting and educational experience being your SCM and one which I leave with some regret. The people I have worked with directly have been most congenial and for the most part a pleasure

to work with. My files are full of call signs and names of those who have done their part becoming involved with the field work here in the Hawaii section, which stretches to the far parts of the Western Pacific. This list too numerous to mention herein would fill this column and several months to come. Not to slight any one amateur whose call might be omitted by error, I say to all of you MAHALO. You know who you are. You got involved! To my successor: I wish him all the luck as he has undertaken the obligation of SCM and is now responsible as are you the members. I have watched you all grow. Keep growing. Those of you who have supported me in the past with your confidence, votes and deeds I say thank you. I hope that I can serve my fellow amateurs again, soon. I will again say my Alohas and Mahalos.

NEVADA – SCM, Harold P. Leary, K7ZOK – SEC: WA7BEU. W7OK is EC for Las Vegas area, contact him for participation in emergency communications. WA7MVY is set up for emergencies with big portable generator. WA7HAG is new in Las Vegas area, welcome. W7HLB reads the mail as he carries the mail, HI. W7OK is ready to send in cards for DXCC. W7JRW and W7OK chasing DX on 40 meters with good luck. K7YUJ has SB-220 and 2-meter kits almost completed. K7TDQ's auto looks porcupine with all the VHF antennas – they all work too! The Nev. Army MARS director, W7ZT is looking for new members for the Sat. 9 A.M. 7311 kHz net. Also the Nev. State RACES Net on 3996.5 kHz 7 P.M. Mon. needs members from outlying areas. Please send in your reports before 5th of month. W7WLV was involved in a serious accident. We wish him a quick recovery. Traffic: W7ILX 115, WA7TYY 8.

SACRAMENTO VALLEY – SCM, Norman A. Wilson, WA6JVD – The Pacific Division Convention in Santa Cruz was well represented by section members and K6FO came away with a Swan 700-CX. The J.J. Sabin Pioneer RC has initiated a club net each Wed. at 5 and 8 P.M. local time on 3983. K6GG is building a new solid state keyer and counter while K6KWN should have his new cw transmitter QRV by now. W6KYA put up a 40-meter sloping dipole and W6NJU has an inverted Vee dipole on 160. In the negative column, K6HTM's 80-foot tower and four-element quad were the victims of a recent wind storm. Members of the RAMS very successfully provided communications via WR6ABZ for the Sacramento County 100 mile Cyclethon sponsored by the Heart Association. WB6SBR kept the RAMS wheels rolling by conducting a wine run into the northern SJV. WB6SRA is again active from Davis with an 80-foot tower and many DX/contest oriented elements. WB6CNT/6 is attending school in Marysville with 2-meter gear operational. The North Hills RC meets on the 3rd Tue. of each month at 8 P.M. in the Fair Oaks Community Club House, 7997 Calif. Ave. Traffic: K6KWN 6, WA6OWH 4, W6CEI 2, WB6MDP 2.

SAN FRANCISCO – SCM, Tom Gallagher, W6NUT – RM: WA@SIG/6. VHF PAM: WA6PYN. W6GGR continues his design and construction projects and is now working on an RTTY demodulator. Tom continues as an OPS. WA@SIG/6 is involved in emergency planning at Treasure Island. EC W6PZE has been deer hunting. W6RQ, W6RSI and K6BI of this section were all listed in the Sept. '73 FMT scores. W6RNL reports fine traffic totals and is active in the new daytime NTS. WB4YOJ now is WB6AIN. W6BIP went on his second annual VE8 sojourn. Recent visitors at W6NUT include KV4HW, W3BQV, W1ICP and W7RM. Let's hear what you are doing for reporting in this column. Traffic: (Oct.) W6RNL 102, WA6ICQ 38, W6BIP 4. (Sept.) W6RNL 140, K6NCG 34, W6GGR 2.

SAN JOAQUIN VALLEY – SCM, Ralph Saroyan, W6JPU – Those attending the Pacific Division Convention in Santa Cruz were W6PSQ, W6WME, WB6JAX, W6IRV, K6TST, WB6IVZ, W6OTH and W6JPU. K6BUD is heard on 40 ssb. W6YKS reports a lot of new stations on 2 meters fm in the Stockton area. W6YKS participated in the Sept. VHF Contest. K6GZN (N@GAE) appointed to Area Coordinator for Northern Calif. The Delta Amateur Radio Club has some test equipment which can be used on a loan basis at their club meetings. The simplex frequency in the Stockton area is 146.52 MHz. WB6VRJ, while in Colo. worked through the Kingman, Ariz. repeater and passed some traffic to his QTH. WB6VRJ is on cw and reports in on NCN/2 net. W6OHT back on the low bands. WA6SHO also attended the Pacific Div. Convention. W6IRV and XYL, both retired are traveling around the country. W6IRV is on 2 meters fm. WB6JAX and W6JPU attended the Southwestern Div. Convention. WA6OIB and W6YEP gave a talk at the FARC aviation communications. WA6UPP has worked all Wyo. counties on phone. WA6ASU operating a 450 MHz repeater in Lodi. Traffic: (Oct.) WA6SCE 109, WA6RXI 19, WB6VRJ 12, WA6JDB 3, WA6CPP 2. (Sept.) W6YKS 5.

Everything's FB with Harry Allen ...with one of the many fine headsets from Telex.

No rig operates at its best without the addition of a Telex headphone or headset.

Rugged, comfortable Telex ceramic boom mic headsets in particular, provide the ultimate in convenience and efficiency.

Their boom microphone adjusts to any position you wish, giving you complete hands free movement and mobility.

For non-voice operated transmission, they have a special easy to reach inline push-to-talk switch.

And both Telex boom mic headsets and headphones seal out unwanted room noises and acoustics, concentrating the signal at your ear, so that you hear clearly and without distraction.

From ultra-lightweight headphones to single or dual muff and boom mic headsets, Telex provides you with proven equipment built to the highest standards we know. For information write Telex Communications, Inc., 9600 Aldrich Avenue South, Minneapolis, Minnesota 55420.

PRODUCTS OF SOUND RESEARCH

TELEX

COMMUNICATIONS INC.

CANADA: Double Diamond Electronics Ltd., Scarborough, Ontario

INTERNATIONAL: Telex Export Dept., 9600 Aldrich Ave.S., Minneapolis, Minn. 55420 U.S.A.

7308

SANTA CLARA VALLEY – SCM, James A. Hauser, WA6LFA – SEC: WA6RXB. RMs: W6BVB, W6RFF. W6RSY again made BPL. W6BVB reports NCN had 680 QNIs with 326 pieces of traffic in Sept. Activity sounds very good. W6BVB, W6YBV, W6AUC, WB6TYA, W6RFF and W6DEF made the Honor Roll for Oct. Congrats. The traffic people report ruff skip conditions on 80 but W6RFF took advantage of this and worked Africa on 75 for his 80-meter WAC. W6AUC received a Meritorious Certificate award from QCWA signed by Barry Goldwater. Traffic: (Oct.) W6RSY 654, W6BVB 126, W6YBV 125, W6NW 106, W6AUC 61, WB6TYA 59, W6RFF 51, W6DEF 45, W6QNB 36, WA6HAD 9, W6OIH 7, W6KZJ 6. (Sept.) WB6TYA 68.

ROANOKE DIVISION

NORTH CAROLINA – SCM, Chuck Brydges, W4WXZ – SEC: K4FBG. PAM: WB4JMG. VHF PAM: K4GHR. RM: WB4ETF. Our new SEC is Herb Lacey, K4FBG, 1022 Medlin Dr., Cary, NC 27511. Please forward your reports on emergency communications to Herb as well as any AREC Diary reports of amateurs in your area helping others. A reminder – Jan. is SET (Simulated Emergency Test) our annual nationwide exercise so please monitor your nets. K4FTB is new OPS and active on Daytime Fourth Regional Net (D4RN) Mon., Wed. & Fri. at 2000Z. W4WCG is mgr. of D4RN, operating on 7233 kHz. Welcome to W4NQA now in Asheville from Va. and a new OO. Formula used by WA4CBE is when school activity goes up, ham activity goes down. The annual survey of overall traffic totals shows that NC moved to 27th from 33rd place among 74 ARRL sections. Keep those traffic reports coming in and we will move up again next year. New pres. and secy. of Raleigh ARS are WA4DKZ and W4RUH. An RARS project currently going is a 2-meter PA Kit. Rockingham County amateurs had a simulated disaster drill which included W4NAP, K4OZQ, K4YFT, K4VAZ, K4YEC, W4YOY, K4BYX and K4CIW. Also, the Morehead High School RC was activated by WN4CKS, WN4DWL, WB4PKJ and W4NAP. WN4YMV now a student at Notre Dame had some nice traffic totals while back in Asheville as a Novice. W4AFM now writes the "Smoke Test" for the Buncombe Co. ARC. The Alamance ARC bulletin written by WB4VHE. The Forsyth ARC "5/9 Plus" written by WB4BGL. Sympathy goes out to the families of W4ILJ and WA4FHV now Silent Keys. Traffic: (Oct.) W4OFO 131, K4MC 113, WB4UOU 64, W4WCG 61, WB4SII/4 58, K4EZH 35, W4WXZ 30, WA4GMC 20, WB4JMG 20, K4FTB 19, W4ACY 14, K4VBG 11, WB4MKI 7, WB4HDS 6, K4TTN 4, W4EHF 3. (Sept.) WA4CBE 14, WB4CES 8.

SOUTH CAROLINA – Acting SCM: Elizabeth Y. Miller, WA4EFP – SEC: WA4ECJ. RM: K4LND. PAM: WB4KNB. Two meter activity is on the increase. Carolina Repeater Society Net with K4FRX as NCS meets Thur. at 8 P.M. utilizing the Columbia repeater. Other two meter nets are known to be active in this section but data is not available at this time. We need information on all nets, any band, known to be centered in SC. Please list days, times, frequency, and manager if any. Also need information on clubs. Include meeting times, location and officers. K4PJW, EC Pickens County, has not missed a single monthly report since his appointment last June. Thanks, Gibby. Lexington County RACES, utilizing W4EGV repeater, assisted the Public Safety Dept. by mounting a mobile patrol on Halloween throughout the suburban areas. Participants were WA4RYN, WA4CPA, W4HOO, W4EGV, W4DQY, WA4VHI, WB4VTC, K4FRX, WB4SQP, WB4SNY, WA4EAU and W4ULS. Nice work, boys. All known nets listed below. Are there any others?

SC SSBN	3915	0000Z Dy (2300Z DST)
CN	3573	0000Z/0300Z Dy
SCPN	3930	1700Z Dy (1330Z/2030Z Su)
CRSN	34/94	0100Z Th (1800 tone burst)

SSBN held 31 sessions in Oct. with 839 check-ins and 115 messages handled. Traffic: K4LND 130, W4AKC 57, WA4ECJ 30, K4NJS 7, K4FRX 2.

VIRGINIA – SCM, Robert J. Slagle, K4GR – Asst. SCM: A.E. Martin, Jr., W4THV. SEC: WA4PBG. PAM: W4HIR. RMs: WA4SMR, W4SQQ, W4SHJ, K4EBY, WA4QEL using gutter around apartment for antenna. WB4PNY and WA4EQW moved to Amherst from Tappahannock. Vienna Wireless Society Spook Patrol active this Halloween. WN4CHQ passed General. Look for WB4FDT at 11 P.M. on 3770 from San Antonio. W4YZC looking for KL7 on 80 and 10 to complete 5BWAS. W8VDA/4 and WA8DYJ/4 building a special 2-meter receiver. WB4WIS having trouble with high speed stuff on VN. Oct. not one of W4KX's busiest months. Got a good plug in Nov. RARC's "Richmond Ham" for traffic nets by Asst.

SCM, W4THV. WB4PWP helping multi-op K4KDJ. W5VZO/4 having conflicting interests with work. Still need more liaison reps on nets. K4CG upgrading antenna for fall contest season. WA4KJR moving to KP4-Land. K4KA's home brew counter is getting him competitive in FMTs. K4KNP out 15 days sick. SEC WA4PBG visited Hq and had session with W1NJM, Communications Mgr. Dir. W4KFC active in phone and cw CD Parties. Counties WA4WQG 3055, W4JUJ 2903. VFN QNI 973, QTC 61, VSN QNI 244, QTC 120. BPL: K4KDJ.

VSMN	3947 kHz	0715/1630 EST M-F
VSBN	3947 kHz	1800/2200 EST Dy
VSN	3680 kHz	1830 EST Dy
VN	3680 kHz	1900 EST Dy
VFN	3947 kHz	1930 EST Dy
VRN	3625 kHz	2000 EST Dy
VPON	3905 kHz	2215 GMT T.

Traffic: K4KDJ 257, WB4SGV 194, W4UQ 178, W4SOQ 176, WA4SMR 124, W8VDA/4 118, K4IAF 96, K4KNP 72, WB4KIT 66, K4GR 64, K4JM 63, WA4PBG 63, WA9MWF/4 47, K4EBY 42, WB4WIS 42, W4YZC 42, K4KA 40, W4LDF 27, W5VZO/4 24, K4VIG/4 23, WA4QEL/4 15, WB4PNY 13, WA4EPH 8, WB4WUZ 8, W4JUJ 7, W4MK 7, WB4RZW 7, WA4WQG 3, WB4WLK 2, W4KFC 41.

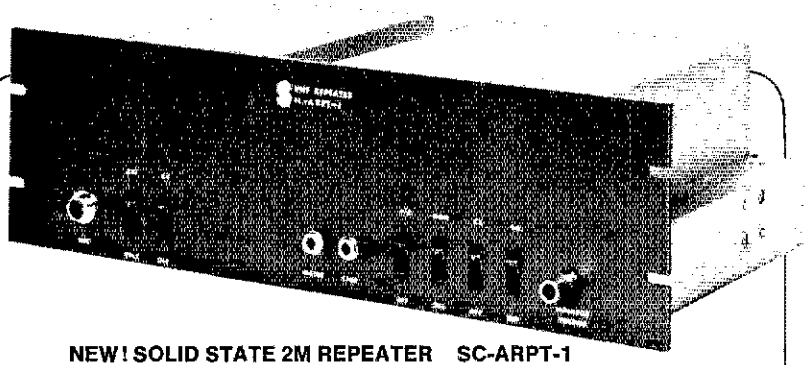
WEST VIRGINIA – SCM, Donald B. Morris, W8JM – SEC: WA8NDY. PAMs: W8DUW, W8IYD. RMs: W8HZA, WB8BBG. CW Net Mgr.: W8HZA. Phone Net Mgr.: WB8DQX. New Tri-State ARC officers: WA8HVM, pres.; WB8FER, vice-pres.; WB8FEO, secy.; WB8AQU, treas.; WA8GCR, trustee. WN7UAW working in Morgantown on the new People's Mover, passed his Advanced. WVN CW Net in 30 sessions and 92 stations, passed 36 messages. WVN Phone Net in 31 sessions and 556 stations handled 264 messages. State Radio Council met in Huntington and elected officers for '73-'74: K8WMX, pres.; W8DUW, vice-pres.; WA8OKG, secy.; K8LOU, treas. 1974 State ARRL Convention, Jackson's Mill, July 6 and 7. It is with regret, I report the passing of W8UHK of Charleston. State Radio Council received a request from a society in Japan, about the Convention at Jackson's Mill. Annual ARRL Membership letter was mailed in Nov. WA8JPC/8 active in cw net. State Radio Council meeting in Buckhannon on Feb. 16, with Buckhannon ARC as host. WA8FCM/8, the Logan County ARC came in 6th in the nation on Field Day, 1973. Remember: SET Jan. 26. Traffic: W8HZA 53, WB8DQX 50, WN8MKL 45, W8CZT 39, K8QEW 25, WA8ZNH 25, WA8LFW 16, W8EUF 14, WBJM 10, WB8MZI 10, WA8NDY 9, WA8YCD 9, W8CUL 8, WB8MAV 7, K8UUD 5, K8CFT 4, W8AEC 3, WB8BSN 3, W8IUV 2, W8GDP 2, WB8LAV 2, K8LSN 2, W8QOB 2, K8TNY 2, K8CMW 1, WB8CPH 1, WA8EKC 1, WB8HLI 1, WA8IAX 1, WB8PKS 1, WA8QEL 1, WA8RUO 1, WB8SKQ 1, W8TGF 1, K8ZDV 1, K8ZDY 2.

ROCKY MOUNTAIN DIVISION

COLORADO – SCM, Clyde O. Penney, WAØHLQ – SEC: KØFLQ. RM: KØOTH. PAMs: KØCNV, WAØWYP, WAØYGO. Newly elected officers for the Denver Radio club for 1973-'74 are KØHRZ, pres.; WBØFPH, vice-pres.; WBØHWQ, secy.; KØGJM, treas. The Denver Radio Club WØOUI activated on Sept. 26, handled considerable Health and Welfare traffic in connection with tornado in Clay Center, Kans. The Denver area AREC did an excellent job in handling communications for the School Night for Scouting campaign on Sept. 20, as well as for the March of Dimes Bike-A-Thon on Sept. 22. In this connection, the members of the Rocky Mountain Relay League are in receipt of a letter of congratulations from Colo. Senator Peter Dominick for their outstanding public service record on this, and other occassions. Congratulations to WAØSZW who passed his First Class Phone exam with Radar endorsement. Congratulations to W5TFS/Ø on receipt of his Extra Class ticket. Net traffic for Oct.: Hi-Noon QNI 1137, QTC 27, informals 221, 31 sessions, 949 minutes. Columbine QNI 976, QTC 43, informals 197, 25 sessions. Late Net traffic for Sept.: Hi-Noon QNI 708, QTC 37, informals 92, 26 sessions, 670 minutes. SSN QNI 195, QTC 97, informals 27, 559 minutes. Traffic: (Oct.) WØWYX 1060, WBØHSZ 146, KØOTH 101, WØLW 85, WØLO 76, WAØYGO 52, WØNZL 34, WAØZPP 30, WØLAE 27, KØSPR 27, WØSIN 22, WØYCD 22, W5TFS/Ø 19, WBØHBT 18, WAØYCI 16, WØDSW 14, WAØTMA 12, WØGAQ 11, KØCNV 7, WØBY 6, WØKFH 6, WAØWYP 4. (Sept.) WAØYED 4, WAØWYP 3, WAØHLQ 2.

NEW MEXICO – SCM, Edward Hart, Jr., W5RE – SEC: W5ALR. RMs: W5UH, WB5CSO. PAMs: W5DMG, W5PNY. New Mexico Road Runners Net 3940 kHz at 1800 local time daily. New Mexico traffic net meets at 1930 local time daily on 3585 kHz.

REPEATERBILITY
by Standard Communications



NEW! SOLID STATE 2M REPEATER SC-ARPT-1

Complete packaged repeater designed for today's popular 2M FM band. 12 vdc. Ideal for new system or emergency portable operation.

