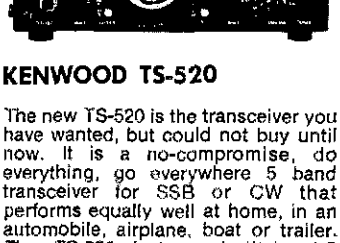
QST

November 1973
75 Cents

devoted entirely to Amateur Radio

OFFICIAL JOURNAL OF THE ARRL

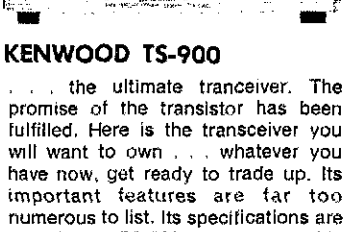
never before has one company presented such a broad selection of superb amateur equipment



KENWOOD TS-520

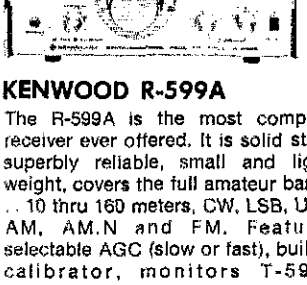
The new TS-520 is the transceiver you have wanted, but could not buy until now. It is a no-compromise, do everything, go everywhere 5 band transceiver for SSB or CW that performs equally well at home, in an automobile, airplane, boat or trailer. The TS-520 features built-in AC power supply, built-in 12 volt DC power supply, built-in VOX with adjustable gain delay and anti-VOX . .

PLUS A HOST OF OTHER IMPORTANT FEATURES AND PROVEN Kenwood reliability. All at a price most amateurs can afford.
The price . . . $599.00



KENWOOD TS-900

. . . the ultimate tranceiver. 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 superb. The TS-900 is unquestionably the best transceiver of its kind ever offered. The price . . . $795.00



KENWOOD R-599A

The R-599A is the most complet receiver ever offered. It is solid state superbly reliable, small and light weight, covers the full amateur band . . 10 thru 160 meters, CW, LSB, USE AM, AM.N and FM. Feature selectable AGC (slow or fast), built-i calibrator, monitors T-599/ frequency to calibrate transmitter squelch circuit, 1 KHz frequenc readout, versatile cross channe operation with the T-599A, stable an accurate VFO, and many, many more In fact, the R-599A is loaded wit features . . . many that are "optional a extra cost" in other receivers. Th price . . . $439.00

. . . a winning pair!

KENWOOD T-599A

The T-599A is mostly solid state . . only 3 tubes, has built-in powe supply, full metering (ALC, Ip, R output & high voltage), CW-LSB-USB AM operation, 1 KHz frequenc readout, smooth easy VFO actior built-in VOX (with delay, sensitivit and anti-VOX adjustments), built-i semi-automatic CW with sidetone, fu amateur band coverage 10 thru 80 versatile cross channel operation wit the R-599A. The price . . . $459.00

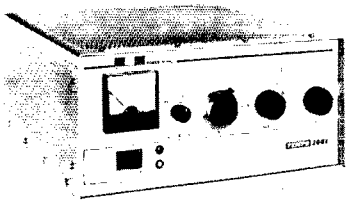
HENRY 2K-ULTRA

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.

HENRY 2K-4

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 . . . $845.00.

ONLY HENRY RADIO OFFERS SUCH A BROAD LINE OF TRULY OUTSTANDING EQUIPMENT. EVERY UNIT REPRESENTS THE MOST ADVANCED TECHNOLOGY . . . THE ULTIMATE IN VALUE FOR YOUR INVESTMENT.



TEMPO/2001

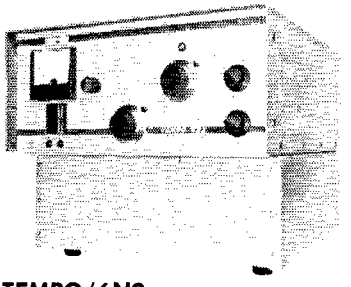
Small, but powerful and reliable . . . the 2001 linear amplifier offers a full kilowatt of power for SSB operation in an unbelievably compact package. It uses two Eimac 8874 grounded grid triodes . . . has a built-in solid state power supply, built-in internal blower, a relative RF power indicator, full amateur band coverage from 80-10 meters and is completely wired and ready for operation. The price . . . $545.00

TEMPO/ONE

. . . the best value in SSB transceivers on the market today. Look at the specifications . . . look at the price tag . . . ask any of the thousands of Tempo ONE owners about its reliability, and the reason for its unparalled popularity will be obvious. Features solid state VFO, receiver offset tuning (clarifier), all amateur bands 80 thru 10 meters, SSB upper and lower sideband, CW and AM. The price . . . $349.00

TEMPO/FMH

So much for so little! 2 watt VHF/FM hand held. 6 Channel capability, solid state, 12 VDC, 144-148 MHz (any two MHz), includes 1 pair of crystals, built-in charging terminals for ni-cad cells, S-meter, battery level meter, telescoping whip antenna, internal speaker & microphone. $199.00.



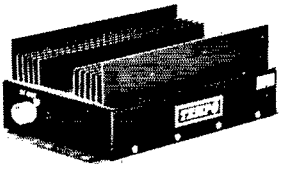
TEMPO/6N2

The Tempo 6N2 amplifier combines most of the fine features of the 2001 for 6 and 2 meter amateur operation. The amplifier uses the same small cabinet, the same modern tubes, the same inherent quality for 2000 watts PEP input on SSB or 1000 watts input on FM or CW. The rig is completely wired in one small package with an internal solid-state power supply, built-in blower, and RF relative power indicator. The price . . . $695.00.

TEMPO/CL-146

The CL-146 offers operation on the 146 MHz amateur band. The price includes a microphone, power cord, mounting bracket and one pair of crystals. A full line of accessories is also available.

- 12 channel capability
- 13 watts or a power saving 3 watts
- All solid state, 12 VDC - 144 to 148 MHz (any two MHz without retuning)
- Supplied with one pair of crystals
- RF output meter, S-meter, receiver detector meter
- Provisions for external oscillator
- Monitor feature
- Audio output at front panel
- Internal speaker
- The price: $299.00.



VHF & UHF AMPLIFIERS

Tempo is exclusive distributor for a full line of superb quality solid state 2 meter, amateur VHF and UHF FM amplifiers designed for mobile or base station operation. Output ranges from 25 to 130 watts for drive power of 1 to 25 watts. Commercial, type-accepted amplifiers are available also. Please write for prices and specifications.

TEMPO/CL-220

As new as tomorrow! The superb CL-220 embodies the same general specifications as the CL-146, but operates in the frequency range of 220-225 MHz (any three MHz without retuning). At $329.00 it is undoubtedly the best value available today.

Attention Military & Commercial Users: Henry Radio offers a broad line of exceptionally reliable high power linear amplifiers and PGB industrial power generators

HENRY, KENWOOD and TEMPO amateur products are available from dealers throughout the U.S.