FEATURES:

- ☐ Adjustable C.O.R.
- ☐ Time-out timer, adjustable 0-5 min.
- ☐ Adjustable carrier delay.
- ☐ Remote Control and accessory provisions.
- ☐ 10 watt R.F. output.
- ☐ Receiver: 0.4 μv or less.
- ☐ Maximum 3 amp current drain.
- ☐ 19" Rack Panel Mounting.
- ☐ Size: 19"w x 5"h x 9"d.

$698.00 Suggested Amateur Net Price

220 MHz & 450 MHz versions available

2M FM TRANSCEIVER SRC-146A

Solid state, 2 watt, 5 channel, hand held transceiver.

UHF version available

$298.00 Suggested Amateur Net Price

Write for complete specifications.

Standard Communications Corp.

213 / 775-6284 · 639 North Marine Avenue, Wilmington, California 90744

NMRRN had 1228 QNI, handled 64 traffic. NMN had 142 QNI and handled 127 traffic. WB5IOM trying for 5BWAS and would welcome skeds. W5PNY trying to get daytime NTS going. Please get in touch with him if you are able to operate during daylight hours. Contact WB5CSO at 9109 Cordova NE Albuquerque 87112 for details on cw net. Lost hunters in the Pecos wilderness gave W5ALR and his group a workout. Traffic: K5MAT 321, WB5CSO 310, W5UH 140, WB4WXX/5 79, K5KPS 77, W5RE 11, W5BWV 3.

UTAH – SCM, John H. Sampson, Jr., W7OCX – SEC: W7GPN. RM: W7UTM. BUN meets daily at 1930 GMT on 7272 kHz, 890 check-ins, 41 messages. UCN meets daily at 0230 GMT on 3575 kHz, 238 check-ins, 98 messages. The Utah ARPSC net meets Sat. and Sun. at 1500 GMT on RACES frequency of 3987.5 kHz and welcomes additional check-ins. K7LKH has earned the UCN certificate and WØLAE the BUN certificate. W7DKB attended the ARRL Pacific Division convention. W7BE also attended that convention and came home with a Shure 444 microphone. For the first time in 42 years of amateur radio W7BE is operating mobile and really enjoying it. Another old-timer has gone modern and he found it useful in keeping in contact with his family. Rig troubles are bothering WA7MEL. K7WYT moved to Ariz. for the winter but will continue checking into our Utah nets. WA7WIB has returned after a lengthy visit with relatives in the east. WA7HCQ soon expects to be on RTTY. Both W7UTM and W7GPN are building antenna tuners. W7GPN has been heard on 80-meter cw. If you like to read about the happenings of fellow hams in this column remember they like to read about your interests, too, so please keep the information coming into your SCM. Traffic: (Oct.) W7UTM 160, WA7OAU 80, WA7WIB 58, W7OCX 39, W7DKB 32, WA7MEL 25, W7IQU 20, K7CLO 14, K1TMK/7 13, W7FYR 8, WA7HCQ 6, WA7QAR 5. (Sept.) W7DKB 36.

WYOMING – SCM, Wayne M. Moore, W7CQL – SEC: K7NQX. PAMs: W7SDA, WA7NHP, K7YUG. OBSs: K7NQX, W7SDA, WA7FHA, K7YUG. Nets: Pony Express Sun. at 0800 on 3920; YO daily at 1830 on 3597; 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. WA7OZJ has moved to South Dak. K7TAQ moved to Ore. for the winter. We have some 450 activity started again in the state WA7FHA and WA7IFJ in Laramie are on 446 and looking for others to join them. The Casper repeater is ddown being revamped to conform to the new FCC regulations. If you didn't get in the sweepstakes, you missed something. Don't miss the SET coming up. Traffic: W7SDA 208, W7TZK 81, K7VWA 28, K7ITH 4, W7SZZ 2.

SOUTHEASTERN DIVISION

ALABAMA – SCM, James A. Brashear, Jr., WB4EKJ – SEC: W4DGH. RM: W4HFU. PAM: W4RQS. K4JK asked if K4IKR turned his GMT clock back an hour when we changed from DST to CST – anyone know? Says he also heard WA4UNM call a couple of CQs on his vertical. His trip to Ariz. was FB but Ala. still No. 1! K4UMD has his TR-4 back from factory. WB4SVH, NM of AENM reports participation picking up and many new calls heard outside the 4-call area. (WN3VGV has been QNI with a strong signal from Md.). WB4SVH also planned to try the CW SS and is working week ends at radio station WUOA as DJ. Congratulations to WN4FBA on receiving his 10 wpm CP certificate; he QNI'd AENM 12 times in Oct. '73. K4HJM has been appointed to Board of Dir. of Southern Section Country Cousins. W4GQC recently gave an interesting talk to the Huntsville ARC on making PC Boards. Hopefully, the Huntsville ARC will have its new club station on the air by the time you read this – our thanks to the local Red Cross for making this possible. AENM activity also picking up. A big thanks to W4RQS for all his efforts and time devoted to the AENM as well as the extra emphasis on the training portion. W4OAU also deserves credit for his efforts on AENR; also the NCSs for their time and work. The start of a new year means the SET is not too far off – check instructions in QST, brush up on traffic handling and net procedure, join in and have fun. ECs should review and update their emergency plans, AREC rosters, etc. for the coming year. Are you ready to handle communications in your community/area in case of emergency? Congratulations to W4HFU on his being nominated by the Central Area Staff as RN5 Net Mgr. Endorsed K4AOZ as OBS. Traffic: (Oct.) WB4EKJ 214, WB4JMH 117, WB4SVH 99, WN4FZO 44, K4AOZ 40, WB4ZQF 31, WA4AJA 27, WB4KSL 10, WB4FJP 9, K4UMD 6, K4HNY 4, K4HJM 2. (Sept.) WB4ZQF 35.

GEORGIA – SCM, Ray LaRue, W4BYG – Asst. SCM/RM: John H. Boston, III, WB4RUA. SEC: K4EOQ.

Net	*Freq.*	*Time(Z)*	*QNI*	*QTC*	*Mgr.*
GSN	3595	0000/0300	578	161	WB4RUA

The 1974 Callbook is here.

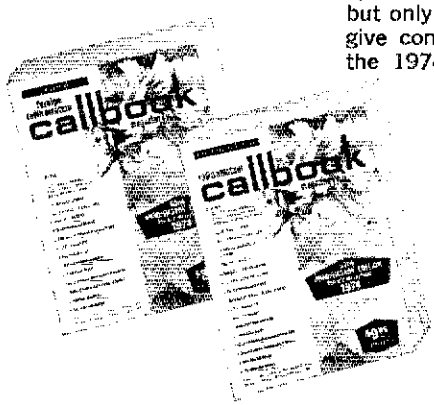
Hallelujah!

Here they are, the Brand New 1974 Callbooks. Both the U.S. and DX Callbooks have been completely updated in these exciting larger than ever editions.

Buy your 1974 Callbooks today and you will enjoy the very latest edition for 12 full months as the next new ones are a year away. Put it off and only you will be the loser.

The CALLBOOK is a vital part of every amateur radio station. Over 285,000 listings in the US CALLBOOK and approximately 200,000 in the DX edition make these two volumes an indispensable reference. Not only do the CALLBOOKS list QTH's, but they also have page after page of valuable charts, tables and maps all designed to make your operating more efficient and more fun.

To makes these volumes even more valuable special service editions are issued each 3 months, but only to owners of the 1974 CALLBOOKS, which give complete cumulative updated information for the 1974 CALLBOOKS.



US CALLBOOK (less service editions)	DX CALLBOOK (less service editions)
Just $9.95	Just $8.95
US CALLBOOK (with service editions)	**DX CALLBOOK (with service editions)**
$15.95	$14.95

Mail orders add 50¢ per CALLBOOK postage and handling.

See your favorite dealer or send today to:

WRITE FOR FREE BROCHURE

RADIO AMATEUR callbook INC.

Dept. A 925 Sherwood Drive
Lake Bluff, Ill. 60044

GSBN	3975	0100	1094	73	K4JNL
GTN	3718	2300			WB4TVII

There has been some exciting conversation around Atlanta on the possibility of the radio amateurs of Ga. sponsoring a "Salute to Amateur Radio" float in the next July 4 "Salute to America Parade" here in Atlanta. This would be a fantastic opportunity to gain some needed PR and expose some of the assets of the fraternity to the public. This would require several key people and financial help from all the operators in the state. If you would like to help, or you have ideas, contact me immediately. GSBN Assn. met in Macon for the annual meeting. All had a good time. K4VNV received the "Amateur of the Year" award. K4JNL is the new pres.; K4ZYK, vice-pres.; WB4DNU, secy.-treas. WB4VAF and WB4UFW have gotten their Extra Class; Congratulations! Dennis is also building a tri-band quad and two-element 40-meter beam, and a pair of 4-400s. WA4BAA has a new CL-33 and get this, is tan cooling his Argo/linear! That's really firing up the rig. WA4NJP is now OVS; K4CPO OPS; W4GXW, W4AQL ORSs. W4GIW took a bunch of Ga. hams to CURACAO, were PJ9GIW in WW DX Contest for about 11 million points. Good to have K4WC active again after many years. PSHR: WA4BAA 39, W9KRR/4 33, WB4UIH 48, WB4RUA 35, K4OSL 40, W4BYG 32. Traffic: WA4BAA 91, W9KRR/4 86, WB4OGN 81, WB4UIH 55, K4OSL 46, WB4RUA 46, W4BYG 39, WB4WQL 30, WA4BRO 23, K4JNL 22, W4JM 10, WB4UPW 4, K4WC 2.

NORTHERN FLORIDA – SCM, Frank M. Butler, Jr., W4RKH – SEC: W4IKB. RM: WA4BGW. RTTY: WA4WIW. PAMs: WA4IZMM/75, W4SDR/40.

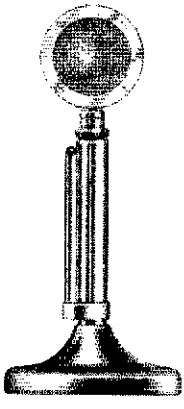
Net	*kHz*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
NFPN	3957	2300 Dy	578	116	WA4IZM
QFN	3651	0000/0300 Dy	–	–	WB4DXN

Appointments: WB4VMP as EC of Seminole County; WB4DXN ORS and OPS. WB4DXN new Net Mgr. of QFN. KØBAD/4 renewed ORS; W4WHK as EC of Clay Co. W4AFT earned FAST Net certificate. W4UC/4 and KØBAD/4 made BPL this month; also WB4VYU for Aug. Because of skip conditions, NFPN was moved back to 2330 GMT; roll call now alphabetically by cities. WR4ADL new .22/.82 repeater in Pensacola. Three messages handled by FFARA from the local fair were routed via satellite. W4UL active again. New hams include WA2STK, WB4COT and WB5IUJ. WB4UPJ/4 moved to Sarasota. New officers of Jax RANGE are W4SME, pres.; WA4ZDP, vice-pres.; WA4ZDQ, secy.; WA4EYU, treas. W4WHK/W4ORT were tops in '73 DX contest. W4WHK was also 2nd in nation in E-D battery power. Jax area hams have formed N. Fla. DX Assn. New officers of Daytona Beach ARA are K4EZE, pres.; WB4ESH and K4FLV, vice-pres.; WB4VAP, secy.; WB4NJL, treas.; WB4VTB, act. mgr. The club provided communication for Halifax River power boat races. WB4WLL now NCS for FPTN; he operates from WB4TCW at FTU. The Citrus ARA manned a traffic booth at Arts & Crafts show. K4IZT new NCS on NFPN. K4CVO was hospitalized for a time. WB4EVO is Hernando County CD Dir. W4YYO is Pasco Co. traffic outlet on NFPN. Traffic: (Oct.) KØBAD/4 810, W4UC/4 392, WA9OVT/4 365, WB4VYU 154, WB4UPJ/4 151, K4BSS/4 147, W4SDR 111, WA4IZM 81, WB4IER 65, WB4DXN 63, WA4EYU 62, WA8ZDE/4 60, WB4OMG 59, W4LDM 55, W4RKH 40, WB4NJI 39, W4NGR 38, WB4WHK 38, K4IZT 32, WA4FJA 25, W4LSR 21, WB4ZQC 21, WB4ADL 15, WB4FIY 15, K4EZE 14, W4AFT 13, WA4VZF 12, WA4NAP 11, WB4ZPC 10, K4CVO 9, K4DBM 7, WB4VAP 7, WB4NHH 5, W4DFP 4, WB4BYI 3, K4FJ 3, W4IA 3, K4UBR 3, W4IKB 2, K4FLV 1. (Sept.) K4BSS/4 109, WA4AQV 2.

SOUTHERN FLORIDA – SCM, John E. Porter, W4KGJ – Asst. SCM: Woodrow Huddleston, K4SCL. SEC: W4IYT. Asst. SEC: W4SMK. RMs: CW WB4NCH; RTTY K4EBE. PAM: W4OGX. First let me apologize for the short traffic report for last month. Some of the reports did not reach me in time to include before my vacation. They will appear as late reports in this month. K4NE helping blind girl qualify for her novice. Good show, Lew. FAST Net needs outlets for Tallahassee, Sarasota and Orlando on the late session. New officers for the Dade County ARPSC are WB4HIS, pres.; W4IYT, vice-pres.; WA4FLW, secy.-treas. OVS reports received from WB4TUP and WB4HDZ. On Oct. 12 and 13 the Dade Radio Club presented an antique radio exhibit at the Museum of Science for the annual "Showcase" of affiliated clubs. The Dade Emergency Net participated in a County Simulated Emergency Test. The County staged an airplane crash and subsequent removal of victims to area hospitals. Mobiles on 2 meters took part in the test. Members of the Tampa Bay Repeater Assn. provided communications for a Boy Scout Camping trip. They are also planning to provide communications for "Bike Hike" in Tampa on Dec. 8. WB4OBO is

YOU KNOW THE FATHER..

NOW SHAKE HANDS WITH THE SON



NEW HAND HELD TRANSISTORIZED MOBILE OR BASE STATION TMD-107

Others try but only Astatic can equal the quality and workmanship of the famous D-104 Microphone. Now Astatic has again matched its own highest achievement in the superlative new, chrome faced TMD-107.

OUTSTANDING FEATURES

- Field effect type amplifier.
- Smooth press-to-talk switch.
- Unbreakable Cycolac housing.
- 6' coiled cord with strain relief bushing.
- Rugged metal hang up button.
- Recessed gain control prevents accidental changes in gain.
- 7 volt mercury battery.

THE ASTATIC CORPORATION • Conneaut, Ohio 44030 U.S.A.
In Canada: Canadian Astatic Ltd., Scarborough, Metro Toronto, Ontario
Export Sales: Morhan Exporting Corp., 270 Newton Rd., Plainview, New York 11803, U.S.A.

WRITE FOR NAME OF NEAREST ASTATIC DISTRIBUTOR

operating the U. Fla. club station W4DFU. Good outlet for several nets. K4WKY and WB4NCH weombined stations Nov. 17. Mike is Net Mgr. of FAST Net and Anda is our RM. Congratulations to you both from the gang in Southern Fla. K4NE has added 2-meter fm and 160 meters to his station capability. We regret to report the passing of W1OD/4. His many friends in Fla. will miss him. After two years K4OG finally made DXCC. Please remember that the cut off date for traffic is the 5th. Traffic: (Oct.) WB4AIW 318, K4SCL 315, WB4GHD 198, WB4UPJ 151, WA4SCK 115, W4DVO 90, WA4IJH 89, W4DQS 56, WB4FFC 56, W4FFF 55, W4EH 47, WB4AID 46, WA4HDH 38, K4BLM 35, W4IYT 34, WA4BPE 31, K4QG 31, K4QCG 29, WB4TRI 28, W4GDK 27, K4SJH 23, W4KGJ 13, WB4HJW 10, WB4QID 10, W4TJM 9, W4BCZ 8, W4EHW 8, K4EBE 6, W4MML 5, W4NTE 4, W4WTR 4, WB4TUP 1, K4NE 44, (Sept.) W4EH 98, W4DVO 57, W4BM 48, WA4BPE 21, WB4HJW 16, K4MV 9, W4MML 6, K4GFW 2. (Aug.) W4BM 41, K4NE 22, K4GFW 4.

WEST INDIES – SCM, Pedro J. Piza, Jr., KP4AST – KP4WL is back on the air on all bands. KP4BJM put up a new four-element 20 meter beam. KP4DJE has a two-element 40-meter beam. KP4DHD installed both antennas. New stations on 2 meters KP4s DDD, BSH, DDP, AOC and GP. Remember that the Caribbean net meets at 11:00 GMT on 7160 daily. Net control is KV4FZ. WB5IBA is the pres. of the Guantanamo Bay AR Club. Keep up your good work, George. Traffic: KP4NT 138.

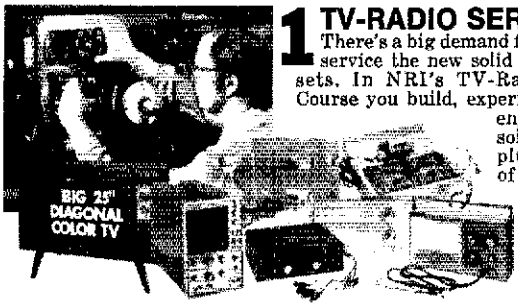
SOUTHWESTERN DIVISION

LOS ANGELES – SCM, Eugene H. Violino, W6INH – SEC: WA6QZY. RMs: W6LYY, K6UYK. The VHF RC is planning to lease 220 MHz repeater from Clegg Co. and using WB6MWT QTH for location. K6YNB is number one on the West Coast for the June VHF QSO Party. The convention was a huge success. The prize winning booth was sponsored by the United Radio RC of San Pedro. WB6UIA had a hardy group working making printed circuit boards for two-tone oscillators which were given free to visitors. Seen working at the booth were W6OAW, WB6ROH, W6SZH and W6OHS. Several hundred printed boards and schematics were given away. The LERC should be congratulated for putting on such a wonderful convention, a very well organized affair and club members seemed to have taken care of everything; a really hard working crew. WB6FSE has talked to all states except two on six meters; considering this a line-of-sight band, that is an accomplishment he also has mobile VHF capabilities. The Associated RC of Long Beach held their yearly auction Oct. 14. This is one event to keep in mind for next year, it is one of the big events in the area. The Marina RC has printed their first bulletin. This group meets at El Nido Park 18301 Kingsdale Ave., Torrance and are planning a very active calendar for the coming year. W6PVD is busy repairing remote power station controls for the local power company. W6OK broke his leg while chasing around his pool, so while mending studied for his Extra Class, now active on cw. Of interest to Novice and General Class hams, will be the IAD award (Ten American Districts). Those contacting all districts and receiving postmarked QSLs are eligible. Contact W6LS 2814 Empire Ave., Burbank, CA 91504 for more details. I want to thank K6UYK for having the SCN group at his home for a meeting and the appointment of a new CRM starting the first of the year but we still have W6LYY who has done a wonderful job. Thanks Don. WB6VKV will soon take over. Let's all help as much as we can. The Daytime NTS is going great guns and I hope that you fellows who can make it will try, its a daytime national traffic system and those interested please contact K6GMI for more information. Since retirement W6GC can be heard on the DX bands most anytime and when not cw then RTTY. The San Gabriel RC and AREC group (W6NRY) provided communications at the Azusa Golden Days parade and for the American Cancer Society Bike-a-thon. Congrats to Bob and Marsha of WA6OIX fame on their new harmonic Alicia Kay. Ex-MayorVero Fay of Rolling Hills is organizing the PV hams to help in case of another fire. WB6KXC now has Swan and all the trimmings. Traffic: K6UYK 284, W6INH 229, WB6GYN 96, WA6IDN 80, W6QAE 74, W6LYY 50, W6OEO 39, WA6BCO 30, W6USY 26, WA6ZKI 21, WB6OYD 19, W6NKE 17, WB6YIZ 13, W6IVC 7, WB6KXC 6, K6LSO 6, W6DGH 5, WB6KGK 5, W6OAW 5, W6JPH 4, W6AM 2, WB6KXC 2.

ORANGE – SCM, William L. Weise, W6CPB – Asst. SCM: Richard Birbeck, K6CID. SEC: WA6TVA. PAM: K6YCL. RMs: WB6AKR, W6BNX. New officers Citrus Belt ARC: K6YCL, pres.; WB6CZN, vice-pres.; K6IG, secy.; WB6VMU, treas. WN6UKK advises he has passed his General. Congrats. W6BUK attended National QCWA convention in Sun City, Ariz. in Oct. Sorry to report XYL of W6WRJ is on sick list. Redlands Sr. High School has

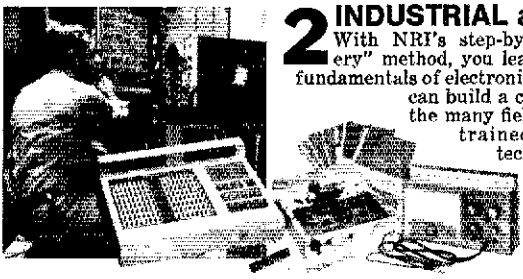
Learn a high-paying skill

NRI can teach you at home in your spare time with professional equipment you build and keep.



1 TV-RADIO SERVICING

There's a big demand for men who can service the new solid state television sets. In NRI's TV-Radio Servicing Course you build, experiment with and enjoy your own solid state radio plus your choice of black and white or the new 25" diagonal solid state Color TV set. NRI's TV sets are the only ones totally engineered for training from the chassis up so that you can introduce and correct defects to discover the real how and why of circuitry. NRI trains you quickly and expertly, showing you how to get started in servicing soon after you enroll, earning as you learn. The Master Course includes —at no extra charge—a wide-band service type oscilloscope, color cross-hatch generator, and other valuable professional equipment that you use and keep.



2 INDUSTRIAL and COMPUTER ELECTRONICS

With NRI's step-by-step, "discovery" method, you learn quickly the fundamentals of electronics on which you can build a career in one of the many fields available to trained electronics technicians. In the NRI Complete Computer Electronics Course, for instance, you build and keep a fully-operational, programmable digital computer—using over 50 integrated circuits. You solve typical problems and learn how to locate faults with diagnostic programs . . . working at home on a real computer, *not* a logic trainer. You train in basic computer programming, computer applications and analog/hybrid computers. NRI's free Electronic Catalog explains the training programs available for home study.

3 COMMUNICATIONS

NRI training in Complete Communications Electronics can train you for a choice of careers ranging from mobile, marine and aviation radio to TV broadcasting and space communications. One special segment includes CB training in which you receive your own Johnson® Transceiver and AC Power Supply. You learn how to install, maintain and operate today's remarkable transmitting and receiving equipment by actually doing it. You build and experiment with test equipment like a TVOM you keep. Whichever one of the five intensely practical NRI Communications courses you choose, you prepare for your FCC License exams, and you must pass your FCC exams or NRI refunds your tuition in full.

"Hands-On" Training Pays Off . . . NRI pioneered custom-designed kits with bite-sized texts to make learning at home fun and profitable. You get professional test instruments to perform experiments and keep for use in servicing. Tens of thousands of NRI graduates are proof it's practical.

Earn $5 to $7 an Hour, Starting Soon . . . Keep your present job while preparing for a top-paying job, or your own business. With NRI's professional equipment (provided at no extra cost) you can make good money doing repairs for friends.

Train with the Leader—NRI . . . NRI's innovative training lets you proceed at your own pace, assisted by your own NRI home training expert.

RUSH for FREE Catalog →
NO SALESMAN WILL CALL

APPROVED UNDER G.I. BILL
Check G.I. line in coupon

NRI TRAINING
3939 Wisconsin Ave.,
Washington, D.C. 20016

19-014

Please send me your new catalog. I have checked the field of most interest to me. NO SALESMAN WILL CALL.

- ☐ TV-Radio Servicing (with color)
- ☐ Advanced Color TV
- ☐ Complete Communications
- ☐ Electronics
- ☐ FCC License
- ☐ Aircraft Electronics
- ☐ Mobile Communications
- ☐ Marine Electronics
- ☐ Amateur Radio
- ☐ Computer Electronics
- ☐ Electronics Technology
- ☐ Basic Electronics
- ☐ Basic Data Processing and Computer Programming
- ☐ Automotive Mechanics
- ☐ Appliance Servicing
- ☐ Air Conditioning, Refrigeration, & Heating
- ☐ Check here for facts on G.I. Bill

Name_____ Age_____
(Please Print)

Address_____

City_____ State_____ Zip_____

Accredited Member National Home Study Council

radio club with call WB6ANX. Welcome gang. Citrus Belt ARC has changed meeting place. Now meet in the County agriculture building 566 Lugo Ave., San Bernardino. Orange County ARC CW Net meets each Wed. from 7 to 8 P.M. local on 21.175 MHz. W6ZE the club call welcomes all amateurs to check in for cw practice. K6GMI licensed since 1941 finally made BPL. Congrats Hal. K6GMI manager DRN6 invites all amateurs, with or without traffic to check in on 7265 kHz daily at 2 P.M. local. Lets help Hal keep the net going. One of Hal's most active members is W6PHT. Lets welcome WA9NBU/6 to Calif. Bob is active on the Mission Trails net. PSHR: WA6TVA 49, K6GMI 47, WB6AKR 44. Traffic: K6GMI 406, W6ISC 190, WB6AKR 86, WA6TVA 22, W6CPB 17, K6GGS 14, W6BUK 3, WA6YWS 3.

SAN DIEGO – SCM, Cy Huvar, W6GBF – Asst. SCM: Art Smith, W6INJ. Many thanks to all amateurs in the section for their assistance in the recent fires. SANDRA members of San Diego County Humane Society rescued many animals in the Lake Moreno area. RACES and AREC members manned evacuation sites and made good use of repeater operation as low band conditions were marginal. This proves one point, in any emergency we need more members so please join as either a full or limited member. The Southern, Eastern and Central districts provided communications for a bicycle marathon, nice going. Our SET will be held this month please participate at least part of the time. Information on nets.

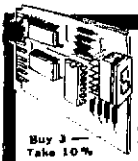
80 meters	Sun 0830	3725 kHz	CW Novice slow speed 5-13
75 meters	Sun 0900	3905 kHz	SSB/AM Section Net
2 meters	Sun 0900	145.5 MHz	AM Section Net
10 meters	Sun 1000	29.37 MHz	SSB/AM Section Net
6 meters	Sun 1000	50.25 MHz	SSB/AM Section Net
80 meters	Sun 1030	3770 kHz	CW Section Net 13 wpm min
2 meters	Sun 1900	146.52 MHz	FM Section Net Simplex
75 meters	Mon 1900	3905 kHz	SSB/AM Section Net
10 meters	Mon 2000	28.58 MHz	SSB/AM Section Net
2 meters	Tue 1900	145.5 MHz	AM Section Net
6 meters	Tue 2000	50.40 MHz	SSB/AM Section Net

Congrats to all who took part in the Baja 1000, great job. Traffic: W6VNQ 163, WA6HMY 120, WB6PVH 100, WA3OHF/6 57, W6DEY 33, WA6BDW 26.

SANTA BARBARA – SCM, D. Paul Gagnon WA6DEI – SEC: WB6HJW. RM: K6QPH. PAM: K6EVO. Note our new RM. Contact K6QPH if you are interested in an ORS appointment. ARRL Pres. W2TUK was guest speaker at the SBARC in Oct. New Novices in the section are WN6YPG and WN6AQL (products of SBARC classes taught by W6EOL), WN6ATD, WN6APT, WB6BAT, WN6AXK, WN6BAP, WN6AVT, WN6AXL, WN6BAM, WN6BAV and WN6AXN. WN6WOK is a new General in Camarillo. W6JEO in SB has a QRP HW-7 rig and has worked 25 states and JA using a vertical. WN6YOI in Santa Maria has worked 27 states with his HW-7 and a dipole. WA6MRJ vacationed in Canada. WB6NYK spoke at CVARC on PCB fabrication. WB6WGE won CVARC T-hunt in Oct. New officers of VCARC are WB6COQ, pres.; K6VMN, vice-pres.; WB6NNP, secy.; WA6PIJ, treas.; WA6WYD, editor. The VCARC auction will be Feb. 8 at the Oxnard Community Center. W6OAL has been designated official AMSAT bulletin station. W6DMJ working 20-meter DX from SB. K6QPH gave a presentation on an active audio filter at MAKRAC. Phone patch champ W6NAZ was speaker on ladies night at Poinsettia ARC. EC WA6PFF reports the SB AREC provided halloween patrol with K6EAQ, WB6ENU, K6HTX, WB6ITW, WA6MSI, K6TAZ, W6JPP, WB6OBB and WB6ENZ participating. EC W6CDN reports Morro Bay AREC also provided Halloween patrol. K6VFE won ribbon for art at VC fair. WN6TGV worked WAC. WN6UJZ has 24 countries. Enjoyed visiting with many of you at the SW Division Convention in N. Hollywood. Thanks to W6POU and WA6QDS for the Hospitality Room. PSHR: WB6PGK 32, WA6DEI 40, K6QPH 18. Traffic: WB6PGK 117, WA6DEI 99, K6QPH 32, WA6PFF 2.

WEST GULF DIVISION

NORTHERN TEXAS – SCM, L.E. Harrison, W5LR – Asst. SCM: Frank Sewell, W5IZU. SEC: K5KQM. RM: W5QU. Your SCM plus WG Director Albright attended Brownfield (attendance 300) and Texoma (attendance 602). Mr. Albright called LO meeting entire division. SCMs, SECs plus 1 Asst. Dir. Temple ARC attendance remains strong and active in letter writing to FCC. Thanks to W5VDQ and W5JEH. CRW active in greater Dallas area. Dallas RS offers nice luncheon Engineers Club, 1st Mon. Tex Traffic Net Oct. '73 sessions 31, check-ins 1606, traffic 218, WB5AMN mgr. Panhandle ARC presents interesting report on "The current that Kills." Who represents West Gulf on "EAC"? Is your repeater covered under ARRL letter dated Oct. 5 '73? WB6MOX wishes contact WA5BNK FMC jr. Plano ARC recently certified by League. Congrats WB5ETZ. OCWAers regret to announce passing of



LED MITY DIGIT "DCM'S" *Your choice of 5 red LED readouts!

☐ Only **$9.99**

Buy 3 — Take 10% off

Scientific Devices "Digital Counting Modules" outperform any other DCM on the market today. More features than ever before! Not gaseous, not incandescents, not nixie but the modern LED. Choose from such famous manufacturers as Monsanto's MAN-1, MAN-4, Litronics 707 and 704, Opcoa's SLA-1 (the last 4 having character heights of 0.33 at no extra charge). Each kit includes 3x2" p.c. board with fingers for a FREE edge connector, sida-mounting dip socket, LED readout of your choice, resistors, 3 IC's, and Molex connectors (this ELIMINATES SOLDERING YOUR IC's!), and booklet, **INCLUDES P.C. EDGE CONNECTOR — FREE!**

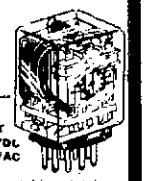
READOUT Char. Maker
- ☐ **MAN-1 .27 h. Monsanto**
- ☐ **MAN-4 .19 h. Monsanto**
- ☐ **707** .33 h. Litronics**
- ☐ **704** .33 h. Litronics**
- ☐ **SLA-1*** .33 h. Opcoa *

Pin-for-pin MAN-1, ** Pin-for-pin MAN-4, elec. char. same.

HIGH POWER TRANSISTOR $1.49 WITH HEAT SINK

☐ 3 for $3

Removed from new equipment. Includes popular 2N174 "doorknob" transistor TO-36, germanium, PNP, 150 watts, VCBO 80V, 15 amps, 10 hfe. For ignition, high power transmitters, etc. Mounted on heat sink 5 x 2½ x 1¼".



Potter & Brumfield KAP RELAYS $2.98

Your choice 3 for $7.50

☐ 3PDT ☐ 12 VDC ☐ 115 VAC

Excellent for "HAM" use as antenna switching, latching, transmit, receive, etc., and 100's of commercial or industrial uses. Includes plastic dust-cover with diagram and hookup info, 11-pin plug-in base. Contacts movable gold flashed silver, stationary overlay, with silver cadmium oxide movables. All contacts 10 amp 3PDT. Coil data, 115VAC 2250 ohms, 17.5 ma. 12 VDC 21 mils 188 ohms. Size: 2¼" x 1 5/16". Wt. 4 ozs. Center pin missing. Comar Mfg. type equal too.

CALCULATOR KEYBOARD SWITCH KITS

Kit of 17 for $7.50

☐ 10-pc. kit, 0-to-9 only, same type as above. **3.50**

Each switch made by Oak* #415, SPST normally open, 24V 1 amp contacts. Kit includes 0-to-9 (10 switches) white with black numerals) decimal, white with black dot, and CE, CL and + functions buse with white characters.

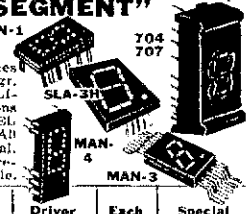
Money-Back GUARANTEE on all items

WEST COAST MAKER OF LED'S

- ☐ **4-MV5054** Jumbo red lens, red lite TO-18 . . . . . $1.00
- ☐ **1-MV5222** Jumbo gren lens, green lite, TO-18 . . . . 1.49
- ☐ **1-MV5322** Jumbo yellow lens, yellow lite, TO-18 . . 1.98
- ☐ **4-MV5080** Micro red dome red lite, TO-18 . . . . . 1.00

SLA-1 SLA-2

LITRONIX-OPCOA-MAN "7-SEGMENT" LED Readouts



MAN-1 704 707 SLA-3H MAN-4 MAN-3

All fit 14-pin IC sockets. All 7-segments. MAN Series "all LED" and made by well-known West Coast mfgr. Others Reflective Bar type made by OPCOA and LITRONIX. The Reflective Bar types are low-cost versions of the MAN's except .33 character height! If one LEL blows you lose a segment. MAN's you DO NOT! All readouts 0-to-9 numerals, plus letters and decimal. **Opcoa and Litronix products pin-for-pin replacements for MAN-1 MAN-4. All 5V TTL compatible.

ALL LED READOUTS — TYPE	charactor Size	Color Display	Decimal	Mils	Driver	Each	Special
☐ MAN-1 equal	.27	Red	Yes	20	SN7447	$4.50	3 for $12.
☐ MAN-1A equal*	.27	Red	Yes	20	SN7447	4.95	3 for $13.
☐ MAN-3 equal	.115	Red	Yes	10	SN7448	2.50	3 for $6.
☐ MAN-3A equal*	.115	Red	Yes	10	SN7448	2.50	3 for $6.
☐ MAN-3M equal*	.127	Red	Yes	10	SN7448	2.50	3 for $6.
☐ MAN-3 equal	.115	Red	***	10	SN7448	1.95	3 for $5.
☐ MAN-3M equal*	.127	Red	Yes***	10	SN7448	1.95	3 for $5.
☐ MAN-4 equal*	.190	Red	Yes	15	SN7448	3.25	3 for $9.
☐ MAN-4 equal*	.190	Red	Yes***	15	SN7448	2.75	3 for $8.
"REFLECTIVE LITE BAR" (Segment LED Readouts)							
☐ 707** (MAN-1)	.33	Red	Yes	20	SN7447	3.25	3 for $9.
☐ 704** (MAN-4)	.33	Red	Yes	20	SN7448	3.25	3 for $9.
☐ SLA-1** (MAN-1)	.33	Red	Yes	20	SN7447	3.25	3 for $9.
☐ SLA-2 + — 1	.33	Red	No	15	SN7447	3.25	3 for $9.
☐ SLA-3H Giant	.70	Red	Yes	20	SN7447	6.50	3 for $18.
☐ SLA-11C** (MAN-5.33		Green	Yes	40	SN7447	5.95	3 for $15.
☐ SLA-12** ±1	.33	Green	No	40	SN7447	3.50	3 for $ 9.

* Red epoxy case, others clear. ** Litronix and Opcoa's pin-for-pin equals and electrical specs as MAN-1 or MAN-4. *** LED "dot" missing.