Export inquiries invited

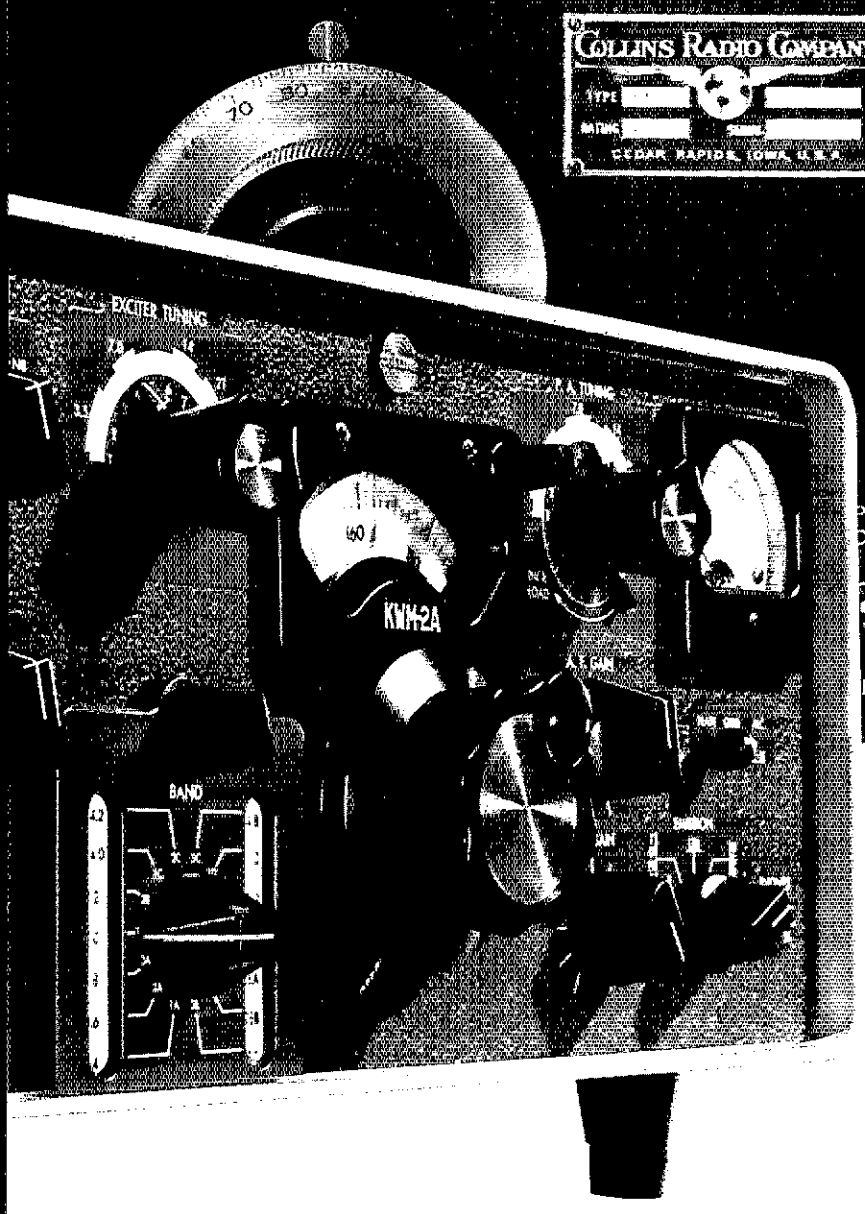
Henry Radio

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

Prices subject to change without notice.

1933

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



1973

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

QST

NOVEMBER 1973

VOLUME LVII NUMBER 11

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

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

At the top of Mt. Whitney, W6JTH and WA6VBA, Field Day Class 1B. Full Details on page 60.

– CONTENTS –

TECHNICAL –

The Rollerless Ultimate . . . . . *Robert M. Myers, W1FBY* 11

Gimmicks and Gadgets

A Homemade VOX Accessory . . *Frank Jerome, W5OJZ* 13

A Single-Band Preamp to Improve SSB Transceivers
Donald K. Belcher, WA4JVE, and Allan W. McCormick, WB4VOZ 14

A Crystal-Correlation Test Oscillator
Cliff Buttschardt, W6HDO 34

The Log-Periodic Dipole Array *Peter D. Rhodes, K4EWG* 16

A TTL Message Generator for RTTY and CW
James E. Bell, K4FUP and Fred H. Schmidt, W4VYS 23

A 7-MHz Vertical Parasitic Array . *Robert W. Jones KH6AD* 39

Technical Correspondence 44

A Heterodyne Exciter for 432 MHz
Carmen F. Moretti, W2AIH 47

Recent Equipment

SBE Linear Systems SB-450 UHF/FM Transceiver 54

Hal MKB-1 Morse Keyboard 56

BEGINNER AND NOVICE –

Some Frequently Asked Questions – and Their Answers
Lew McCoy, W1ICP 35

OPERATING –

ARRL 10-Meter Contest 58

ARRL 160-Meter Contest 59

Results, 1973 Field Day . . . *Rick Niswander, WA1PID* 60

Is the Repeater King? 73

GENERAL –

Oscar News 38

FM Repeater News 53

Amateur Radio Regulation .*Commissioner Richard E. Wiley* 90

ARRL QSL Bureau 96
Coming Conventions . . . 79
Correspondence 92
Feedback 46
Hamfest Calendar 79
Happenings of the Month . 80
Hints & Kinks 51
How's DX? 107
I A R U News 94
"It Seems to Us . . ." . . . 9
League Lines 10
Operating Events 112
Operating News 113
Public Service 73
Silent Keys 106
Station Activities 118
World Above 50 Mc. . . . 100
YL News & Views 97
W1AW Schedule 114
25 and 50 Years Ago in *QST*. 96

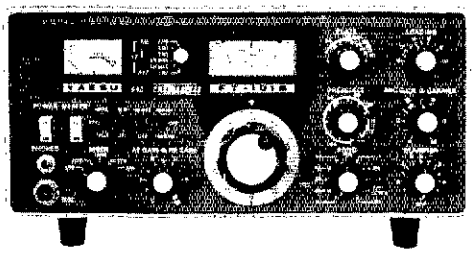
YAESU

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

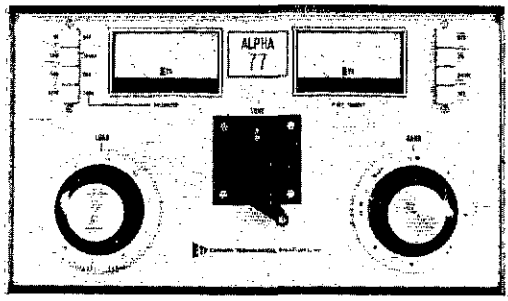
Amateurs *and* Maritime operators around the world have discovered the FT101's versatility and reliability. Many of the outstanding signals you hear are using the FT101. It's all here—AM, CW, SSB. Receiver sensitivity 0.3 microvolts 10dB signal to noise ratio. 160 meters through 10 meters. Citizen's 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, LI, 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 702-451-6650
P.O. BOX 116, Pittman, Nevada 89044

HOW RUGGED IS AN ALPHA 77?



THE ALPHA 77 IS A NO-COMPROMISE POWER AMPLIFIER BUILT FOR CONTINUOUS COMMERCIAL AND MAXIMUM-LEGAL-POWER AMATEUR SERVICE IN ANY MODE, 10 THROUGH 160 METERS

It has to be exceptionally rugged to allow E.T.O. to warrant the entire amplifier for a full year and the transformer for an *additional* full year! Here's part for the *inside story*:

- EIMAC'S FINEST GROUNDED-GRID TRIODE, the ceramic-metal 8877, with a conservative 1500 watts plate dissipation. Operating under manufacturer-recommended conditions, it delivers an outstandingly clean, sharp, legal-limit signal with only 50-75 watts drive.
- 1.5 KVA **CONTINUOUS DUTY** TRANSFORMER; tape-wound, grain oriented core for maximum efficiency and minimum bulk.
- 25 MFD, 4 KV OIL FILLED polypropylene dielectric filter capacitor.
- RUGGED BANDSWITCH: 20 ampere silver contacts, 6 KV ceramic insulation.
- MASSIVE COILS: Silver-soldered and heavily plated main tank, husky Teflon®-insulated toroids in a full pi-L network.
- 7.5 KV VACUUM VARIABLE tuning capacitor; 10 pf minimum capacitance to maintain optimum circuit efficiency at all frequencies.
- VACUUM T/R RELAYS for extremely fast, silent changeover. Plus electronic T/R switch for full break-in CW.
- FULL-CABINET COOLING by whisper-quiet, computer-grade, ball bearing blower. Heat is ducted out the rear.
- BATTLESHIP CONSTRUCTION using ¼" thick aluminum main end plates.