1" SQ MINI METERS

- * Plastic case
- * Red needle indicators

☐ Balancing, stereo, tape, amps. **$1.49**
☐ VU, side mtg, plus 3 minus 20 db.
☐ VU, front mtg, plus 3 minus 20 db. 3 for $3.75

LINEAR Op Amps

● FACTORY GUARANTEED — FACTORY TESTED — FACTORY MARKED

Buy 3 — Take 10% off

- ☐ **531 Hi slew rate op-amp (TO-5)** . . . **$2.50**
- ☐ **532 Micro power 741 (TO-5)** **2.50**
- ☐ **533 Micro power 709 (TO-5)** **2.50**
- ☐ **536 FET input op amp (TO-5)** **3.95**
- ☐ **537 Precision 741 (TO-5)** **2.50**
- ☐ **550 Precision 723 voltage reg. (DIP)** . **1.17**
- ☐ **556 5 Times faster than 741C** **2.10**
- ☐ **558 Dual 741 (TO-5)** **1.00**
- ☐ **560 Phase lock loops (DIP)** **3.25**
- ☐ **561 Phase lock loops (DIP)** **3.25**
- ☐ **562 Phase lock loops (DIP)** **3.25**
- ☐ **565 Phase lock loops (A)** **3.25**
- ☐ **566 Function generator (TO-5)** **3.25**
- ☐ **567 Tone decoder (A)** **3.25**
- ☐ **702C Hi-grain, DC amp (TO-5)** . . . . . **.49**
- ☐ **703C RF-IF, amp, 14 ckts (TO-5)** **1.00**
- ☐ **704 TV sound IF system** **1.50**
- ☐ **709C Operational amp (A)** . . . . . **.49**
- ☐ **709CV Op amp (mini DIP)** . . . . . **.49**
- ☐ **710C Differential amp (A)** . . . . . **.49**
- ☐ **711C Dual diff. comp (A)** . . . . . **.49**
- ☐ **723C Voltage regulator (A)** . . . . . **.95**
- ☐ **733 Diff. Video Amp** **1.75**
- ☐ **741C Frequency compensator 709 (A)** . **.49**
- ☐ **741CV Freq. comp 709 (Mini DIP)** . . **.49**
- ☐ **747C Dual 741C (A)** **1.25**
- ☐ **748C Freq. adj. 741C (A)** . . . . . **.49**
- ☐ **753 Gain Block** **1.75**
- ☐ **709-709 Dual 709C (DIP)** **1.00**
- ☐ **739-739 Dual stereo preamp** **1.98**
- ☐ **741-741 Dual 741C (A)** **1.00**
- ☐ **PA265 5-Watt voltage regulator** **1.95**
- ☐ **ULN2300M Op amp with SCR** **1.50**
- ☐ **CA3065 Video Audio system** **1.50**

(A) TO-5 or DIP dual in line pak

Lowest Prices

Largest Selection TTL IC's

Buy 3 or more, 10% discount

Brand New * "DIP" Packages Order by type number! Spec sheets on request "ONLY"

Type	Sale
SN7400	$0.30
SN7401	.30
SN7402	.30
SN7403	.30
SN7404	.35
SN7405	.35
SN7406	.45
SN7407	.55
SN7408	.35
SN7410	.30
SN7411	.35
SN7413	.95
SN7415	.55
SN7416	.55
SN7417	.55
SN7420	.30
SN7421	.55
SN7422	.35
SN7425	.50
SN7426	.36
SN7430	.30
SN7432	.35
Factory Marked	

☐ SN7437	.55	☐ SN7472	.50	☐ SN74112	.95	☐ SN74163	1.95
☐ SN7438	.55	☐ SN7473	.55	☐ SN74113	.96	☐ SN74164	2.95
☐ SN7440	.30	☐ SN7474	.55	☐ SN74114	.95	☐ SN74165	2.10
☐ SN7441	1.40	☐ SN7475	1.00	☐ SN74121	.60	☐ SN74166	2.05
☐ SN7442	1.50	☐ SN7476	.65	☐ SN74122	.95	☐ SN74173	2.50
☐ SN7443	1.50	☐ SN7478	.95	☐ SN74123	1.20	☐ SN74174	3.20
☐ SN7444	1.50	☐ SN7480	.65	☐ SN74125	.71	☐ SN74175	3.20
☐ SN7445	1.50	☐ SN7481	1.25	☐ SN74126	.71	☐ SN74176	2.10
☐ SN7446	1.65	☐ SN7482	.99	☐ SN74139	1.25	☐ SN74177	2.10
☐ SN7447	1.45	☐ SN7483	1.25	☐ SN74140	1.25	☐ SN74179	2.10
☐ SN7448	1.50	☐ SN7485	1.41	☐ SN74145	1.55	☐ SN74180	1.20
☐ SN7450	.30	☐ SN7486	.55	☐ SN74148	4.50	☐ SN74181	4.90
☐ SN7451	.30	☐ SN7489	4.50	☐ SN74150	1.61	☐ SN74182	1.20
☐ SN7453	.30	☐ SN7490	1.49	☐ SN74151	1.25	☐ SN74186	2.50
☐ SN7454	.30	☐ SN7491	1.35	☐ SN74152	4.95	☐ SN74192	1.95
☐ SN7455	.55	☐ SN7492	1.35	☐ SN74153	1.60	☐ SN74193	1.95
☐ SN7460	.30	☐ SN7493	1.35	☐ SN74154	2.10	☐ SN74194	1.95
☐ SN7461	.35	☐ SN7494	1.35	☐ SN74155	1.55	☐ SN74195	1.25
☐ SN7462	.35	☐ SN7495	1.35	☐ SN74156	1.45	☐ SN74196	2.50
☐ SN7464	.30	☐ SN7496	1.35	☐ SN74157	1.55	☐ SN74197	2.50
☐ SN7465	.50	☐ SN74106	.95	☐ SN74158	1.55	☐ SN74198	2.65
☐ SN7470	.50	☐ SN74107	.70	☐ SN74160	1.95		
☐ SN7471	.55	☐ SN74108	.95	☐ SN74161	1.95		

* Money Back Guarantee

Buy 100 — Take 20%

NATIONAL EQUALS ON "DIGITAL CLOCK on a CHIP"

WAS $12.88 as Low as **8.88**

*With Spec Sheet!

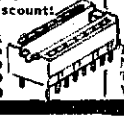
Money Back Guarantee!

*With spec sheets & for all readouts

- ☐ **MM5311 28-pin, 6-digit*** . . . **$11.50**
- ☐ **MM5312 24-pin, 4-digit*** . . . **8.88**
- ☐ **MM5313 24-pin, 6-digit*** . . . **9.95**
- ☐ **MM5314 24-pin, 6-digit*** . . . **11.50**
- ☐ **MM5316 40-pin, 4-digit*, normal alarm sleep timer, snooze alarm, 12-or-24-hr.** . . . **14.95**

INTEGRATED CIRCUIT SOCKETS

Buy Any 3 Take 10% Discount!



- ☐ 14-Pin, DIP . . . . $.45
- ☐ 14-Pin, Wire Wrap . .59
- ☐ 14-Pin, Side Mount 1.00
- ☐ 16-Pin, DIP 50
- ☐ TO-5, 8 or 10-Pins . .29

'HAM' UHF 400 MC HIGH POWER TRANSISTORS $3.95

3 for $10.

☐ By RCA or equal 2N3632, NPN, 23 watts, 3 amps, TO-60 case, with stud mtg. VCEV max 65.

Terms: add postage **Rated:** net 30
Phone Orders: Wakefield, Mass. (617) 245-3829
Retail: 16-18 Del Carmine St., Wakefield, Mass. (off Water Street) C.O.D.'S MAY BE PHONED

☐ 15¢ CATALOG on Fiber Optics, 'ICs', Semi's, Parts

POLY PAKS

P.O. BOX 942 M LYNNFIELD, MASS. 01940

Army and ex-Navy man W5FA. New AREC application from WA5QPW. The Kilocycle Club expects large turnout at swapfest. Three members hospitalized WB5FGM, WA5ZHJ and W5CAX. Arlington, Garland, Richardson, Irving and Euless ARCs participated in opening Greater Dallas-Ft.Worth airport, call W5FWA, 24 hour period, 2080 contacts, 700 QSLs plus Concorde. No assistance from Dallas & Ft.Worth, Tex C.W. Bulletin arrived on time. SCM unable make Whitney. Remember all RMs can recommend Tex. cw members Net certificates. SEC K5QKM reports following ECs have been renewed: W5ZNN, W5NGX and K5ZVZ. WA5PPF had electrical accident months ago. Now active again. Any amateur in Commanche, Tex. or thereabouts please contact SCM, have request for Novice Exam your area. SCM going on trip. K5QKM will help us with our work. I'll keep him advised. Traffic: WA5NSJ 105, WA5GQE 95, WB5BFW 85, W5GSN 74, W5OWV 44, W5SMN 32, W5DWV 16, W5PW 16, K5QKM 14, W5LR 9, W5MBP 6, W5QGZ 4, W5YK 4, W5TI 186.

SOUTHERN TEXAS – SCM, Arthur Ross, W5ER – SEC: WA5YXS. PAM: W5HWY. RM: W5ABQ. ARRL Hq. has appointed PAM W5HWY as mgr. of Daytime Fifth Region Net. 7290 Net deeply mourns Silent Key K5HVL. 7290 Net elected OPS K5HZR Net Mgr.; W5TST, asst. mgr.; WA5YEA, secy. OPS WA5VBM reports Lufkin 34/94 repeater now WR5ACF. Austin ARC has been given a certificate of appreciation from American Red Cross for their work following tornado emergency at Burnet. Houston ARC elected W5FEM, pres.; W5AIR, vice-pres.; K5IRS, secy.-treas. ORS W7WAH/5 converting old taxi equipment to 2-meter fm. New ORS WB5GZG celebrated 15th birthday with new phone patch. ORS K5EJL looking for traffic people on RTTY. ORS WB5IOG operating from W5YG, Ruce D. WB5HXR 13, and WB5HJV 15, are new General Class licensees. OPS WA5CBT active on 2-meter fm. Southwest Repeater Organization has new 22/82 machine in El Paso at 6100-ft.; estimated radius 70 miles. K5CWS has new 10-15-20 quad; has worked 2 stations, both DX and both new additions to his DXCC; also looking for schematic on RCA CMU-15B transceiver. Houston QCWA elected W5FR, pres.; W5KV, vice-pres.; W5YZ, secy.-treas. WA5VJW planted 150 strawberry plants. W5YG using 160-meter inverted V, open wire feeders and matchbox on all bands. ORS WA5ZBK certificate endorsed for another year. WB4FDT/5 is new ORS. HAM TIDES is new bulletin of Tidelands ARS in Galveston; WB5IIJ editor. EC WB5FMA has inverted 2-meter antenna. K5MYY now on 2-meter fm. W5LHX on with new TR-4. W5LDA and K5FRK have new 2-meter rigs. WA5LDT has new HW-12. W5LQP joined Silent Keys in Oct. Traffic: K1ONW/5 246, WA5YXS 175, WA5YEA 164, W5TQP 153, WA5VBM 134, W7WAH/5 129, W5ABQ 111, WA5ZBN 88, WB5CUR 83, WB5DBK 82, WB5AMN 74, WB5GZG 62, W5HWY 55, WA5FOE 53, K5EJL 51, K5HZR 50, W5KLV 46, WB4FDT/5 45, W5QO 44, WB5GVO 34, WA5LNV 33, WB5FMA 27, WB5FQU 25, WA5JFZ 25, W5TFW 24, W5TST 20, W5YG 17, WA5ZBK 16, WB5HJV 11, WA5TJI 8, WA5TVI 8, W5UKN 6, WA5TWF 4, WB5FPD 3, K5RVF 3, WA5CBT 1.

CANADIAN DIVISION

BRITISH COLUMBIA – SCM, H.E. Savage, VE7FB – British Columbia Phone Net 3755 kHz new Net Mgr. is VE7AZG who also is an OO VHF. VE7FB retired after many years as Net Mgr. RM VE7OQ for BCEN 3650 is Editor BCEN Net News. A fine paper on net activities for net members. Asst. Dir. VE7LL sold his gear for TS-900. New owners of TS-900, VE7BWL and VE7BC. VE7GF reactivates after fifteen years. VE7CT fifty years cw operating is going phone, 1st time! VE8CV reports crew change at VE8RCS to be VE3NA, 3DNH and 3CX. VE8CM has is Class "A". WA4ZDE/VE8 left Baffin Is. in Dec. Traffic: VE7BLO 59, VE7CCJ 34, VE7CDF 29, VE7OO 24, VE7TT 11, VE7MW 8.

MANITOBA – SCM, Steve Fink, VE4FQ – We hope everyone made it through the Holiday season okay. ARLM held a successful auction Nov. 4, and Winnipeg AREC provided communications for the West Kildonan Police for Halloween. We welcome VE4OW as a new ORS, while PAM VE4FO and XYL VE4QF have moved to The Pas. Congrats to VE4AY and VE4NK on new junior ops! We would also like to welcome new hams VE4GZ in Winnipeg, VE4QI (ex-VE3BTS) in Brandon, and VE4IN in Dauphin, and to an old ham now back on, VE4HF in Dauphin. Thanks to those who have been supporting Daytime Tenth Region Net on 7263 kHz at 2000 GMT. MTN: 60 sessions, 236 QNI, 59 QTC. MEPN: 31 sessions, 902 QNI, 23 QTC. Don't forget SET Jan. 26-27! Traffic: VE4PG 56, VE4OW 42, VE4JP 27, VE4RO 23, VE4TY 22, VE4JA 12, VE4UN 12, VE4CR 7, VE4IL 4, VE4XA 4, VE4DR 2, VE4FK 2, VE4HR 2, VE4NF 2, VE4LA 1, VE4TR 1.

MARITIME – SCM, W.D. Jones, VE1AMR – SEC: VE1HJ. Lots of activity during Boy-Scout Jamboree on-the-air, some of the

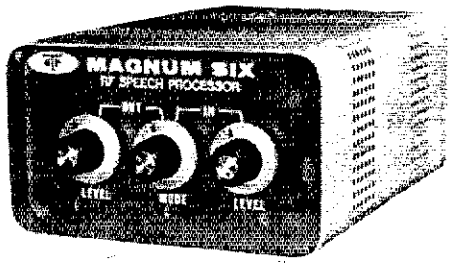
400% MORE SSB OUTPUT

WITH A MAGNUM SIX

A QUALITY RF SPEECH PROCESSOR

Collins 32S KWM	$139.95
Heath SB100/HW100/SB400	139.95
Drake TR4/TR4C	159.95
Drake T4X/T4XB/C	154.95
Yaesu FT101	139.95
Yaesu FTdx 400/401/560/570	144.95
Kenwood T-599/TS-511	139.95

To Order: Specify model. Add $2 for shipping in U.S.



Brochure available on request. Dealer inquiries invited.

Communication Technology Group
31218 Pacific Highway South
Federal Way, Washington 98002

A Division of Bitcil Systems Inc.

DYCOMM SUPER D 80 WATT KIT

(See our ad in November and December QST)

Now a Dycomm super D kit extension — we have had three times the response we anticipated on our offer — we are three to four weeks behind now on delivery but we hope to catch up soon. Under the circumstances, we will extend the offer until January 31, 1974. However, because our own costs have increased, we will be forced to increase the price on all orders postmarked after January 10, 1974 to $59.95 —still a superb bargain.No telephone or COD orders, please.

DYCOMM 948 Ave. E., P.O. Box 10116, Riviera Beach, Florida 33404 (305) 844-1323

stations who participated with Scouts include VE1s PB, WV, CX, AG, FO, AKF, LC, ABT, UH, AKO, TS, EL and VE1ATG. CIIs ARA, ATP and CIIEO also VE3BZA/VE1, VE1DF and VE1AAB enjoyed a trip to VE3-Land. Section net certificates were issued to VE1AKB and VO1GW. VE1RO alias VE1ZH moved to a new QTH Sat. afternoon and showed up on the air that evening with a much improved signal. VE1AMB, VE1KK and VE1MY all have new towers and beams. Welcome to VE1AZT a new ham in the Moncton area. VO1FX is handling the VO QSL Bureau while VO1AA is ill. ARCON is operating an outgoing QSL Bureau for all who are interested 4 cents per QSL card, any destination other than QSL mgrs. VO1IV/VE2 has gone to Egypt with CAF. A reminder to all that SET '74 will be held on the last week end of Jan. Ex-VE1ANZ now VO2AS. Traffic: VE1AMR 174, CI1AKB 95, VE1ZH 62, VE1AWS 59, VE1AKB 52, VO1CA 25, VE1AWP 19, VE1AAQ 14, VE1AYJ 12, VE1AFM 5, VO1GW 5, VE1AHM 1.

ONTARIO – SCM, Holland H. Shepherd, VE3DV – Not many "Mr. Average Amateur" are aware that the League sponsored FD, with its fun and games aspect, has a duplicate in the Simulated Emergency Test, usually held in Jan. Yes, that is right – in Jan. with all the bad weather and while you are reading this item you might also ask yourself the following questions: "What have I done to prepare my station in the event my village, town or city suffers a disaster?" "Who would I call if I wanted to offer my station (or my mobile) and my unique talents to provide communications during a disaster?" "Do I know how to prepare a formal written message?" "Have I participated in directed-nets often enough to be able to contribute rather than hinder?" "Where would I go to borrow or rent a gasoline generator?" "Do I know enough about Ont. nets so that I could provide liaison communications to a nearby town or city?" "What frequencies and mode would I use?" "Does the repeater I use have an independent source of supply?" "If not, why?" If your answers to these questions is "I don't know", then we amateurs, and our communities, are in a very poor position should a natural or man-made disaster occur! I hate to use the cry of "wolf" when describing our general attitude towards amateur emergency preparedness because emotion should have no place in our plans for developing a communications capability during adverse times, however, we all can do a little preparing right now by finding out the answers to the above questions. The following ECs would like to hear from you. VE3EBY, Windsor; VE3BPC, Rideau Valley; VE3VP, Ottawa; VE3DOC, Oshawa; VE3GFN, Toronto Metro and VE3AYR, Hamilton-Burlington. Traffic: (Oct.) VE3SB 251, VE3DPO 196, VE3FQZ 141, VE3EHF 128, VE3AWE 107, VE3GJG 107, VE3GFN 105, VE3FRG 96, VE3DV 77, VE3GT 58, VE3DVE 56, VE3ARS 47, VVE3ATR 31, VE3GCE 28, VE3FGV 22, VE3EWD 20, VE3ASZ 17, VE3FZG 12, VE3DH 10, VE3BPC 9. (Sept.) VE3ARS 18, VE3GEO 7.

QUEBEC – SCM, Joe Unsworth, VE2ALE – VE2DRG became a Silent Key on Oct. 15. VE2BG has received a 50-year membership from ARRL. VE2VI back on the air and VE2DNA is a new ham. VE2s AOL and EC participated in Scout Jamboree '73 from Three Rivers. VE2BYG reports VE2s BMN, DAB and AFB with new towers. VE2DIC active on Oscar 6, and keep an ear open and rig up for oscar 7 coming soon. VE2AFB using a new Hurricane 2000 linear and VE2BYG has completed 44 elements of 88 for the Oscar 7. QST Nov. '73 Field Day report shows VE2CRG as non club entry but call sign belongs to Grandby Radio Club (how come?). VE2BB doing fine job as assistant net mgr. for the QRN. MARC had a tour of The Air Canada Airline shops on Oct. 27. VE2DGU keeping the VE2PY repeater on the air and there may be a new location soon for the repeater. Two new directors for the MARC are VE2s DDT and DNZ. VE3HAH former VE2BQN and his XYL VE3HAI former VE2ALA have helped organize The Seaway Valley ARC at Cornwall, Ont. Repeater VE2AT reverted back on Oct. 20 to the .46/.94. VE2KB says that a new repeater for the Abitibi region, no details as yet. VE2MO, 50th anniversary. Look for the MARC forum net on about 7155 kHz every Sun. A.M. at 1030 local. PSHR: VE2ALH 34, VE2APT 27. Traffic: VE2DR 132, VE2ALH 88, VE2BP 45, VE2EC 28, VE2APT 22, VE2AP 14, VE2ALE 11.

SASKATCHEWAN – SCM, Percy A. Crosthwaite, VE5RP – Reports from affil. clubs show Saskatoon, Prince Albert and Last Mountain contain a new slate of officers. Regina officers will remain as in '72. Two meters is a very much talked about topic. VE6AEA flying about at approximately 30,000 feet has certainly put some added interest on two meters in the province. EMO very interested in arranging for a two meter repeater linking Regina and Saskatoon. The Weyburn Estevan and Esterhazy boys are looking for a two meter site possibly Arcola? VE5VJ is thinking of going SSTV. Hope things on SSTV work out Vic. Traffic: VE5HP 36, VE5BO 11, VE5XO 10, VE5QO 6, VE5KZ 5, VE5UK 5, VE5PG 1. QST

Novice Roundup

(Continued from page 72)

less than 15 minutes at a time. Times on and off *must* be entered in your log.

3) *QSOs:* Contacts must include certain information sent in the form as shown in the example. QSOs may take place on the 80-, 40-, 15-, or 10-meter bands. Crossband contacts are not permitted. Novices work any amateur stations; non-Novices work Novices only. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your RST and section and receipt of a RST and section/country. A station may be worked only once, regardless of band.

A Novice may operate in the Novice portion of the competition until he receives his General Class license, then he must participate as a non-Novice only.

4) *Scoring:* Each exchange counts one point. Only one point may be earned by contacting any one station, regardless of the frequency band. The number of ARRL sections (see page 6 of any *QST*) + foreign countries worked during the contest is the "total multiplier." Yukon-N.W.T. (VE8) also counts as a multiplier. A fixed scoring credit may be earned by entrants who hold the ARRL Code Proficiency certificates. FCC code credit *cannot* be used in lieu of the above. If an entrant does not hold a ARRL CP Award, he can apply for credit by attaching to his Novice Roundup report a copy of the qualifying run from W1AW or W6OWP for January or February. Cp credit equals the wpm speed indicated on the latest ARRL certificate or sticker held by the entrant. The final score equals the "total points" plus "ARRL Code Proficiency credit" multiplied by the "total multiplier."

5) *Reporting:* Contest work must be reported on forms from the ARRL. Reporting forms and a map of the United States will be sent free upon request. Indicate starting and ending times for each period on the air. All NR reports become the property of ARRL and none can be returned. Entries must be mailed to ARRL Hq., 225 Main St., Newington, CT 06111 no later than March 5, 1973.

6) *Awards:* A certificate will be given to the highest scoring Novice in each ARRL section. Multioperator or General-class licensees and above are not eligible for awards. However, a box containing the TOP TEN W/VE higher-class licensees will be incorporated in the results. And should participation warrant, a similar box will show TOP TEN DX enterants.

7) *Disqualification:* If the claimed score of a participant is reduced by 2 percent or more, the log may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, banned countries, and/or other scoring discrepancies.

If a participant is disqualified, he will be barred from submitting an entry in the next annual running of that specific contest, (e.g., disqualification from the 1972 phone SS prohibits submission of an entry for the 1973 phone SS, but 1973 cw SS participation is okay).

The calls of all disqualified participants will be listed in the *QST* report of the contest.

(Continued on page 164)

Novice Roundup *(Continued from page 162)*

Any participant on the borderline of disqualification but not actually disqualified may receive a warning letter from the Communications Manager.

For each duplicate contact that is removed from the log by Hq., a penalty of 3 additional contacts will be exacted. The penalty will not, however, be considered as part of the 2% disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final. QST

Happenings of the Month

(Continued from page 96)

ference, Geneva, 1971. With these amendments, a new Amateur-satellite Service was established and certain frequencies within the Amateur Radio Service were also allocated to the new service. The Commission desires to proceed with rulemaking for the Amateur-satellite Service.

2. The Amateur-satellite Service is defined as "A radiocommunication service using space stations on earth satellites for the same purpose as those of the amateur service." Space radiocommunication is defined as "Any radiocommunication involving the use of one or more space stations or the use of one or more passive satellites or other objects in space." A space station is defined as "A station located on an object which is beyond, is intended to go beyond, or has been beyond, the major portion of the earth's atmosphere."

3. The frequencies allocated to the Amateur-satellite Service are: 7.0-7.1 MHz, 14.0-14.25, 21.0-21.45, 28.0-29.7, 144-146,435-438 secondary status, telecommand required, 24-24.05 GHz. In the frequency band 435-438 MHz, the Amateur-satellite Service may be authorized, provided harmful interference is not caused to other authorized services also operating in that frequency band.

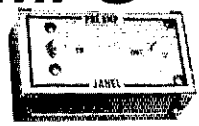
4. Over the past twelve years, prior to the adoption of these rules, the Commission authorized a total of six amateur radio stations for operation on board earth satellites, under the rules in Part 97 applicable to all amateur radio stations. Specific temporary waivers to the rules were granted where necessary. For instance, in the case of the most recent amateur satellite, OSCAR 6, launched on October 15, 1972, several waivers to specific regulations in Part 97 were granted for station operation under the license WA3NDS. These waivers were granted on the basis of representations to the Commission by the applicant concerning certain provisions incorporated into the design of the station, including reasonably well protected remote control command functions and very low transmitter power.

5. Unlike its predecessors whose operating lifetimes were but a few weeks, OSCAR 6 was designed for an operating lifetime of at least one year. This demonstrated that amateurs now have the capability of producing satellites to operate for periods exceeding the six month limitation for waivers authorized by the Bureau Chief under delegated authority. For this reason, on March 21,

(Continued on page 166)

SUPER SENSITIVE PREAMPS

START HEARING THE WEAK ONES



JANEL makes a preamp for improving the performance of almost any receiver. All are resistant to overload and fully diode protected. Top quality construction.

Application	Model	Frequency
OSCAR VI	30PB	29.5 MHz
6 Meters	50PB	50.5 MHz
2 Meters	144PB	144 MHz
2 Meter FM	147PB	147 MHz
220 MHz	220PB	220 MHz
Aircraft	120PB	108-140 MHz
FM	100PB	88-108 MHz
TV	TV-PB	Ch2-13 (Specify)
High Band	160PB	146-174 MHz
432 MHz	432PA	432-438 MHz
440 ATV	432PA-T	435-445 MHz
450 FM	432PA-F	440-450 MHz
UHF FM	432PA-U	450-470 MHz

PB models are only $19.95 and 432PA models are only $29.95. All are in aluminum cases, have BNC connectors (others available), require 12 vdc and are postpaid and guaranteed. Specify model and frequency when ordering. Other models are available with AC power supply. Write for details.

JANEL can also supply a wide variety of receiving equipment for industrial applications. A quote to your specifications will be sent promptly.

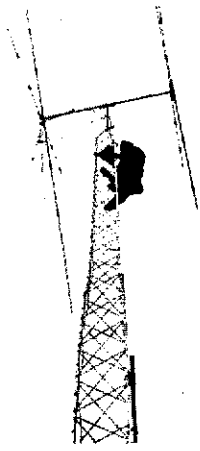
JANEL
LABORATORIES
Box 112, Dept. Q
SUCCASUNNA, NJ 07876
Telephone (201) 584-6521

UNIVERSAL TOWERS

FREE STANDING ALUMINUM TOWER

10' to 100'—
Prices from $98.00 (40')

MOST POPULAR HAM TOWER EVER MADE!



REQUEST NEW CATALOG OF TOWERS & ANTENNAS

Midwest Ham Headquarters
For Over 35 Years
HAMS! Write For Free Catalog and Wholesale Prices!

ELECTRONIC DISTRIBUTORS, INC.
1960 Peck Muskegon, MI 49441
TEL: (616) 726-3196—TELEX: 22-8411

VHF DX OPS

MODEL 60 SPEECH PROCESSOR — ORO the average-to-peak ratio of the speech waveform as much as 8 db using a logarithmic principle. Operates with FM, SSB and AM transmitters and transceivers. Low/High impedance Mic input. Two 9Vdc batteries provide a self-contained unit.

Model 60W	(Processor Assembled)	$26.50
Model 60K	(Processor Kit)	$21.90
200-15	(Processor Board Kit)	$12.95

QRG ?

MODEL 20 DIGITAL DIAL — Available for Collins and Drake gear. Optional four digit readout and crystal time base. OSY your fixed or mobile transmitter, receiver or transceiver with 100 Hz accuracy and no last digit jitter. Simple one wire connects dial to rig and you're ready to go. **Specify your type of rig.**

Model 20	(5-6.6 Mhz VFO range)	$169.95
Model 20C	(Collins)	$169.95
Model 20D	(Drake)	$169.95
Options:	(4 Digit Readout)	$ 29.95
	(Crystal Time Base)	$ 29.95

CW OPS

MODEL 11A PADDLE — Designed with reliability in mind. No mechanical switches or bearings to fail. Paddle contact spacing adjusts easily.

Model 11A (Assembled) $9.95

MODEL 10A ELECTRONIC KEYER — Has NEW features at no extra cost. Linear Speed Control and Operate/Tune Switch. Plus internal penlight cells and reed relay output provide a compact, portable, versatile unit.

Model 10AWA		
(Keyer & Sidetone Assembled)		$33.95
Model 10AW	(Keyer Assembled)	$28.50
Model 10AK	(Keyer Kit)	$21.95
200-2K	(Keyer Board Kit)	$12.95
200-3K	(Sidetone Board Kit)	$ 4.95

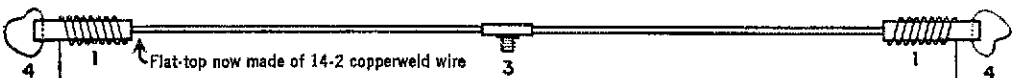
MATRIC
BOX 185A • FRANKLIN, PA. 16323
PHONE: (814) 432-3647

DEALERS:

VE AMATEUR RADIO SALES, Downsview, Ontario, Canada • **SST ELECTRONICS**, Lawndale, CA 90260 • **AMATEUR WHOLESALE ELECTRONICS**, Miami, FL 33155 • **AN-TEK INDUSTRIES**, Elkhart, IN. 46517 • **SIGNAL SYSTEMS**, Bedford, OH 44146 • **KASS ELECTRONICS DISTRIBUTORS**, Drexel Hill, PA 19026 • M. WEINSCHENKER K3DPJ, Irwin, PA 15642 • **HAMTRONICS**, Trevose, PA 19047

LRL-70 ANTENNA

70' LONG, 80 & 40 M • Power rating 2 Kw. P.E.P. or over



PRICE $45.00 In Cont. USA. ppd.

OPERATES ON 2 BANDS AUTOMATICALLY

1. Loading coils for 80 & 40M doublet operation
2. Adjustable ends to set 80 meter resonance SWR 1.5:1 or less at resonant frequencies
3. Center insulator with female coax connector to take PL-259 plug
4. Fittings on insulators to tie on rope

Use RG-8/U feeder

LATTIN RADIO LABORATORIES • Box 44 • Owensboro, Kentucky 42301

BUILD YOUR OWN SPACE-AGE TV CAMERA

ONLY KNOWN SOLID-STATE CAMERA KIT! Ideal for experimenters, hams, educators, industry, etc. ☆ High quality ☆ Backed by over six years of lab & field testing ☆ Fully Guaranteed ☆ Connects to any TV set without modification ☆ Step-by-step construction manual ☆ Model XT-1A, Series D complete with vidicon $169.50 postpaid anywhere in USA & Canada (less vidicon tube $116.95pp)

PHONE or WRITE for CATALOG.
DIAL 402-987-3771

Many other kits, parts and plans available including starter kits, focus coils, vidicon tubes, const. plans, audio subcarrier kit, etc.

BOX 453-QD **ATV Research** DAKOTA CITY, NEBR. 68731

CLIMBING SAFETY BELT

1. (NEW) NYLON/COTTON	(S/B)	WAIST SIZE (33-58)	$15.00
2. (NEW) NYLON/COTTON	(S/B)	BETTER THAN #1. WAIST SIZE (33-58)	$17.00
3. (NEW) LEATHER LINESMAN	(S/B)	SIZE (33-43)	$21.00
4. NYLON ROPE LANYARD	ONE SNAP	USED	$8.50
5. NYLON ROPE LANYARD	TWO SNAP	USED	$13.50
6. NYLON WEB LANYARD	ADJUSTABLE	NEW	$18.50

ITEM 1. and 4. together $21.50 — ITEM 2. and 6. together $33.50
1. and 5. together $26.50 — 3. and 4. together $27.50
1. and 6. together $31.50 — 3. and 5. together $34.50
2. and 4. together $23.50 — 3. and 6. together $37.50
2. and 5. together $28.50

LINK 1000 MONROE TPK MONROE CT 06468

Happenings of the Month

(Continued from page 164)

1973, the Commission adopted an order delegating to the Chief, Safety and Special Radio Services Bureau authority to act on waiver requests of the provisions of Part 97 for amateur radio stations on board satellites. Waivers granted under this delegated authority are limited to rules regarding station location, authorized emissions, station control, identification, logging and operator privileges. This action was taken as a temporary measure pending the development of rules for the Amateur-satellite Service to govern the operation of amateur satellites.

6. It is our objective that the Amateur-satellite Service develop in an orderly fashion and in a spirit of cooperation with other amateur radio activities and services sharing the same frequencies. While we recognize that every eventuality and need cannot be accounted for now, and that further rule making will be necessary, we believe there is sufficient basis for establishing rules. The experience of amateurs with six satellites over a twelve year period should provide adequate insight for developing rules. Accordingly, the Commission will establish rules for the Amateur-satellite Service, in Part 97. We propose to adopt a new Subpart, Amateur-satellite Service, based upon information provided in response to paragraphs 7 and 8 of this Notice, and such other relevant information as deemed appropriate.

7. In order to assist the Commission in formulating rules for the Amateur-satellite Service, knowledgeable parties are invited to submit comments and suggestions on the following:

a. What specific types of stations and/or functions should be provided for in the Amateur-satellite Service, in addition to space stations? Earth stations? Telecommand stations? Others?

b. What should be the station license requirements and privileges for the above stations? What representations should be made for these stations in applications for licensing?

c. What classes of amateur radio operator licenses should be a prerequisite for the above station licenses? What should be the operating privileges at these stations? What material should be added to the examinations for these operator classes?

d. What technical standards should be adopted? What should the telecommand and telemetry requirements be? What emissions should be authorized?

e. What should the rules provide for in the way of operating requirements and procedures? Station identification requirements? Station log requirements? Should distinctive call signs be assigned?

f. What other provisions should be included in the rules?

8. Comments and suggestions on the means by which the Commission can fully and properly comply with the requirements of international agreements are solicited. Geneva footnote 320A to the Table in secion 2.106 requires the Commission to ensure that any harmful interference caused by emissions from an amateur satellite authorized by the Commission to operate in the band 435-438 MHz be eliminated by means of appropriate

(Continued on page 168)

Happenings of the Month

(Continued from page 166)

devices for controlling the emissions. Additionally, the Commission must insure that sufficient earth command stations are established before launch to guarantee that harmful interference can be terminated by the Commission, as stipulated by Article 41, section 1576A, subsection 6 of the ITU Radio Regulations.

9. This action is taken pursuant to sections 4(i), 303, and 403 of the Communications Act of 1934, as amended. Comments must be filed on or before January 7, 1974. All relevant and timely comments will be considered.

10. In accordance with provisions of § 1.419 of the rules, an original and fourteen (14) copies of all comments, suggestions, pleadings, briefs, or other documents shall be furnished the Commission.

FEDERAL COMMUNICATIONS COMMISSION
Adopted: October 25, 1973 QST

How's DX

(Continued from page 101)

getting my DX feet wet on 15. (WB5HVY) . . . TI2IT is a freshman at Penn State. (K3CR) . . Final Novice statistics at WN4ZVF: 883 QSOs with 43 countries and 42 states. QSLs from 19 countries. Last September 19th-20th were just fabulous on 21 MHz, bringing my dipole contacts with six Germans, two F8s, FM7AO, G3ZZR, OK1DIM, OZ7ANSP8GQU and YU2HH. I intend to help start a 28-MHz Novice net with certificates for check-ins. (WB4ZVF) . . . WA2EXP and I lugged 500 pounds of radioteletype and slow-scan television equipment to St. Pierre last fall. We made the first SSTV contacts from that country and gave many DXers a new one on RTTY. (W2JNO) . . . Fine 28-MHz DX results with just a homebrew "Wonderbar" dipole from November '56 *QST*. Now rigging a 4-element Yagi to compete with W2HCW's huge 10-0ver-10. (K2YFE) . . . After hamming for eleven years I just discovered 15 meters. Wow! Worked all continents in a little more than four hours barefoot with a 10-foot-high long-wire. (WA7NEV) . . . W6TI transmits our DX bulletins at 1800GMT Sundays, 0200 Mondays, on 14,002 kHz. The club's membership is 47.1 percent Extra Class. (NCDXC) QST

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, if 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, gov't, police, etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to the L.I. DX Assn., P.O.Box 73, West Coram NY 11727.

EDITING a club paper? Need public relations help? You should belong to the Amateur Radio News Service. For information write: Rosemary Willis, 9276 Borden Ave., Sun Valley CA 91352.

GOOD News — SRRC Hamfest June 2, 1974 at a fabulous new site in Princeton, Illinois Fairgrounds. SRRC/W9MKS, RFD 1, Box 171, Oglesby IL 61348.

TREASURE Coast Hamfest March 9-10; sponsors Vero Beach Amateur Radio Club Inc., and St. Lucie Repeater Association. Community Center, Vero Beach FL 32960. Free Continental breakfast, speaker, Swappers row. Tickets and information write Ike Roach, K4QM, Box 3088, Vero Beach FL 32960.

ROCHESTER, N.Y. — The largest Hamfest in the northeast in on May 17 and 18. Get your name on the mailing list. Write: WNY Hamfest, Box 1388, Rochester NY 14603.

DAYTON Hamvention expands to three days April 26, 27, 28, 1974 at Hara Arena and Exhibition Center. Brochures mailed March 15th. Write for information if you have not attended the last two years. P.O. Box 44, Dayton OH 45401.

GREATEST of them all! That's the ARRL 1974 National Convention! Remember the dates — July 19, 20, 21 at the Waldorf-Astoria, New York City. Three days of exciting events!! Wide array of demonstrations, exhibits and forums featuring latest in fm, SSTV, atv, RTTY, fax, satellites, antenna design, transistors, integrated circuits, DX, MARS, ARPSC and much more. Something to do every exciting minute for YLs & XYLs — tours, New York sightseeing, visits to popular TV shows, parties, fashion shows. Meet the ARRL President, vice-presidents, and all 16 directors! Famous-name speakers at Saturday Night Banquet! For info contact: ARRL Convention, 303 Tenafly Road, Englewood NJ 07631.

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.

WANTED: tubes, transistors, equipment, what have you? Bernard Goldstein, W2MNP, Box 257, Canal Station, New York NY 10013.

QSLs??? Made-to-order!!! Samples 35c. DeLuxe 50c. Religious 35c. (Deductable). Sakkers, W8DED, Box 218, Holland MI 49423.

3-D QSLs — Far more spectacular, little more cost. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

TRAVEL-PAK QSL Kit — Send call and 25c; receive your call sample kit in return. Sameo, Box 203, Wynantskill NY 12198

FREE QSL samples, Samcards, 48 Monte Carlo Dr., Pittsburgh PA 15239.

PICTURE QSL cards of your shack, etc. from your photograph. 500, $12.50. 1000, $16.25. Also unusual non-picture designs. Generous sample pack 30c Half pound of samples 60c. 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 63118.

QSLs 300 for $4.65, samples dime, W9SKR, Ingleside IL 60041.

QSLs "Brownie" W3CJI, 3111 Lehigh, Allentown PA 18103. Samples 10c, Catalog 25c.