The ALPHA 77 is *loaded* with versatility, performance, and ruggedness.

PAYNE RADIO HAS THE ALPHA 77 IN STOCK
FOR IMMEDIATE DELIVERY AT $1995

Write or phone Don Payne, K4ID, for an illustrated brochure, operating experience, and a king-size trade on your gear.

ALPHA 77 by EHRHORN TECHNOLOGICAL OPERATIONS, INC.

PAYNE RADIO

Phones: Six Days (615) 384-5573 Nights, Sundays (615) 384-5643
Box 525 Springfield, Tenn. 37172

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 V.H.F. PAM. | SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist

ATLANTIC DIVISION

Delaware	W3DKX	Roger E. Cole	345 E. Roosevelt Ave.	New Castle 19720
Eastern Pennsylvania	W3HK	George S. Van Dyke, Jr.	4607 Convent Lane	Philadelphia 19114
Maryland-D.C.	W3FA	Karl R. Medrow	RFD 1	Davidsonville 21035
Southern New Jersey	W2YPZ	Charles E. Travers	State Police Drive	Trenton 08628
Western New York	K2KTK	Richard M. Pitzeruse	407 Woodland Rd.	Syracuse 13219
Western Pennsylvania	W3NEM	Robert E. Gawryla	1463 N. Allen St.	State College 16801

CENTRAL DIVISION

Illinois	W9PRN	Edmond A. Metzger	1520 South 4th St.	Springfield 62703
Indiana	W9BUQ	William C. Johnson	2838 Hillside Ave.	Indianapolis 46218
Wisconsin	W9OMT	Joseph A. Taylor	1982 Mulberry Ln.	Green Bay 54303

DAKOTA DIVISION

Minnesota	WAØVAS	Casper Schroeder,	10971 Quincy Blvd. N. E.	Blaine 55434
North Dakota	WØDM	Harold L. Sheets	21 Euclid Ave.	Grand Forks 58201
South Dakota	WAØCPX	Ed Gray	Rt. 3	Salem 57058

DELTA DIVISION

Arkansas	WA5VWH	Jimmie N. Lowrey	6301 Euper Lane	Fort Smith 72901
Louisiana	W5GHF	Robert P. Schmidt	5100 Press Dr.	New Orleans 70126
Mississippi	W5NCB	Walker J. Coffey	RFD No. 2	Oxford 38655
Tennessee	WA4GLS	O. D. Keaton	Rt. 1, Medearis Dr.	Old Hickory 37138

GREAT LAKES DIVISION

Kentucky	W4CID	Ted H. Huddle	604 Amanda Furnace Dr.	Ashland 41101
Michigan	W8ZBT	Ivory J. Olinghouse	1227 Rose Dr.	Niles 49120
Ohio	W8IMI	William E. Clausen	403 Canyon Dr. S.	Columbus 43214

HUDSON DIVISION

Eastern New York	K2SIN	Graham G. Berry	80 Parent Ave.	New Rochelle 10801
N.Y.C. & Long Island	K2DGI	Fred J. Brunjes	22 Ivy Drive	Jericho 11753
Northern New Jersey	WA2UOO	John M. Crovelli	436 Mt. Airy Road	Basking Ridge 07920

MIDWEST DIVISION

Iowa	KØYVU	Al Cuthert	P.O. Box 306	Charles City 50616
Kansas	KØBXF	Robert M. Summers	3045 North 72nd	Kansas City 66109
Missouri	KØVVH	Larry S. Phillips	2482 W. Randolph	St. Charles 63301
Nebraska	KØOAL	V. A. Cashon	334 Pine St., Box 488	Chadron 69337

NEW ENGLAND DIVISION

Connecticut	WICVT	John J. McNassor	218 Berlin Ave.	Southington 06489
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	65 Beechwood Rd.	Halifax 02338
Maine	K1TEV	Peter E. Sterling	39 Latham St.	So. Portland 04106
New Hampshire	W1SWX	Robert Mitchell	Box 137-A	Chester 03036
Rhode Island	K1AAV	John E. Johnson	30 Fruit St.	Pawtucket 02860
Vermont	W1BRG	James H. Viele,	101 Henry St.	Burlington 05401
Western Massachusetts	W1BVR	Percy C. Noble	P.O. Box 5	Lanesboro 01237

NORTHWESTERN DIVISION

Alaska	KL7OUK	Roy Davie	Star Route - Montana Creek	Willow 99688
Idaho	W7ZNN	Donald A. Crisp	1508 Alder Drive	Lewiston 83501
Montana	W7RZY	Harry A. Roylance	P.O. Box 621	Harlowton 59036
Oregon	K7WWR	Dale T. Justice	1369 N. E. Sunrise Lane	Hillsboro 97123
Washington	W7QGP	Mary E. Lewis	10352 Sandpoint Way N.E.	Seattle 98125

PACIFIC DIVISION

East Bay	K6UWR	Charles R. Breeding	3130 Raleigh Ct.	Fremont 94536
Hawaii	KH6GQW	J. P. Corrigan	47-109 Kamehameha Hwy.	Kaneohe 96744
Nevada	K7ZOK	Harold P. Leary	1512 N. Saylor Way	Las Vegas 89108
Sacramento Valley	WA6JYD	Norman A. Wilson	Route 1, Box 730	Woodland 95695
San Francisco	W6NUT	Thomas A. Gallagher	Box 31365	San Francisco 94131
San Joaquin Valley	W6JPU	Ralph Saroyan	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	WB4CBJ	Joseph Rubin	P.O. Box 117	Pelion 29123
Virginia	K4GR	Robert I. Slagle	3515 — 25th St., N.	Arlington 22207
West Virginia	W8JM	Donald B. Morris	1136 Morningstar Lane	Fairmont 26554

ROCKY MOUNTAIN DIVISION

Colorado	WAØHLQ	Clyde O. Penney	1626 Locust St.	Denver 80220
New Mexico	W5RE	Edward Hart, Jr.	1909 Moon N.E.	Albuquerque 87112
Utah	W7OCX	John H. Sampson, Jr.	3618 Mt. Ogden Drive	Ogden 84403
Wyoming	W7CQL	Wayne M. Moore	142 South Montana Ave.	Casper 82601

SOUTHEASTERN DIVISION

Alabama	WB4EKJ	James A. Brashear, Jr.	3002 Boswell Drive	Huntsville 35811
Canal Zone	KZ5ZZ	James L. McMillen	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 E. Porter	6890 S.W. 51st St.	Miami 33155
West Indies	KP4AST	Pedro I. Piza	Box 2001	Ponce, PR 00731

SOUTHWESTERN DIVISION

Arizona	W7CAF	Gary M. Hamman	2813 E. Campbell Ave.	Phoenix 85016
Los Angeles	W6INH	Eugene H. Violino	2839 Canada Blvd.	Glendale 91208
Orange	W6CPB	William L. Wesse	1753 Iowa St.	Costa Mesa 92626
San Diego	W6CBF	Cyril E. Huvar, Jr.	108 Jamul Ave.	Chula Vista 92011
Santa Barbara	WA6DEI	D. Paul Gagnon	1791 Hedon Cir.	Camarillo 93010

WEST GULF DIVISION

Northern Texas	W5LR	L. E. Harrison	1314 Holly Glen Drive	Dallas 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

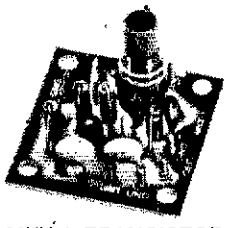
Alberta	VE6BR	Don Sutherland	444-25th Ave., N.E.	Calgary, Alta. T2E 1Y3
British Columbia	VE7BB	H. L. Savage	4583 West 12th Ave.	Vancouver 8, B.C.
Manitoba	VE4FQ	Steven Fink	14 Grandcrest St.	Winnipeg 17, Manitoba
Maritime	VE1AMR	Walter D. Jones	79 Waverley Ave.	Moncton, N.B.
Ontario	VE3DV	Holland H. Shepherd	3016 Cowan Cres.	Ottawa, K1V 8L1
Quebec	VE2ALE	Joseph Unsworth	163 Mgr. Bourget	Vaudreuil, P.Q.
Saskatchewan	VE5RP	Percy A. Crosthwaite	R.R. 3	Saskatoon S7K 3J6

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

for the EXPERIMENTER!

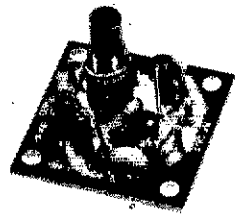
INTERNATIONAL EX CRYSTAL & EX KITS

OSCILLATOR • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



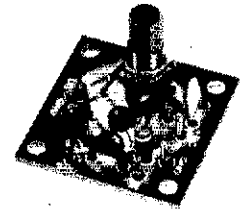
1. MXX-1 TRANSISTOR RF MIXER

A single tuned circuit intended for signal conversion in the 3 to 170 MHz range. Harmonics of the OX oscillator are used for injection in the 60 to 170 MHz range. Lo Kit 3 to 20 MHz, Hi Kit 20 to 170 MHz (Specify when ordering).....**$3.50**



2. SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive MXX-1 mixer. Single tuned input and link output. Lo Kit 3 to 20 MHz, Hi Kit 20 to 170 MHz (Specify when ordering).....**$3.50**



3. PAX-1 TRANSISTOR RF POWER AMP

A single tuned output amplifier designed to follow the OX oscillator. Outputs up to 200 mw, depending on the frequency and voltage. Amplifier can be amplitude modulated. Frequency 3,000 to 30,000 KHz.....**$3.75**

4. BAX-1 BROADBAND AMP

General purpose unit which may be used as a tuned or untuned amplifier in RF and audio applications 20 Hz to 150 MHz. Provides 6 to 30 db gain. Ideal for SWL. Experimenter or Amateur **$3.75**

5. OX OSCILLATOR

Crystal controlled transistor type. Lo Kit 3,000 to 19,999 KHz, Hi Kit 20,000 to 60,000 KHz. (Specify when ordering).....**$2.95**

6. TYPE EX CRYSTAL

Available from 3,000 to 60,000 KHz. Supplied only in HC 6/U holder. Calibration is ± .02% when operated in International OX circuit or its equivalent. (Specify frequency) **$3.95**

for the COMMERCIAL user...

INTERNATIONAL PRECISION RADIO CRYSTALS

International Crystals are available from 70 KHz to 160 MHz in a wide variety of holders. Crystals for use in military equipment can be supplied to meet specifications MIL-C-3098E.

CRYSTAL TYPES:

(GP) for "General Purpose" applications
(CS) for "Commercial Standard"
(HA) for "High Accuracy" close temperature tolerance requirements.

write for CATALOG

INTERNATIONAL

CRYSTAL MFG. CO., INC.

10 NO. LEE • OKLA. 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 LØR 2H0
Vice-Director: A. George Spencer VE2M
171 Kipling Ave., Beaconsfield, Quebec

Atlantic Division

HARRY A. McCONAGHY W8SV
3708 Fenway Dr., Bethesda, MD 20034
Vice-Director: Jesse Bieberman W3K
RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355

Central Division

PHILIP E. HALLER W9HP
6000 S. Tripp Ave., Chicago, IL 60629
Vice-Director: Edmond A. Metzger W9PR
1520 South Fourth St., Springfield, IL 62703

Dakota Division

LARRY J. SHIMA . . . . . WØPA
11417 Goodrich Rd. S., Bloomington, MN 55437
Vice-Director: Edward C. Gray . . . . . WAØCP
Rt. 3, Salem, SD 57058

Delta Division

MAX ARNOLD W4WH
612 Hogan Rd., Nashville, TN 37220
Vice-Director:

Great Lakes Division

RICHARD A. EGBERT W8ET
6479 Red Fox Rd., Reynoldsburg, OH 43068
Vice-Director:

Hudson Division

STAN ZAK K2SJ
13 Jennifer Lane, Port Chester, NY 10573
Vice-Director: George A. Diehl W2IH
20 Wilson Ave., Chatham, NJ 07928

Midwest Division

RALPH V. ANDERSON . . . . . KØN
528 Montana Ave., Holton, KS 66436
Vice-Director: Paul Grauer . . . . . WØFL
Box 190, Wilson, KS 67490

New England Division

ROBERT YORK CHAPMAN W1QV
28 South Road, Groton, CT 06340
Vice-Director: John C. Sullivan W1HH
Whitney Road, Columbia, CT 06237

Northwestern Division

ROBERT B. THURSTON* W7PG
7700 31st Ave., N.E., Seattle, WA 98115
Vice-Director: Dale T. Justice K7WW
1369 NE Sunrise Lane, Hillsboro, OR 97123

Pacific Division

J.A. "DOC" GMELIN W6ZR
10835 Willowbrook Way, Cupertino, CA 95014
Vice-Director: Albert F. Gaetano W6VZ
116 Old Adobe Road, Los Gatos, CA 95030

Roanoke Division

VICTOR C. CLARK* W4KF
12927 Popes Head Road, Clifton, VA 22024
Vice-Director: L. Phil Wicker W4AC
4821 Hill Top Road, Greensboro, NC 27407

Rocky Mountain Division

CHARLES M. COTTERELL . . . . . WØSI
430 S. Swadley St., Lakewood, CO 80228
Vice-Director: Allen C. Auten . . . . . WØEC
6722 West 67th Ave., Arvada, CO 80003

Southeastern Division

LARRY E. PRICE W4DQ
P. O. Box 2087, Georgia Southern Branch
Statesboro, GA 30458
Vice Director: C. James Roux K4TH
P.O. Box 1710, Largo, FL 33540

Southwestern Division

JOHN R. GRIGGS* . . . . . WØKV
1273 13th St., Baywood Park, San Luis Obispo
CA 93401
Vice-Director: Arnold Dahlman W6UE
3022 Las Positas Rd., Santa Barbara, CA 93105

West Gulf Division

ROY L. ALBRIGHT W5EY
107 Rosemary, San Antonio, TX 78209
Vice-Director: Jack D. Gant W5GN
521 Monroe, N.W., Ardmore, OK 73401

* Member Executive Committee

"It Seems to Us..."

THE ATLANTIC SPANNED – 1923

TO TELL THE STORY of the first contact across the Atlantic ocean, let us set the scene by recalling the second transatlantics. Then, it will be remembered, one of the three European stations reliably reported heard in the United States was French 8AB, at Nice, France. In January, 1923, a preliminary attempt at two-way transatlantic communication failed. The European station on that occasion was also French 8AB.