DELUXE QSLs, Petty, W2HAZ, PO Box 5237, Trenton NJ 08638. Samples 10c.

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 43691.

FRAME Display, and protect your QSLs with 20 pocket plastic holders, 2 for $1, 7 for $3, prepaid and guaranteed. Tepabco Box 198T Gallatin TN 37066.

QSLs, multicolor glossy; choose Globe, Eagle or straight key. Report form on back. 100 - $5.50. QSL cards not personalized, 100 — $2. Rusprint, Box 7575, North Kansas City MO 64116

QSLs. Second to none. Same day service. Samples 25c. Ray, K7HLR, Box 331, Clearfield UT 84015.

QSLs 300 for $4.95! Samples 15c. Colourcard, Box 326, Topanga CA 90290.

QSLs — Variety, quality, custom. Samples 20c or your QSL. Alkanprint, Box 3494, Scottsdale AZ 85257.

RUBBER stamps, $1.75 includes postage. NJ residents add tax. Clints Radio, W2UDO, 32 Cumberland Ave. Verona NJ 07044.

QSLs catalog. Samples 35c. Ritz Print Shop, 5810 Detroit Ave. Cleveland OH 44102

FREE samples, good designs, fast service. W7UZ Press, Box 2387, Eugene OR 97402.

RUBBER Stamps for Hams — Free Catalog. Brock's, K9OSC, 11021 W. Jeffrey Ct., Milwaukee WI 53225.

QSLs — Free Samples, design-a-card also. K5HYB, Press, Rt. 8, Box 546, Pine Bluff Arkansas 71601.

CANADIAN QSL cards, write for free samples. Bon Rae Specialty, Dept. A, P.O. Box 601, Saint John, NB.

WANTED— Receivers and test equipment made by McMurdo Silver and Guthman. George Publow, Box 969, Picton ON Canada.

CANADIAN Surplus Catalog and flyers — $1. Etcon Electronics, Box 741, Montreal Canada H3C 2V2

DXERS: Sunrise sunset times world wide, twelve months — 50c. VE5XU, 3637 Victoria, Regina Sask. Canada

CASH or trade for old radio receivers, magazines, book, handbooks, catalogs and parts. Erv Rasmussen, 164 Lowell, Redwood City CA 94062.

DX-pedition XYL approved? Montserrat West Indies; beautiful house in tropical setting, overlooking Caribbean and mountains. Large swimming pool, 3 bedrooms, 3 baths, maid service. K. Hollatz, VE3FHO, Box 1077, Elmira, Ontario Canada (519) 669-5582.

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY NY 10012.

CALL Toll-free: (800) 327-7799. Ask for Bob Hoffman (Jaro Electronics Corp.) We buy all types of tubes. Top prices paid for Varian, Eimac, Amperex. Address: 412, 27th Street, Orlando FL 32806. In Florida call collect (305) 843-9551.

WANTED: An opportunity to quote your ham needs. 35 years a ham gear dealer. Collins, Drake, Galaxy, Swan, Tempo, Kenwood, Clegg, Ten-Tec, Hy-Gain, and all others. Also $25,000 inventory used gear. Request list. Chuck, W8UCG, Electronic Distributors, Inc. 1960 Peck St., Muskegon MI 49441. (616) 726-3198. Telex 228-411.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 So. Washington St., Kennewick WA 99336

VERY in-ter-est-ing! Next 5 big issues $1. "The Ham Trader," Sycamore IL 60178

OFFER $10 for Electrical Experimenter May 1913, Popular Electricity May 1908. Wayne Nelson, Concord NC 28025.

MOBILE ignition shielding gives more range, no noise. Kits and custom systems. Literature, Estes Engineering, 943-A West 184th, Gardena CA 90248.

MANUALS for most ham gear made last 25 years. Send SASE for quote. W0JJK, Hobby Industry, Box 864, Council Bluffs IA 51501.

WE BUY electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 150 Miller St., Elizabeth NJ 07207. (201) 354-2420.

TELETYPEWRITER parts gears, tape, supplies, machines, toroids. S.a.s.e. list. Typetronics, Box 8873, Fort Lauderdale FL 33310. W4NYF. Wanted: parts, late machines.

MOBILE ops — Wrtie for info on shielded ignition systems and noise suppression components. Summit Enterprises, 36 Winchip Road, Summit NJ 07901.

SELL: Heathkit SB200 kW linear. Pickup only. Call Ed, K2RCO, (212) 941-7475.

CRYSTALS airmailed: general purpose, MARS — Novice, active FT-243, all frequencies minimum five, 40 m 15 m, 10 m — 99c each, 80 m — $1.59 — Cover bands inexpensively — rock solid. Less than five, 80 m — $1.75 other $1.50. Novice — with VFO or no — four bands — eight crystal package just inside bands for QSO — band limits — $9.95. General purpose: FT-243 .01% 32 pF. 3500-8600 kilocycles $1.80, (five $1.75), (nets, ten same $1.45). 1700-3499, 8601-13000 fundamentals, 10,000-30,000 overtones $2.95. Add 50c each for .005%, 75c for HC-6/u above 2000. Airmail 15c crystal, 1st-cl 10c. Free listing. Bob Woods, W0LPS, "Since 1933" C-W Crystals, Marshfield MO 65706.

TRANSFORMERS rewound, Jess Price, 407 Raehn, Orlando, FL 32806

MONITOR police/fire dispatchers in connection with CD, MARS, RACES work. Official directories show channels, nationwide. Catalog +10 sase. Communications, Box 56-AR, Commack NY 11725.

DO-it-urself DXpedition. Stay at ZF1SB, Cayman Is. Vertical antenna and Caribbean at your doorstep. Diving-fishing if band folds. Write Spanish Bay Reef Resort, Box 800J, Grand Cayman B.W.I.

6-METER/2-meter 2000 watt PEP linear amplifier with 4CX1000A tube. See June 1973 QST article. $350. With 2 spare tubes. Wanted: 1296 MHz low noise xtal controlled converter with 28 MHz i-f. W4UCH.

P.C.'S. Need a project for winter? Send a s.a.s.e. for list of available boards. Semitronics, Charles R. Sempirek, Rt 3 Box 1, Bellaire OH 43906.

WANTED: UTC CG-1C, Eimac SK-506. Specify condition and price in first letter. F. Budavari, 285 Summit Ave., St. Paul MN 55102.

R-390A. Clean, good condition electrically, mechanically — $465. Includes crating, shipping. W6ME, 4178 Chasin Street, Oceanside CA 92054.

PARTS trays — 3 for $1, 12 sections each tray. Santana, P.O. 3477, LA CA 90028.

WANTED: QSLs 1920 and before. Also ARRL Handbook before 1940. W6ISQ, 82 Belbrook Way, Atherton CA 94025.

SONEY F-83 Command Microfone wanted. Perhaps also the 800-B to go with it. Write Reveal, Lawrence Road, Dover NJ 07801.

FOR SALE: TR-3 — $320; AC-3 — $44; MS-4 — $12; Galaxy V Mk II — $215; calibrator — $9; SC-35 speaker — $10; AC-35 supply — $50. All like new. W9HF, 505 Roxbury Ct., Ft. Wayne IN 46807.

BUY, sell, trade. Write for monthly mailer, give name, address, call letters. Complete stock of major brands new and reconditioned equipment. Call us for best deals. We buy Collins, Drake, Swan, etc. ssb & fm. Associated Radio, 8012 Conser, Overland Park KS 66204. (913) 381-5901.

GENERAL Radio antenna insulator (circa 1922) wanted for my collection. Also National Company, Fleron, Ohio brass insulators. Walt Lehnert, 5209 Minnehaha Blvd., Minneapolis MN 55424.

RETIREMENT dream Phoenix Arizona "ham" equipt home. Small 3 bedroom family room, fireplace, lot 120 X 297 feet, Citrus grove, 40' tower, wired 220 V. K7CEH, 1439 E. McLellan, Phoenix AZ 85014.

DRAKE 2B receiver, good condition $175 plus shipping. John Vick, 26 Princeton Circle, Longmont CO 80501.

WANTED: Motorola S-1056 '57, '58, or 59A test set. Also, want G.E. test set, or adapter to use Motorola test set on G.E. equipment. N. Swan RR2, Ludington MI 49431.

TEKTRONIX 535A oscilloscope; dual trace, triggered sweep. Less probes, laboratory calibrated — $575 or best offer. You pay shipment. H. Karimi, Box 405, Fairborn OH 45324.

FOR SALE: Heathkit SB-200 amplifier — $200; SB-630 station console — $75; SB-610 monitor scope — $75. All are complete with manuals, are on the air and in good condition. Need money. John Small, WB2HOM, 78 Croft Lane, Smithtown NY 11787. (516) 265-0457.

SELL: Pearce-Simpson Gladding 25 fully equip with crystal's — $189. G. Smith, WA9GUE, 340 Granville, Bellwood IL 60104.

COLLINS MP-1 mobile power supply, new, never used. Trade for Bird Model 43 Wattmeter, GE Pocketmate, HT220 or sell — $150. WB8IJX, 3636 Douglas, Toledo OH 43613.

SELL: Antenna Specialists PA50 5/8-gain two-meter bumper mount antenna. Used three months — $25. Thomas Ferguson, W1WFL, Milton Road, Litchfield CT 06759.

SELL: Hallicrafters SR-400 Cyclone II with a/c power. Excellent condx — $550. K7KOX, 3070 E. Burnside, Portland OR 97214.

HALLICRAFTERS: HT-33A — $225; SX-101A with product Det. (factory sch.) — $175. Both mint, with manuals. W1JSS, 9 Winter Terrace, Westwood MA 02090.

SELLING out: SB-102 with cw filter; HP-23A ps & SB600 spkr — $335; HM-102 pwr. mtr — $24; HDP-21A mic — $18; GH-12 mic — $5; HN-31 dummyload — $6; HyGain Triband beam — $45; HS-24 spkr — $5; SB200 — $195. You ship. W. H. Wiley, POB 52, Montara CA 94037. Ph. (415) 728-7136.

WANTED: Any kind of RTTY pictures on reperf tape. Send to WB2JIC, 7 Birarcliff Drive, Monsey NY 10952.

QUAD/Rotator, fiberglass, spider, AR-33, has two DXCC's, guaranteed. $100. D. Nixon, K3ZNJ. Phone (301) 725-1496.

SELL: Heath SB-300 — $175; SB400 — $185, SB630 — $40, or entire station (incl. dummyload, line filter & turner mike) — $425. Mint. W3LSR. (301) 472-4845.

HW-16 accessories — $100, or offer. Jim Fox, P.V. West, Box 93, A.S.U., Tempe AZ 85281.

SELL: Heath SB300 — $200; SB400 — $200, both excellent condition. WB8GGM.

SWAP even: Have HA-6 six-meter transverter and power supply; want decent receiver. W5TTH, 1423 Preston Ave., Austin TX 78703.

SWAP Collins 75A4 & EWS1 also three narrow band fm transceivers with linear for accumulations of Indian Pennys silver dollars, gold pieces or guns & war souveniers. W2MCA, Rivoli TV, 287 W. Merrick Rd., Valley Stream NY 11580. (516) 561-8464.

COLLINS 75S3A top condx — $400; Ranger II — $100; G. Burwell, Box 36, Maplewood NJ 07040. Will ship your expense.

WANTED: Johnson Matchbox. Albert Ayting, Baden-Wuerttemberg APO 09154.

CLEGG Venus 6 transceiver with power supply; Clegg Apollo 6 linear amplifier with powerstat and meter; Clegg signal booster; Drake R4 receiver with MS4 speaker; Polycom 2 transceiver with mike; Millen grid-dip meter 90651 complete, like new, manuals, highest offer accepted; all inquiries answered; Ameco nuvistor 6 & 2 converters with power supply, preamp and selector box, no kits; Maverick 6-meter filter, D K antenna TR switch 242, Drake LP filter 1000, instructograph with tapes, microphones — Astatic D 104-G stand; Shure 440 SL; Turner 251 high-low impedance; RCA 331-8; Astatic T-3 and 788; 2B & W 6-position switches; Kreco ground-plane antennas GP-2A and GP-6A (never used). You pay shipping. WB2ASR, Philip P. Zarch, 2728 Kings Highway, Brooklyn NY 11229.

"DON and Bob" discount prices plus full warranty. Call or write fast quotes. All items new, guaranteed. SBE144 — $199.95; Midland 13500 2 M fm 15 W mobile — $219.95; 13509 W-T 2 W — $209.95; 20% plus off list; HyGain: TH6DXX — $143; Mosley-Classic 33 — $124; Ham-M — $99; TR44 — $59.95; Belden 8-wire rotor cable 8448 10c/ft; 8214 RG8 foam coax 17c/ft; HyGain 400 rotor ($230 list) — $179; 5 cond. rotor cable 19c/ft; 15% off list Triex tower; Motorola HEP170 Epoxy diode 2.5A/1000 PIV 29c; $25/100 lot; Write quote Swan, Drake, Kenwood, Ten-Tec, Eimac. All items guaranteed. Free flyer. Prices FOB Houston. Madison Electronics, 1508 McKinney, Houston TX 77002. (713) 224-2668 nite/weekend (713) 497-5683.

DRAKE 2-C revr with 2-ac and 2-CQ speaker/q-multiplier — $190. FOB. R K Martin, WB0CQJ, 1869 W. Campus Road, Golden CO 80401.

WANTED: Drake TC2, excellent condition with manual. WA2AOF, A. Jefferson, 444 Roland Avenue, Pottstown PA 19464. (215) 326-7771.

MINT Swan 500 CX 117 XC VX-2. You make offer. WB2IWH. (201) 779-2562.

WANTED: Johnson Viking I or II in 1st class shape. Premium-paid. W2DEO, 391 Valley Rd., Watchung NJ 07060.

SELL 2-meter fm transceiver Gladding 25 with 6 crystals and ac power supply used once, excellent condx. I pay shipping by UPS anywhere USA. — $199. Karl Rittinger, K3BSX, 1231 Wyoming Ave., Forty-Fort PA 18704. (717) 287-1204.

HEATHKIT HR-10 and DX-60B, very fine — $110 or best offer. Sean Logghe, 710 Orchard Place, Northfield MN 55057.

NOVICE xmtrs; Eico 720 and Heathkit DX-35. Also Hustler 4BTV vertical and Heath HD-11 q-multiplier. Must sell. WB9FDR. (414) 258-4577.

HEATH SB-301, speaker, a-m, cw, ssb filters; vhf converters. Expertly wired — $250 firm. WA5GQT, Parker Dinkins, 7006 Dominican, New Orleans LA 70118.

HEATH SB-301; SB-401; SB-600 filters — $460; SB-620 scanalyser — $99; SB-200 — $199; HW-16 — $89, all excellent clean gear; purchased new, wired and tested by BSEE, K9HDP. (317) 896-3626.

WANTED: Invader 200; preferably from within 100-mile radius of New York City. State price and condition. W2LRL, 2 Birch Lane, New Hyde Park NY 11040. (516) FL4-8903.

SELL or swap Hammarlund HQ-110C revr — $90, plus shipping. Swap for Heath HW-16. WA3TBA, 418 Hickory St., Warren PA 16365.

R390A receiver, mint condition with custom case and extras. Dirt cheap. David Nixon, K3ZNJ, phone (301) 725-1496.

FOR SALE: Heath HW-100, works good, mobile mike; HP-23, 8 new tubes plus extra finals — $250; Heath SB-200 linear less than a year old, perfect — $200. For quick sale take both for $400. Ore gone Yaesu. Wanted tri-band beam, tower, Ham-M rotor. David Critchlow, Box 567, Union City TN 38361. Phone (901) 885-0744 (day).

SELL Measurements, model 760 frequency and model 140 deviation meters — Secode 673 RPD decoders. WA9III, 1700 E. Jackson, Springfield IL 62703.

NATIONAL NCX3 transceiver and ac power supply, from estate — $200, FOB, V. Bailey, 2823 S. 3rd St. Louisville KY 40208.

FOR SALE: One Pickering KB-1 keyboard keyer. Chas. Sodergren, 9017 Shady Lane, Wonder Lake IL 60097.

FREE with the purchase of a new Genave GTX-200 at $259; 18 crystals of your choice. Send cashier's check or money order for same-day shipment. For equally good deals on Drake, Standard, Clegg, Regency, Hallicrafters, Tempo, Kenwood, Midland, Ten-Tec, Galaxy, Hy-Gain, CushCraft, Mosley, Sony, and Hustler, write to Hoosier Electronics, your ham headquarters in the heart of the Midwest. Become one of our many happy and satisfied customers. Write or call today for our low quote and try our individual, personal service. Hoosier Electronics, Inc., R.R. 25, Box 403, Terre Haute IN 47802. (812) 894-2397.

FOR SALE: Heathkit SB-102, SB-200 spare finals, SB-600, SB-640 VFO, HP-23A, keyer, desk mike, wattmeter, Magnum Six. Mint — $800. Want used quads. Dick Whetstone, St. Matthews SC 29135. WB4QZT. 874-3177 weekend nights.

YAESU FL2500-2 kW, PEP linear 160 M-10 M — $200. Paul W. Haczela, 8 Yale Place, Armonk NY 10504. (914) 273-9067.

TNT early 30's QST xmtr with VT2 tube 40 M coil & 500 V PS ant and key works fine sell $50. Box 8352 Savannah GA 31402.

TWO-meter fm xmtr/rcvr GE 4ES12/13 and HB a/c power supply $45; Amprobe clip on model TM-63 — $45; capacitors 8 mf 25.00 volt, others Heathkit tuner — $25. Bob, K9DPZ, 4420 Prospect, Downers Grove IL 60515.

SELL: 75A-4 500 Hz filter, Vern. knob, noise blanker — $295; Tempo FMV, ac supply 34/94, 46/94, 16/76 — $175; SR-42 and VFO — $75. Aerotron GN15 — $50; Dycom 50 W amp — $60; Motorola G-Strip xmitter — $10; Motorola T44 450 w/man — $20. W9OHH, Zielinski (312) 279-8057.

SALE: SB-610, excellent condition. W5PGP, 10509 Marsh Lane, Dallas TX 75229.

FOR SALE: Johnson Invader 2000 — $400; Collins 32V-3 $175; ST6 AFSK-FSK 170-850 shift — $300; SC101 Station control, relay box, relays for 5 antennas — wire channel — $400; Hallicrafters keyer & key — $65. WA1HNV, 12 Grove St., East Rochester NH 03867.

HYGAIN TH-2 MK3 — $59.95. W6RQZ, 1330 Curtis, Berkeley CA 94702, (415) 526-7345.

SELL: NCX-5 MK II, NCX-A — $350; HW-32 — $45; TX-62 — $60. All excellent. WA2CNT, Bob Harrison, 43 Hopewell Drive, Stony Brook NY 11790.

FOR SALE QST 1935- thru 1947; 1958 thru 1973. Radio — 1939 & 1940. CQ 1964 thru 1967. $18 each year trans. pd. One almost new SBE34 with mike and 75 mtr. Hustler ant. — $400. Manuel H. Johnson, K4SRF, 113 No. 3 Notch St. Troy AL 36081. Phone (205) 566-4588 daytime.