The owner of 8AB was Leon Deloy. During the summer of 1923 Deloy visited the United States to study American amateur methods, with the avowed determination to be the first to span the Atlantic. He went to the A.R.R.L.'s national convention in Chicago; he bought American radio gear; he consulted with John L. Reinartz, 1QP-1XAM, concerning his new station. He lived, thought, acted and worked with one objective – *to work across the Atlantic.* Returning home to France in early autumn, he applied all the information he had received, completed his new station and tested with British 2OD in October, and in November cabled A.R.R.L. Traffic Manager Schnell that he would transmit on 100 meters from 9 to 10 p.m., starting November 25th.

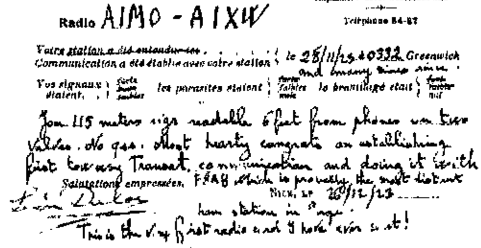
Over the traffic routes of the A.R.R.L. flashed the electrifying news. Many a station commenced listening. From the very first, 8AB and the identifying cypher group "GSJTP" were audible in Hartford. The next night, the 26th, Deloy transmitted again and, having been advised by cable that he was being heard, sent two messages, which were copied not only by Schnell and K. B. Warner at 1MO, but also by Reinartz at 1XAM. One was a message of greetings from French to American amateur radio; the other made a schedule for an attempt at two-way work the following night.

The night of November 27, 1923. Both Schnell and Reinartz were on the air. Schnell had secured special permission from the Supervisor of Radio at Boston to use the 100-meter wavelength, and everything was in readiness. At the stroke of 9:30 the strangely-stirring 25-cycle gargle from 8AB came on the air. For an hour he called America, then sent two more messages. At 10:30 he signed off, asking for an acknowledgment. Long calls from 1MO and 1XAM and then . . . there he was, asking Reinartz to stand by, and saying to Schnell, "R R QRK UR SIGS QSA VY ONE FOOT FROM PHONES ON GREBE FB OM HEARTY CONGRATULATIONS THIS IS FINE DAY MIM PSE QSL NR 12" . . . American and European amateurs were working for the first time, with strong signals, and to Deloy, after a year's constant and unremitting effort, it was a fine day!

He then called Reinartz, 1XAM, whose transmitting circuit was in use at all three stations, and they also worked with similar ease. A message was sent via 1MO to the renowned General Ferrie, France's grand old man of radio. Further schedules were arranged. Signals were coming through on loudspeakers. A key and buzzer, actuated by the neighbor lad next door, would have been no louder; yet a mighty ocean, four thousand miles of trackless distance, separated these pleasantly-chatting friends, separating innumerable friends to chat in countless days to come.

It was, indeed, a fine day.

— *Two Hundred Meters and Down*
(The Story of Amateur Radio)



League Lines . . .

Licensed and operating repeaters were granted continuing life by an almost-indefinite extension of the August 30 deadline (p. 88, last month). Caught up in the backlog, however, are applicants for new repeaters ready to go but not yet licensed. If you did not have a repeater (or remotely-controlled) station on the air prior to October 17, 1972, but have since filed application, please let Hq. have (1) name of applicant, e.g., trustee; (2) club name, if any; (3) address; (4) date application filed. FCC has indicated priority can be granted this paperwork, so you can get your repeater on the air at a fairly early date.

October 15th marked the present Oscar's first birthday -- longest-lived of the seven ham satellites. W1AW has transmitted 301 different bulletins of general info and orbital data, a total of more than 2400 times (47 bulletins weekly, 25 on cw, 12 voice, 10 RTTY).

Splitting even the milliseconds, WWV precision in time announcements shows up now as Coordinated Universal Time (UTC), replacing the familiar Greenwich Mean Time.

The texts of papers delivered at the ARRL Technical Symposium on Space Communications are being compiled in one volume, with a copy to be sent each registrant (tho it will be some weeks before completion). Others may order copies at $3 each, postpaid. It's an outstanding collection of technical data.

A caution to all volunteer examiners: The practice of a volunteer examiner scanning the written test to see whether the candidate has passed is now specifically prohibited by the "Instructions to the Examiner" printed on the test envelope; no one is permitted to discuss examination questions with anyone else (except, of course, that an applicant may discuss the test with members of the FCC staff. Since the volunteer examiner is not allowed to read the test, he doesn't have this privilege!)

Blind amateur applicants have the option of taking the General Class examination in Braille at FCC offices, rather than using the services of another person as reader and recorder. The other examinations are not yet available in this form, however.

Studies of interference to radio communication by automobile components and functions have periodically been made by the Motor Vehicle Manufacturers Assn. of Detroit. ARRL has regularly participated by invitation, and W1FBY will represent us at another series of tests now in process -- one specifically concerned with amateur communication problems.

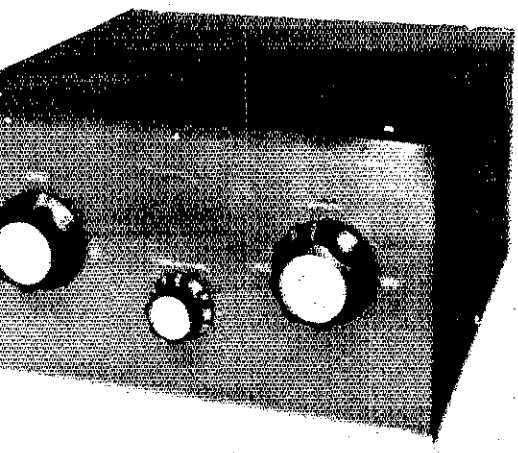
W7BQ says the power shortage in the Northwest is so critical that he is cutting back on operation of some of the nets, and recommends power reduction to amateurs generally as a good policy especially this winter.

An editorial change in the Novice rules some time ago, mostly intended to include transistorized finals in the language, actually changes the basis for computing Novice power where tubes are used so that driving power and screen power also must be counted. The rule reads: "The power input to the transmitter final amplifying stage supplying radio frequency energy to the antenna shall not exceed 75 watts, exclusive of power for heating the cathode of a vacuum tube(s)."

Think 28 MHz is a "dead" band much of the time? If it so appears, it is likely that everyone listens and no one transmits! That will all change in the new 10-meter party ARRL is sponsoring; see page 58.

Can a General Class operator use cw in an Advanced Class phone band? This question came up at the FCC forum during the New England Division Convention. FCC staff's answer: emphatically not! Operators must observe both the license-class privilege rules and the mode-of-operation rules.

Noting that a brilliant comet (Kohoutek) is predicted by scientists for a November appearance, Denver's "Round Table" bulletin wonders if the density is sufficient to reflect radio signals. Well, let's try!



The Rollerless Ultimate

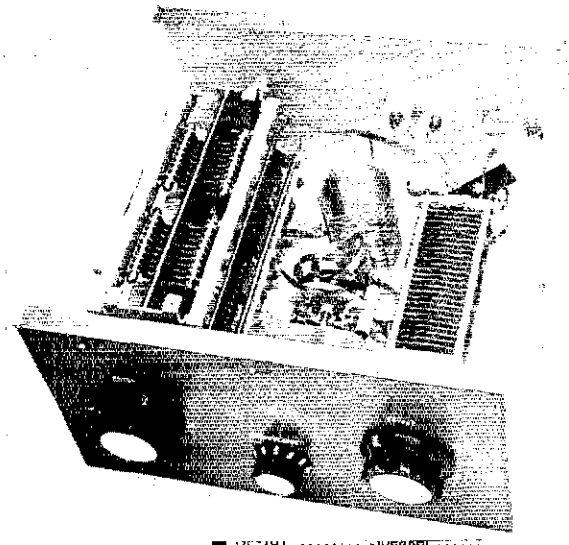
BY ROBERT M. MYERS,* W1FBY

OVER THE YEARS, Transmatches of every color, size, and description that one could imagine have been published in both *QST* and *The Radio Amateur's Handbook*. Recently, a particular design has become popular because it is capable of matching everything from a slightly mismatched antenna-feed-line system to the proverbial wet noodle. The circuit has three variable components to allow adjustment of both series and parallel capacitance as well as inductance. In many cases, however, the would-be builder has trouble locating a suitable rotary inductor (roller coil) at a reasonable cost. Even if a roller inductor is acquired, the mechanical problems of adapting it to a turns-counting dial mechanism and accommodating various shaft diameters oft times dampens the spirits of the amateur. For those who have experienced the problem, the following description may be of considerable interest.