SELL Drake T4X, R4, MS4, AC-3. All manuals, original factory packing. Recently overhauled, good clean working gear — $600. Michael D. Harrison, 431 Windsor Pl. Oceanside LI NY 11572. (516) 536-5320.

WANT: H-P model 516B digital printer, in good working condition. Thompson, Box 187, Gorham NH.

KWM-2A, 516F2, very good condition — $700. FOB. Hammond, W1GCD, Box 49, Brooklin ME 04616. (207) 359-8960.

FOR SALE: Ten-Tec model PM-3A excellent condx — $55. I ship. WA5BMN, Rt. 1, Box 80-Q, Portales NM 88130.

COLLINS KWS-1 in fine condition — $495. Tel. (218) 736-6624 evenings. K9GRS, 1007 W. Summit, Fergus Falls MN 56537.

FOR SALE: Like new Signal One CX7 — $1350 and ETO Alpha 70 Vapor — $1450, both for $2675. WB5BYW, 4330 South Alameda, Corpus Christi TX 78412.

SELL: Swan 350C — $290; Hammarlund HQ-170AC receiver — $175; Heath Twoer, modified — $25; Swan 117X power supply with 14X dc module — $80; Heath phone patch — $20; Swantenna model 85 — $70. FOB. All items excellent condition. James M. Benjamin, 2203 Archer Trail, Denton TX 76201.

SBE-144 with crystals and Hustler antenna, and HW7 with headphones. Make offer. Ken Hand, WB2EUF, Bridgehampton LI NY 11932. Tel (516) 324-4066.

FOR SALE: as a complete package only: Collins 75S3B with 800 and 500 cps filters, 32S3, 312B4, 516F2, SM4, and Waters dummy load 384. Near mint, only 350 QSOs. Manuals, cables, cartons — $1650 firm. WBØDAT, 208 Chief Street, Cherokee IA 51012.

FOR SALE: package deal, Heathkit HW-12A xmitter, HP-23 ac supply; HP-13 dc supply, and 75 m mobile helicoil ant - $135; also model 14 teletype — $50. Milt Johnson, W1EGS, Wheeler Hill Drive, Durham CT 06422.

TELETYPE machine $60, pick-up only; DX-40 — $50, like new. Larry Dodd, 1033 West Spruce, Junction City KS 66441.

HALLICRAFTERS SR-400 transceiver; HA 20 Ext-VFO, 500 A ps and Swan TV-2B beam ant (all less than 2 years old) — $650, firm. Going to college. Larry Reimer, WB9GHI, 1312 Ruger Ave., Janesville WI 53545. Phone (608) 752-9651.

COLLINS 200 Hz crystal filter X455KQ-200 wanted. W1RML, 31 Midwell Road, Wethersfield CT 06109.

BUILDING kW amp, need parts. Contact Rod, W7PXS, Rt. 1, Box 89, Oakland OR 97462.

SWAN 500 c (late model), 117-XC, VX-2 — $450; Drake TR22 — $170; Robot 70A SSTV monitor — $270; Hy-Gain 14 AVQ — $35; CushCraft 7-el 3-meter and AR-22R rotor — $35. WB2ZSY. (212) 461-3278.

SELL: Lampkin 105B frequency meter, good to 175 Mc., recently re-calibrated — $85, postage paid within U.S. D.L. Daniel, WAØSVO, RR 2, Box 115B, Lawrence KS 66044.

WANTED: Vox for SB33. K6YIE, (408) 263-0347. Rt. 2, Box 749B, San Jose CA 95131.

SINGER SB12-B panalyzor VG condition, best offer. WA1HAR.

ALL Heathkits: Vom-MM1 — $25; 15 W Monoamp AA-161 — $20; RF-1 Signal Gen. — $20; TV Post-Marker/Sweep Generator IG-57 — $110; am/fm tuner AJ-11 — $35. Curt Gamble, K8IBQ, 7283 Thomas Drive, Cincinnati OH 45243. (513) 561-5330.

FOR SALE: 30S-1; 51S-1; 55G-1; 312B-4; 32S-3; 516F-2; Hallicrafter keyer; Vibroplex key, package — $2,875. You pay shipping, certified check or money order. All in excellent physical and functional order. No time to use. K8ACF, 15317 W. Brant Road, St. Charles MI 48655. Phone (517) 585-2966, nights or weekends (517) 636-9333, days.

FOR SALE: TH-6 DXX Hy-Gain antenna. I pay shipping. Henry, CE3JP/W6, 1209 Roberta Court, Barstow CA 92311. (714) 256-7385.

HEATHKITS repaired, aligned. Parrish, 306 W. Amherst, Melbourne FL 32901.

DRAKE R4A, excellent — $265. WB4WZR, 8441 SW 142 St, Miami FL 33158.

SERVICE manuals most Hammarlund equipment, since 1930 — $5 each, postpaid. Will align, Hammarlund and other receivers to original specifications, 15 years factory experience. Wayne Cordell, Rt. 4, Weaverville NC 28787. (704) 645-7070.

HEATHKIT HW-12A (80); HP13 dc, and ac supply — $140. W6BLZ, 528 Colima, La Jolla CA 92037.

SELL: IRE Proceedings unbound 1928 thru 1972, 45 volumes, best offer. Gonset G50 6 m xcvr — $110. WA2DWV, RD1 Box 155, Freehold NJ 07728.

ASTRONOMER Hams: Complete Questar, standard, full sun filter; Exacta 35 mm SLR; Linhof tripod, etc. — $1200. WA8YNI, 1720 N. Broadway, Hastings MI 49058.

LOOK, sell or swap: Tektronix high-frequency sampling scope, look at your 432 MHz carrier, mod 661 with 5 T1 and 4S1 plug-in's, new was $4000, excellent clean condition. Need clean Collins 30S1 linear. W2YPM, Top-O-Hill Rd., Wappingers Falls NY 12590. Phone (914) 297-3461.

FOR SALE: Hallicrafters Hurricane SR2000, ACPS with HA20 too much equipt highest bid or trade? WA3KKL, Dick, 9771 Woodland Rd., Pittsburgh PA 15237.

GROUNDED grid filament chokes 22 amps — $5; plate chokes 600 mA — $4; 2 amp — $6; 3-30 Mcs 1/2 X 5" ferrite rods — $3 PP USA 48. William Deane, 8831 Sovereign Rd., San Diego CA 92123.

NEW HW32A w/HP23B, perfect — $150. K8IKB, 407 Normandie, Bowling Green OH 43402. (419) 352-8734.

QSTs of 1916, March through July, wanted for any unreasonable price. Also, any tubes purchased at 5% over prevailing market price. Ted Dames, 308 Hickory St., Arlington NJ 07032.

SALE: NCX 1000 transceiver 1KW; Hammarlund HQ-170A VHF; Hammarlund HWL, one, all in mint condition. John E. Rightmyer, 605 South 4th Street, Hamburg PA 19526.

STUDYING for FCC ham exams? Try Posi-Check, original expertly devised, multiple choice questions and diagrams covering all areas tested over in FCC exams. Keyed answers with explanations. IBM sheets for self-testing. Each classification complete for its class. Advanced class — $4.50; Extra Class — $4.75. General class newly written in line with new FCC exams, including new section on Rules and Regulations — $5; first class mailing included; air mail 25c extra per copy. New Novice now available. Write for price. Send check or money order to Posi-Check, P.O. Box 3564, Urbandale, Des Moines IA 50322.

DRAKE T4XB, R4B, AC4, MS4 & HA-10 Keyer — $800. Gene Crumrine, K3OFV, 18-W Front St., Media PA 19063. Tel. (215) 566-0934.

WANTED: Hewlett Packard electronic distance measuring infra-red unit, for surveying. Also, old antique world maps of U.S., any States and towns. Paul Neveu, Jr., 60 Northwestern Dr., Bristol CT 06010. Phone (203) 582-4885.

COLLINS 75S-3 serial 14K. Complete with 200 Hz filter. Very clean, top condx — $499. Brand new 2-meter TR10 2200-G — $170. Both firm FOB. San Diego, W6KS. (714) 274-7060.

HEATHKIT SB-102, cw filter, ac and dc supplies, mobile mount, remote LMO, speaker, manual, asking $475; Heathkit SB-110 ac supply, speaker, manual $225; also Hallicrafters HA-1 keyer — $50. All good condition. John Boston, WB4RUA, Box 354, Calhoun GA 30701. (404) 629-3048.

DRAKE TC-2. Wanted working or not, over $250. If clean. WB8RKC, 1014 Woodbridge, Ann Arbor MI 48103.

SELL: QSTs 1935 to 1968. Best offer. W9TCO, John Coffey, 5444 N. Monitor Ave., Chicago IL 60630.

QST 1917/1919 — few 1921-22 wanted by serious collector. Letters answd airmail, Jock, ZL2GX, 152 Lytton, Gisborne New Zealand.

SELL: Heath Sixer, Tower, like new, with xtal — $20 each. Olson 6 m xcvr, 15 watts — $60. Motorola U44BBT, less accessories — $40. Postpaid in USA. WA4JNA, Thomas Ellison, 6050 Drexel Rd., Pensacola FL 32504.

HEATH HX-20 all-band sideband cw transmitter — $80; Collins 75S3, excellent — $400; R-390A — $300. 602 North 2nd Ave., Northwood IA 50459.

SELL: Gonset Communicator III — $100. Ken Christensen, W6LCZ, 2615 Rancho Cabeza Drive, Santa Rosa CA 95404.

FOR SALE: Heathkit SB-401; SB-301; SB-600, excellent condition — $395. Bill Johnson, 4427 Wightman St., San Diego CA 92105, (714) 282-5793.

FOR SALE: HW22A, HP23, HP13, resonator, bumper mount, speaker — $150. Stuart Leiman, 78 Fallon Ave., Elmont LI NY 11003. (516) 437-4147.

JOHNSON Valiant — Factory-wired 1958; HQ-110 1958, manuals, QST 1959-73, complete, all as is — $100. K1JKA, Box 1661, Duxbury MA 02332. (617) 934-5781.

GLADDING 25, preamp, touchtone and extra crystals — $175. FOB. O'Brien, 8401 N. Atlantic L15, Cape Canaveral FL 32920.

WANT Collins KWM-2 or 2A with ac, or complete S-line, also want 30L-1 or 30S-1 must be clean and priced right. Sell absolutely mint 51S-1 receiver — $1200 or trade for complete late model S-line. Richard Schark, 417 North Ferry, Ottumwa IA 52501. Ph (515) 682-5741.

COLLINS 51J2 with matching speaker — $150; 32V3 with new 4D32 — $125. All FOB. H. W. Bower, W4DLM, 5203 NE 24th Terrace, Fort Lauderdale FL.

SWAN 270 with IC audio filter, sidetone and spare tubes — $350; Waters 375 coax switch — $7. I ship. WA2GMD, 8 Hollis Pl., Huntington Station NY 11746.

SELL: Argonaut mint condx with power supply — $255; Shure 444 — $20; HW16 good condx — $60. Andy Woolfries, Osage IA 50461.

6-meter FM mobile and base stations. Write for description and price. W5MUG, 2469 Paden, Jackson MS 39204.

IN College, must sell — Drake TR-4, AC-4, MS-4, hardly ever used, mint condition, will deliver 150 miles — $550. Jerry Marquith, Fraternity Complex C, Warrensburg MO 64093.

EICO 717 keyer — $25. Burge, 228 No. Glenroy Ave., Los Angeles CA 90049.

HAVE QST's from 1931 to 1972 with about 8 issues missing. Make offer. Clinton Hoar, 32 Cumberland Ave., Verona NJ 07044.

HALLICRAFTERS tri-bander SR-160 & dc & homebrew ac supply — $200; Heath HW-30 Twoer — $25; Hy-Gain 64B 4-element 6-meter beam — $15. Tom Howey, WB2IML, R-2 Coachmen Manor Apts., Lindenwold NJ 08021, 627-3199.

AIRLINES personel interested in amateur net. Write Dick Kalman, W6GZG, 18450 Ogilvie Drive, Castro Valley CA 94546.

BEST offer takes. WW I airplane spark gap transmitter. Type BC 15A. Weighs 7 lbs. Find condition. W2YYL.

WANTED: Tranco 7-34 transformer for Devry tech. oscilloscope. VE5PX. 56V-OS9.

SWAN-350 with ac power supply. Baugin priced at $300. FOB. V. Bailey, 2823 3rd, Louisville KY 40208.

FOR SALE: QST magazine 1922 to 1962, 415 months, best offer over $100. Wooldridge, P.O. Box 242, Bernardsville NJ 07924.

"HOSS Trader Ed Moory" says he will not be undersold on cash deals! Shop around for your best price and then call or write the HOSS before you buy! new Galaxy GT-550A transceiver (reg. $595) cash — $439; Demo TR-4C — $479.95; Demo Swan 500CX — $429; Demo Swan 270B — $379; factory authorized dealer for Drake, Collins, Swan, Clegg, and others. New Rohn 50 ft. heavy-duty foldover tower, prepaid — $255; new Mosley CL-33 and demo Ham-M rotor — $215; used equipment: R4-c — $399; T-4XC — $425; R4-B — $309; Ham-M — $85; nice KWM-2 — $549; FPM-300 — $489. Moory Electronics Company, P.O. Box 506, DeWitt Arkansas 72042. Tel: (501) 946-2820.

SIGNAL/One, new latest production — $2195; used CX7A — $1300; used CX-7 — $1200. All guaranteed perfect working condition. Drake 2C with 2CQ and calibrator — $180; package deal with R4A, T4X, AC4 and MS4, perfect — $800; SBE-34, perfect — $200; Ten-Tec PM3A — $35; Collins 351D-2 mobile rack for KWM-2 — $45; Heath HW-16 — $75; Motorola HEP-170 diodes, 2.5 A, 1000 PIV — $19.50/C. Kenwood Twins at special price. Save 10% on new TS900 demo unit. Bob Douglas, W5GEL, Douglas Electronics, 1118 South Staples Street, Corpus Christi TX 78404.

MOTOROLA HT-200 handie-talkie, setup for 94/94 & 34/94, Nicad & charger — $150. WB6KCN, Eric, 12030 Washington Bl., LA CA 90066. (213) 398-0680.

SALE: 2m fm raobile xcvr 80D W/3 xtals xmt & rcv w/mike & tuning head etc — $115; Seneca 2 & 6 m xmttr a-m or cw with mike & ant, relay — $115; Heath SW rcvr Mohican GC1A 80-10 m — $60; 2 m fm handi-talkie Bendix No. 1H01C — W/94-94, xtal, rcvr, needs align — $45; 2 m conv Fecraft i-f 14 MHz, needs align — $12; 2 m conv int'l xtal i-f 7-11 MHz w/supply — $25 or swap for Ameco VFO 621 or R5; 2m xmtr & rcvr Motorola No. FMTU-30DC2 & FMRU-16V w/94-94 xtals, no time to try out — $45, both. Call (219) 887-9284. WA9YOZ, 4259 Harrison, Gary IN 46408.

DRAKE R4A receiver — $235; IC-21 2 m fm base with 17 sets crystals — $335; Heath SB-110; SB-500, and PS — $350. K8YQH, 1340 Brainard Woods Dr., Dayton OH 45459. (513) 885-3905.

2 kW & PEP homebrew linears; 3-400Z's with HD PS — $210; 4CX1000A w/spare, no. PS, 90% complete — $95. K6HER, 585 Grand Ave., Colton CA 92324.

FOR Fast Sale: National receivers NC300 — $125; NC303 — $150, both with matching spkrs xtal calibs 160 thru 10 mtrs, plus dial calib for 6 and 2 mtrs, perfect. Collins 75A4, serial 1457 with 3 kHz filter — $225; deduct $25. If pick up deal. W4ITD, 1230 S.E. 9th Ave., Pompano Beach FL. (305) 781-5387.

SWAN-350 with 117X power supply (no spkr.) — $320 or trade for 75A-4. Heath Apache TX-1 — $60, both excellent condition. Richard Brunner, W1ATO, 10 Brookside Drive, Foxboro MA 2035. (617) 543-7275.

HALLICRAFTERS SR2000 & P2000 2 kW xcvr — $850; Collins 75A4 high ser No. 4125; .6 & 3.1 filters — $395, all mint, no mods. Don Burns, 4410 Reading Rd., Dayton OH 45420. (513) 256-0345.

BC-610's model E & F with speech amps, tuners, coils and tubes — $100 each. U pay shipping. Bob Willett, 1535 N. Calhoun Rd., Brookfield WI 53005.

TUBE tester wanted. W2GL, 61 Chatham Street, Chatham NJ 07928.

SELL: Heath SB-102, ac supply, speaker — $450; National NCX-3, ac/dc supplies — $300; Sony TC-440 auto-reverse tape deck — $350; rectilinear X1 speakers, pair — $150. WA0GAE, Bruce, Mount Ayr IA 50854. Phone (515) 464-3627.

HEATH IG-72 audio gen — $35; PK-3 rf probe — $3.50; ant spec HM80 2 m whip — $12; Collins F455FA-05 — $30; Cesco CM-52 SWR bridge — $20. F. S. Eggert, Box 2154, Livonia MI 48151.

SELL: Touchcoder with memory, typewriter keyboard sends perfect code all speeds, neat — $245, no trades but postpaid. Sase information. Stuber, W8PJH, Amherst OH 44001.

SSTV, monitor tubes, focus magnets, yokes 5 amp rf ammeters. S.a.s.e. info. Lotz, W5HCO, 750 Florida Blvd., New Orleans LA 70124.

SELL: Hallicrafters SR-150 transceiver 80-10 m, PS 150-120 — $395; Heathkit DX-60A xmtr; HR-10B rcvr, xtal cal. spkr — $140; DeVry kit oscilloscope and Trvm — $60; offers? Will ship. WN7VPP, 730 NE 80th Ave., Portland OR 97213.

FOR SALE: RA88 recv — $125; TX-1 trans — $100; Johnson Match Box 275, reflected power — $85, all mint. W1TPV. (203) 655-9439.

CALL letter license plates wanted for collection. I'll pay postage. Art Phillips, WA7NXL, 3401 N. Columbus Apt. 5-O, Tucson AZ 85712.

FOR SALE: Hallicrafters HR-44 transmitter, all new tubes, complete factory realigned, mint condition with PS-150-120 power supply and manual — $250; Hallicrafters SX-117 receiver, all new tubes, factory realigned, mint condition with manual — $250, complete package — $450. Jim Gysan, W1VYB. (617) 922-3850. 53 Lothrop St., Beverly MA 01915.

FOR SALE: Ten brand new Eimac 4CX-350A's; two will run 1 kW output hf or thf — $25 each. Also have two brand new 4CX-5000A's, make reasonable offer. K4RUQ, P.O. Box 805, Cambridge MD 21613. Call evenings (301) 228-8534.