* Assistant Technical Editor, *QST*.

The mechanics related to the installation of a rotary inductor can be easily eliminated by doing away with the roller coil itself and replacing it with a fixed-value inductor (Miniductor stock) and a high-voltage-insulation multiposition switch. If the taps are selected correctly, or if a sufficiently large number of taps are made, performance on a par with the roller coil is possible. The model shown in the photographs has a switch which is used to select any of twelve taps on the inductor. In actual use, only three or four taps are needed to match most antennas from 80 through 15 meters. Accordingly, the builder could make use of any ceramic high-grade switch having as few as five positions. The taps are placed on the coil every other turn beginning at the top (hot end).

One distinct advantage of using a switched coil is the requirement for the operator to manipulate only three controls in order to change bands (or



Inside view of the Rollerless Ultimate. The balun transformer is positioned behind C2 shown at the upper right. The front panel is painted bright red and has black knobs with silver insets. The inductor is supported by its own leads and the tap connections.

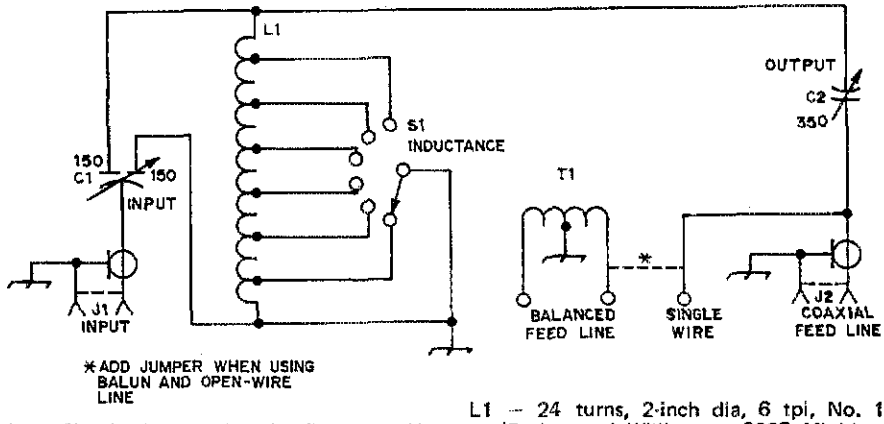


Fig. 1 — Circuit diagram for the Rollerless Ultimate.
C1 — Dual differential, 150-pF per section. See text for details.
C2 — Air variable, 350-pF maximum (E. F. Johnson 154-10).
L1 — 24 turns, 2-inch dia, 6 tpi, No. 12 wire (Barker and Williamson 3025 Miniductor). If 160-meter operation is not anticipated, a total of 12 turns should be suitable.
S1 — High-voltage-insulated rotary switch. (Millen type 51001 suitable.)
T1 — See Fig. 2.

antennas) quickly. There is no need to crank a roller-inductor handle. If one antenna is used for all-band operation, taps can be made for each band and labeled appropriately on the front panel.

Construction

Every effort was made to keep the mechanical construction simple. A dual-differential capacitor (available from James Millen Company) is used to adjust the input section of the coupler. Each section is approximately 150 pF maximum. The cost of this capacitor is rather high and the builder might prefer to use a conventional differential type. An alternative method would be to connect two capacitors mechanically in series to provide differential action. While this latter scheme is less expensive than purchasing a dual-differential capacitor, the tuning will become a bit more critical. Nevertheless, there should be no problem obtaining adequate performance.

The output capacitor must be insulated from chassis ground because it is connected in series with the output terminals. The capacitor shown in the photograph was mounted on two ceramic pillar insulators and connected to a front-panel-mounted shaft-and-bushing assembly. Rather high rf voltages can occur in a Transmatch when power levels in excess of a few hundred watts are employed. The unit described here is adequate for power levels of two kilowatts input to the amplifier. Only top-grade components should be used for insulating material. The shaft through the front panel must be grounded to prevent rf from appearing on the knob assembly.

The balun-coil assembly is used for coupling to balanced feed-line antenna systems. It is shown mounted at the rear of the output capacitor, C2. Four terminals are provided on the back panel. Two of them are for a balanced feed line (open wire or Twin-Lead), one connector is a chassis style of coax receptacle, and one ceramic feed-through insulator is used for random-length single-wire antennas. The ceramic insulators are available from James Millen on a factory-direct basis. A jumper wire must be placed from the single-wire terminal to one of the balun connections when a twin-feed system is used. If a long wire or coaxial-fed antenna is employed, the jumper must be removed to prevent unusually high voltages from developing in the unterminated balun coil.

Operation

A built-in wattmeter (or SWR indicator) is not included with this model since a directional wattmeter is normally a part of this writer's station setup. The wattmeter is connected between the transmitter and the input to the antenna coupler. Adjustment of the Transmatch is simple. Apply a

(Continued on page 22)

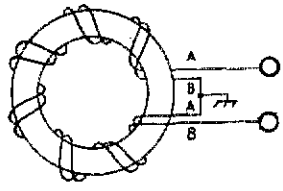
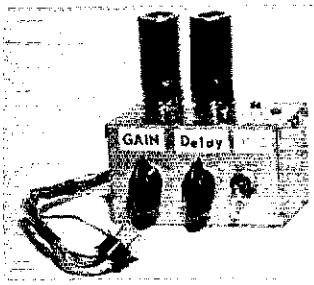


Fig. 2 — Balun coil. Three ferrite cores are stacked together and held in place by wrapping them with several layers of 3M No. 27 glass-cloth insulating tape. The winding consists of 15 bifiliar turns of No. 14 Teflon-covered wire. Conventional Formvar insulation is suitable for power levels up to several hundred watts. Approximately 20 feet of wire (two 10-foot lengths) is needed.



A Homemade VOX Accessory

BY FRANK JEROME,* W5OJZ

HERE IS an easy-to-build piece of accessory equipment that performs the VOX function very well at a minimum cost. The circuit is simple but does not have the anti-VOX function. Eliminating the anti-VOX requires two less stages. The operator has to use a headset rather than a loudspeaker, however.