SELL: Heath SB303 receiver — $275; SB401 transmitter — $225; SB220 linear — $325; linear — $325; SB650 frequency display — $150; SB610 monitor scope — $70; SB620 Scananalyser — $100; SB630 console — $70; Hal ST6 — $200. Will ship. WA2CXM, 92 Coventry Ct., Voorheesville NY 12186. (518) 765-4338.

FOR SALE: HW12A factory checked — $50; Ranger, good condition — $50. Mike Farrow, WA4IVP, 13205 Johnny Moore Lane, Clifton VA 22024.

COLLINS mechanical filters, new F455H-21, F500Y-31S — $15 ea.; F455Z-7; F452C-10 USB & LSB set — $25 or $15 ea.; Xtal SSTV ISB, others. S.a.s.e list. New CTS Knights JKTO-47 1 MHz TCXO, Aging 2 X 10^{-9} /day. Octal plug-in. Orig cost $239, sell — $35. Add 50c postage. WB6ORT, C. Isham, 6275 Arnold Way, Buena Park CA 90620.

DRAKE T-4XB, R-4A excellent condx — $700. DeFendis, 1422 W. Ashcroft, Fresno CA 93705.

FOR SALE: Drake 2C perfect — $175. WN1SOZ, 18 Summer St., Claremont NH 03743.

FOR SALE: 1 Swan 80 m - 10 m mobile ant — $15; 10-26 V, coax relays — $10 ea; Morrow MB-560 50 W 80-10 m xmtr — $25; MB-6 rcvr — $50; E/V PA speaker — $25; 5-100 CFM muffin fans — $10 ea.; 2 Simpson 260 VOMs — $25 ea; 2 4-1000 — $35 ea.; 2 4CX1000 — $35 ea, Lambda 0-350 V 800 mA p/S — $50; 15 amp variac — $25; PACO V-70 VTVM — $15; Heathkit HW-22A — $85. David L. Marshall, KØBKD, 1117 June St., NE, Albuquerque NM 87112.

WANT: information on station WCJ, which operated at Blatchley and Peck Streets, New Haven, around 1920. Want Gilbert Radio Products, other Gilbert products. Don Hilke, K9CMN, 3381 Howell, Milwaukee WI 53207.

NCX-5 Mark II with 100 kC marker and unused pair finals. Original owner — $360, certified check. Spencer L. McCarty, 98 Delmar Place, Delmar NY 12054. (518) 439-2889.

SELL: SBE-34, SB3-mic mike, mobile mount, Hustler antenna with 75 and 20-meter coils. Excellent condx — $250. WA2JLM, 175 E. 17th St., Huntington Sta. NY 11746.

HEATHKIT SB-110A 6-meter SSB transceiver and HP-23A power supply with manuals. I will pay shipping — $250. Dick McKenna, WA9FUD, 10231 Greenbrook Court, Indianapolis IN 46229.

TEKTRONIX 543/a mods, with type H plug-in — $400; Tek type N plug-in — $50; Gertsch FM-3 freq. meter — $225; HP 400DR — $65; Boonton 207G Univerter — $50; HP-540 B — $100; HP-560 A — $150. All equipment in very good condition. FOB, S. Meith, P.O. Box 14508, UCSB, Santa Barbara CA 93107.

COLLINS 75A4, serial no. 3994, mint condition, Vernier tuning knob, filters, speaker — $395, or best offer. WN2EJS Box 632, Cocoa Beach FL 32931.

WANTED: Swan 406 VFO. K5UPV.

JAMAICA: Hams invited to rare DX location. For information on available gear, accommodation, reciprocal licensing, write: 6Y5HF, Box 92, Montego Bay, Jamaica.

HEATHKIT SB-100 with HP-23 mike and speaker — $300. Regency HR-2, 15 crystals, E-Filter, preamp — $200. Will ship or deliver. W1MBX, Prospect CT 06712. (203) 758-5858.

DXers: copying ham sentences in 54 languages get QSLs! K4CHP's DX QSL guide — $3.95. Joe Mikuckis, 3916 Furman Pkwy., Riverdale MD 20840.

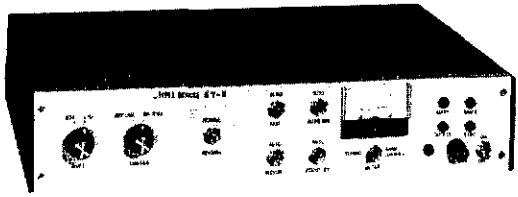
COUNSELLOR — Penna. Brother-Sister Camp seeks Ham Radio college man with a General License. David Blumstein, 1410 East 24 St., Brooklyn NY 11210.

MOTOR generator, up to 9 VDC @ 100 mA — $3 or $5 per pair postpaid. W2GKF, 55 Runnymeade Road, Berkeley Heights NJ 07922.

Advertising Index

CW or RTTY, whichever way you go,

HAL HAS TOP QUALITY YOU CAN AFFORD!

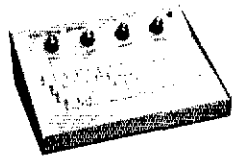


TOP QUALITY RTTY...WITH THE HAL MAINLINE ST-6 TU. Only 7 HAL circuit boards (drilled G10 glass) for all features, plug-in IC sockets, and custom Thordarson transformer for both supplies, 115/230 V, 50-60 Hz. Kit without cabinet, only $135.00; screened, punched cabinet with pre-drilled connector rails, $35.00; boards and complete manual, $19.50; wired and tested units, only $280.00 (with AK-1, $320.00).*

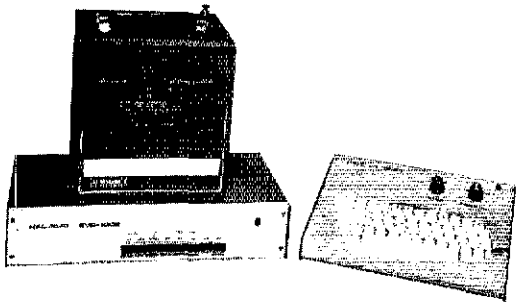
TOP QUALITY...WITH THE HAL 1550 ELECTRONIC KEYER. Designed for easy operation; perfectly timed CW with optional automatic ID for sending call letters, great for DX and RTTY; TTL circuitry, *transistor switching for grid block*, cathode keying. Handsome rugged crackle cabinet with brushed aluminum panel. 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 1½" 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. RVD-1002, $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. RKB-1 assembled, only $275.00.*

HAL provides a complete line of components, simi-conductors, and IC's to fill practically any construction need. Send 24 cents to cover postage for catalog with information and photographs on all HAL products available.

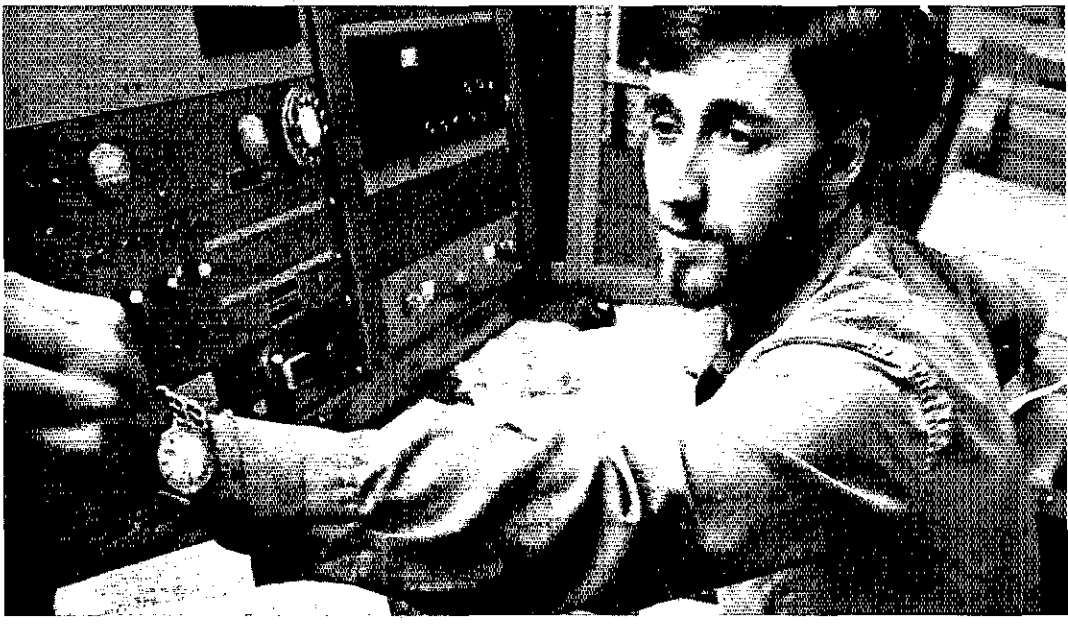
*Above prices do not include shipping costs. Please add 75 cents on parts orders, $2.00 on larger kits. Shipping via UPS whenever possible; therefore, street address required.

Your BANKAMERICARD welcome here

master charge THE INTERBANK CARD

HAL COMMUNICATIONS CORP.
Box 365 A, Urbana, IL 61801 (217) 359-7373

Instead of just saving QSL cards, you can help us save lives in the U.S. Coast Guard.



You could be the communications link between a freighter sinking in a raging storm and the Coast Guard's search-and-rescue teams.

You could be radioing for supplies to feed the victims of a raging Mississippi River flood.

You could be sending pollution-control experts out to contain an oil spill off California.

In the Coast Guard, there's nothing routine about being a radioman. When you're doing the job you want to do, you're helping others at the same time.

Last year we answered over 60,000 calls for help. Picked up signals from all over the world.

Even if you're not yet an amateur, you could qualify for radioman school. If you do, we'll pay you over $300 a month to start. Not to mention free food, housing, and medical care. And there's an added benefit. One of our radiomen, in his free time, worked over 165 countries and all zones. In only three months.

We'll build your code speed to 18-26 WPM. And teach you voice, teletype and radioteletype procedures on the most modern transceivers.

So if you're between 17 and 26, send in the coupon. Find out about all the benefits of our guaranteed Radioman School Program.

Or call us toll free at 800-424-8883. In Washington, D.C. call 800-426-1370.

Once you discover what a job as a Coast Guard radioman can do for you, we think you'll get the message.

Help others/Help yourself Join the lifesavers. The Coast Guard.

Commandant (G-PTP-2/72) 45014
U.S. Coast Guard
Washington, D.C. 20590

I'd like to know more about the Coast Guard's guaranteed Radioman School Program.

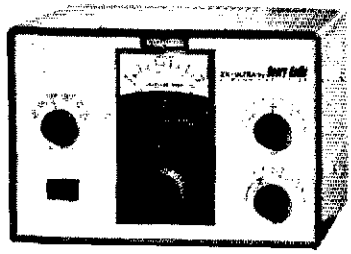
Name_____ Age_____

Street_____

City_____ State_____ Zip_____

Phone_____

choose from the finest line of amplifiers ever offered



2K-ULTRA
... THE "ULTIMATE"

There has never been an amateur linear amplifier like the new 2K-ULTRA. Small and lightweight, yet rugged and reliable . . . all that the name implies. The ULTRA loafs along at full legal power without even the sound of a blower. Its anode heat is silently and efficiently conducted to a heat sink through the use of a pair of Eimac 8873 tubes. In fact, all of its components are the very best obtainable. The price . . . $845.00

TEMPO/2001

Small but powerful, reliable but inexpensive, this amplifier is *another top value from Henry Radio. Using two 8874 grounded* grid triodes from Eimac, the Tempo 2001 offers a full kilowatt of output for SSB operation in an unbelievably compact package (total volume is .8 cu. ft.). The 2001 has a built-in solid state power supply, a built-in antenna relay, and built-in quality to match much more expensive amplifiers. This equipment is totally compatible with the Tempo One as well as most other amateur transceivers. Completely wired and ready for operation, the 2001 includes an internal blower, a relative RF power indicator, and full amateur band coverage from 80-10 meters.... $545.00

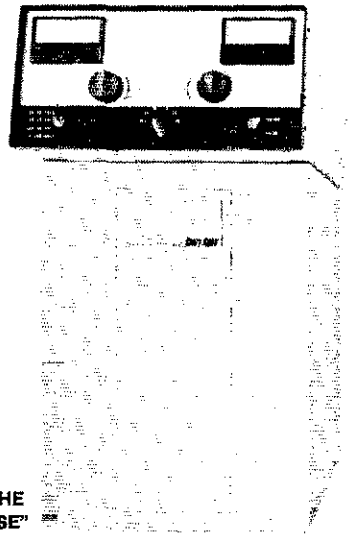
TEMPO/6N2

The Tempo 6N2 joins the Henry Family of fine HF amplifiers, bringing the same high standards of performance and reliability to the 6 meter and 2 meter bands. Using a pair of advanced design Eimac 8874 tubes, it provides 2,000 watts PEP input on SSB or 1,000 watts input on FM or CW. The 6N2 is complete in one compact cabinet with a self-contained solid state power supply, built-in blower and RF relative power indicator. Price . . . $695.00

3K-A COMMERCIAL/MILITARY AMPLIFIER

A high quality linear amplifier designed for commercial and military uses. The 3K-A employs two rugged Eimac 3-500Z grounded grid triodes for superior linearity and provides a conservative three kilowatts PEP input on SSB with efficiencies in the range of 60%. This results in PEP output in excess of 2000 watts. In addition, the 3K-A provides a heavy duty power supply capable of furnishing 2000 watts of continuous duty input for either RTTY or CW with 1200 watts output. Price . . . $1080.00

Prices subject to change without notice.



2K-4 . . . THE "WORKHORSE"

The 2K-4 linear amplifier offers engineering, construction and features second to none, and at a price that makes it the best amplifier value ever offered to the amateur. Constructed with a ruggedness guaranteed to provide a long life of reliable service, its heavy duty components allow it to loaf along even at full legal power. If you want to put that strong clear signal on the air that you've probably heard from other 2K users, now is the time. Move up to the 2K-4. Floor console or desk model . . . $845.00

Henry Radio

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

Please call or write for complete specifications

Your 10-year operating cost with EIMAC tubes is the lowest in the world.

Yes! Even very high power transmitters can have low per-hour operating costs. The *vital* requirement is the long life, high efficiency and reliability of EIMAC transmitting tubes.

Prove this by projecting 10-year replacement costs, operating costs per watt or operating costs per hour for your own equipment. After comparison, you'll agree that EIMAC tubes represent the best value for broadcast communications use.

You'll join select company when you make use of EIMAC's comprehensive line of 50 kW, 100 kW, 250 kW and 1.5 MW super power tubes. Facilities now using EIMAC tubes include:

Bangladesh	Pakistan
Colombia	Portugal
Iraq	Taiwan
Mexico	Venezuela
Mozambique	Republic of Vietnam

and VOA installations in Bangkok, Bethany, Delano, Dixon, Greenville, and the Philippines.

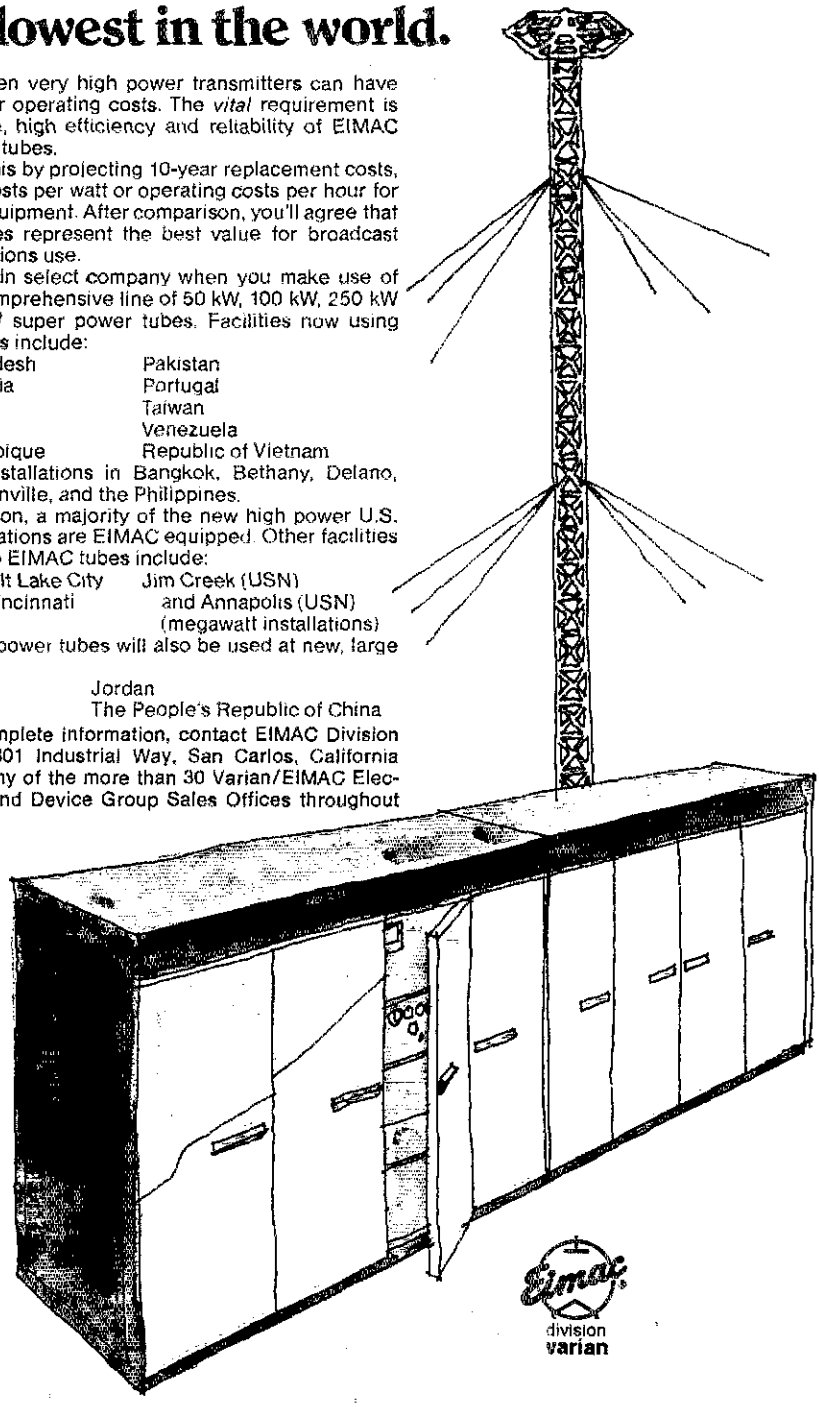
In addition, a majority of the new high power U.S. broadcast stations are EIMAC equipped. Other facilities retrofitted to EIMAC tubes include:

KSL, Salt Lake City	Jim Creek (USN)
WLW, Cincinnati	and Annapolis (USN) (megawatt installations)

EIMAC power tubes will also be used at new, large facilities in:

Ireland	Jordan
Dubai	The People's Republic of China

For complete information, contact EIMAC Division of Varian, 301 Industrial Way, San Carlos, California 94070. Or any of the more than 30 Varian/EIMAC Electron Tube and Device Group Sales Offices throughout the world.



Eimac
division
varian