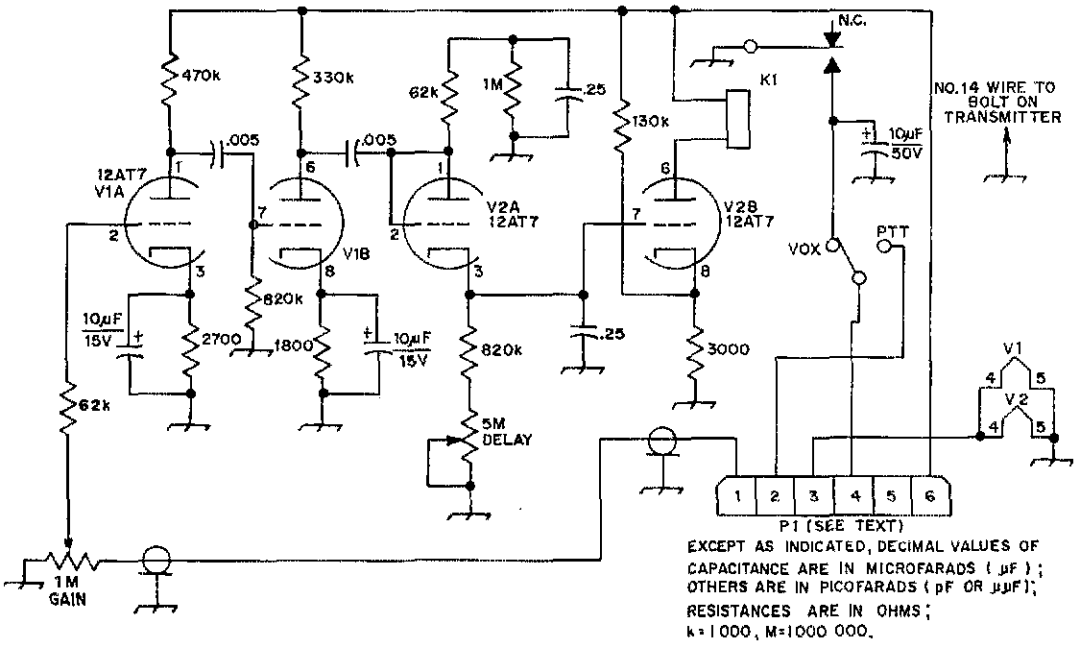
This unit is made for use with the Hallicrafters HT-46 transmitter but it does not have the "bolt on" feature of the Hallicrafters HA-16 VOX control unit. This VOX unit should work with any transmitter that has provision for a plug-in VOX unit. The only change necessary would be the plug needed to match to the accessory socket of the equipment you are using.

* 908 Holoway, Midwest City, OK 73110.

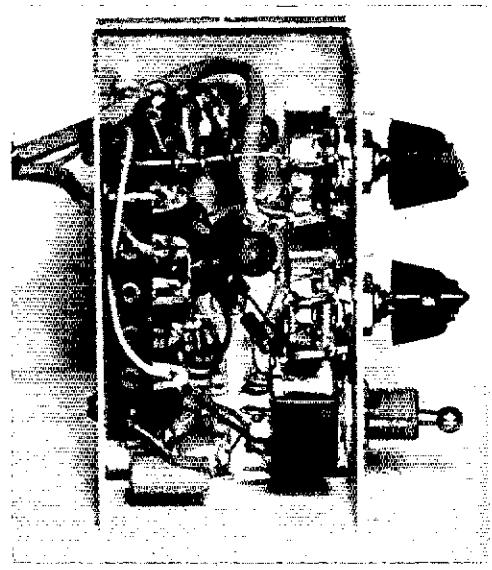
The circuit is shown in Fig. 1 and uses two 12AT7 tubes. One 12AT7 is used for two stages of audio amplification in a common triode circuit. The other 12AT7 is the audio voltage rectifier and current-control amplifier that controls the keying relay. The heart of the unit is the relay. It is a Herald SW-34, a low-cost item made in Japan. It has a 10,000-ohm winding and single-pole double-throw contacts. Calectro has similar relays.

The VOX-PTT switch on the front panel transfers the transmitter keying circuit from the relay in the VOX unit to the microphone PTT switch. The unit has the heater and plate voltage applied whenever the transmitter is on. The result is that you will hear the relay clicking and following your speech pattern while using PTT.

Fig. 1 — Schematic diagram of the VOX accessory. Resistors are 1/2-watt composition and capacitors are disk ceramic with a 600-volt rating unless otherwise noted.
K1 — Herald SW-34 relay or equivalent.



General layout of the VOX accessory.



This allows you to change the GAIN and DELAY adjustments while in the PTT position and you need not transmit a signal to determine the proper settings. The correct settings will generally be GAIN at maximum, and DELAY at minimum. The chassis is 2 × 2-1/4 × 4 inches and gets crowded before completion, so a smaller chassis is not recommended. No. 14 bare copper wire is used from the VOX unit chassis to the grounding bolt on the rear of the transmitter. This wire is taped together with the other wires that make up the interconnecting cable. There is no other common or grounding circuit and a shock hazard exists if this common wire is disconnected. It should be securely bolted in place. To eliminate or minimize this hazard, always connect this common wire first, and disconnect it last, and of course, always have the transmitter turned off when making connections.

The front-panel lettering was done with Deca-Dry Transfers by Chart-Pak, Inc. The dry letter transfers are first transferred to a self-adhesive label. The label is trimmed to size, backing material removed, and applied to the front panel. QST

A Single-Band Preamp to Improve SSB Transceivers

BY DONALD K. BELCHER,* WA4JVE AND ALAN W. McCORMICK,** WB4VOZ

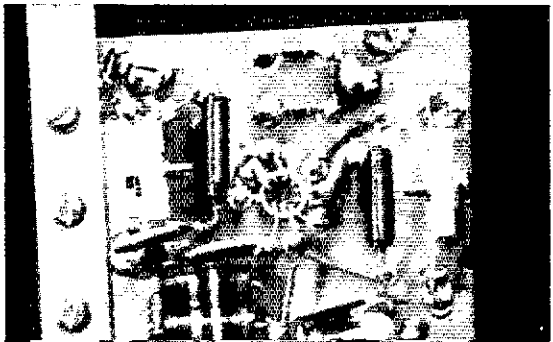
IT HAS BEEN the experience of the authors that some ssb transceivers could stand improvement when it comes to reception. With this in mind, a single-band preamplifier was designed and constructed. After it was installed in an HW-32A, signals that were not Q5 previously were easily readable.

The entire cost of the unit is approximately ten dollars, including a Motorola MC1550G IC (designed for rf and i-f amplifier use to 60 MHz). Since elaborate test gear was unavailable for the project, the circuit had to be simple enough to be adjusted with only an "ear" and a screwdriver. Tune-up is simply accomplished by setting the variable capacitors C2 and C7 at minimum and then peaking them for loudest response near the middle of the band. A crystal calibrator connected to the antenna input will provide an adequate marker. The input and output networks are optimized for broadband operation and good stability, rather than for maximum power gain. Once the simple adjustments described are performed, no further alignment is necessary.

Calculations and results indicate that the preamplifier has a gain of approximately 30 dB on 14 MHz (the HW-32A frequency) with slightly less gain on the 15- and 10-meter bands. Preamplifier component values are given for 20, 15, and 10 meters.[1]

*602 Forest Dr., Olathe, KS 66061
** 2250 Pimmit Dr., Falls Church, VA 22043.

[1] [EDITOR'S NOTE: The reader is reminded that additional gain at the front end of some receivers can lead to cross-modulation and overloading effects in the early stages of the receiver. There is little point in adding a preamplifier to a receiver that has sufficient sensitivity and a good noise figure. If preamplifier gain is too great for a specific receiver, as evidenced by cross-modulation and overloading in the presence of strong signals, try installing a step attenuator between the preamplifier and the input to the receiver, using only that amount of gain which will assure improved reception. Suitable circuits for attenuators are given in the receiving chapter of *The Radio Amateur's Handbook*.]



Preamplifier board and mounting bracket.

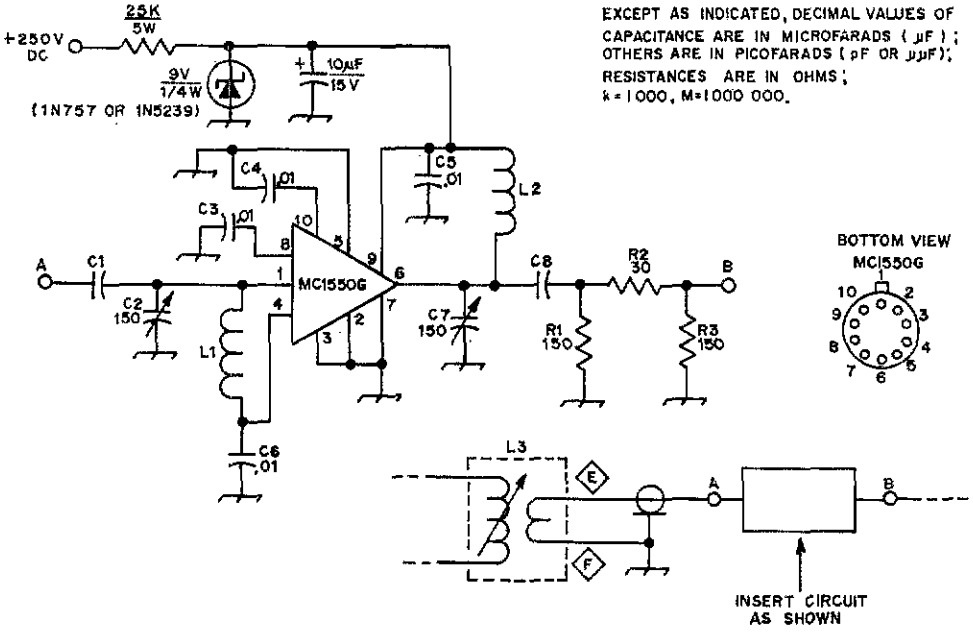


Fig. 1 — Schematic diagram for the preamplifier and the power supply. All resistors are 1/2- or 1/4-watt composition.

C1, C8 — 20 meters — 39 pF.
15 meters — 27 pF.
10 meters — 22 pF.
Dipped mica, MIL-TYPE CM04 preferred.

C2, C7 — 150 pF trimmer (Elmenco No. 424 or equivalent).

C3, C4, C5, C6 — .01 µF disk ceramic.

L1, L2 — 20 meters — 1.0 µH (J. W. Miller, No. 4602).
15 meters — 0.47 µH (J. W. Miller, No. 4588).
10 meters — 0.33 µH (J. W. Miller, No. 4586).

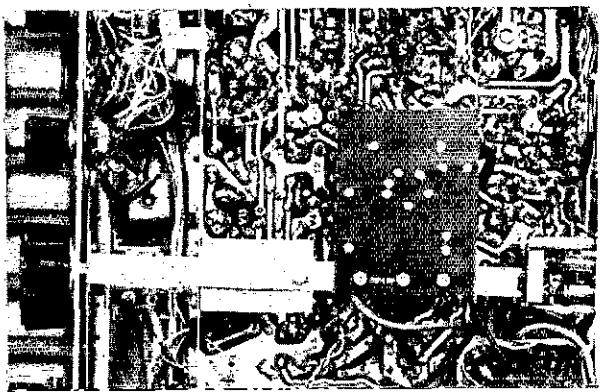
L3 — See schematic diagram of the HW-32A.

Construction

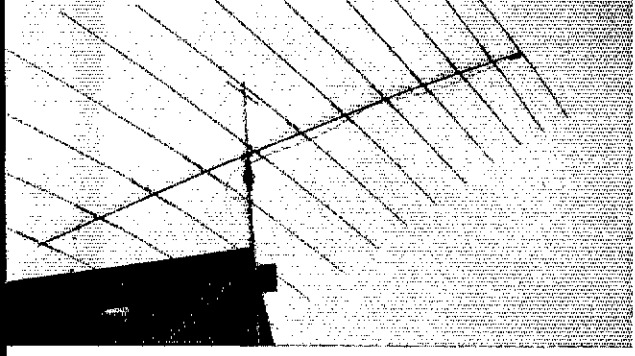
The preamplifier should be constructed on a small copper-clad board, with all leads as short as possible. Since pin 7 of the IC is internally connected to the case, there is no problem with getting the case close to the ground plane. The unit assembled by the authors used miniature Teflon-insulated standoff terminals, a technique highly recommended for rf work. Be sure that the variable capacitors are mounted so that the adjusting screw is at rf ground. This minimizes the effect of the screwdriver used for aligning.

After the preamplifier is constructed it can be mounted underneath the chassis near the original receiver rf amplifier. Use a small bracket (the bracket and the approximate location of the board are shown in the photographs). Power for the preamplifier can be obtained from a small 9-V radio battery, or directly from the transceiver power supply. The latter method was used by the authors and is shown in Fig. 1. A circuit consisting of a Zener diode and a series dropping resistor provides the necessary voltage for the IC.

Since the dropping resistor dissipates 2 watts, one with a 5-watt rating is required. It should be mounted far enough away from components which might be damaged by excessive heat. Other types of transceivers may not use 250 volts and the series-dropping resistor must be changed if the preamplifier is to be used with them. The total current through the resistor is approximately 9.6 mA. If the transceiver has a 300-V supply for example, the dropping resistor should be increased to 28,000 ohms. No increase of the power rating should be necessary. QST



Preamplifier installed in Heath HW-32A transceiver. It should be positioned near the receiver rf amplifier



The Log-Periodic Dipole Array

Theory, Design, and Construction of a Practical Antenna for HF Work

BY PETER D. RHODES,* K4EWG

THIS ARTICLE is written to familiarize the amateur with the log-periodic dipole array (LPDA), and to provide the basic theory, design procedures and the construction of a practical antenna such as that used at the author's QTH. In the discussion the mathematical derivation of individual element currents, voltages, and admittances has been omitted for simplicity. The amateur with a solid background in differential calculus, vector algebra and simultaneous differential-equation matricies can pursue this area using the reference material. However, derivation of the mathematical model for these parameters is not necessary in a practical design consideration.

The LPDA has had relatively little use in amateur applications and has been presented sparingly in vhf and uhf articles; however, it will be seen that a good LPDA for any band, hf to uhf, can be built to meet the amateur's requirements at nominal cost: high forward gain, good front-to-back ratio, low VSWR, and a boom length equivalent to a full sized three-element Yagi.

The LPDA is a frequency-independent antenna invented by DuHamel and Isbell.[1] It is in wide use by the armed forces. The LPDA exhibits a relatively low SWR (usually not greater than 2 to 1) over a wide band of frequencies. Carlel[2] has shown that a well designed LPDA can yield a 1.3 to 1 SWR over a 1.8 to 1 frequency range with a directivity of 9.5 dB.†

* 3125 Keenan Rd., College Park, GA 30349.

[1] For this and subsequent references, refer to the bibliography at the end of this article.

†[EDITOR'S NOTE: Directivity is the ratio of maximum radiation intensity in the forward direction to the average radiation intensity from the array. Assuming no resistive losses in the antenna system, 9.5 dB directivity equates to 9.5 dB gain over an isotropic radiator or approximately 7.4 dB gain over a half-wave dipole.]

Basic Theory

The LPDA is frequency independent in that the electrical properties such as the mean resistance level, Ro, characteristic impedance of the feed line Zo, and driving-point admittances, Yo, vary periodically with the logarithm of the frequency. See Fig. 1. As the frequency f_1 is shifted to another frequency f_2 within the passband of the antenna, the relationship is $f_2 = f_1/\tau$

where τ = a design parameter, a constant; $\tau<1.0$.
Also $f_3 = f_1/\tau^2$

$f_4 = f_1/\tau^3$

.
.
.

$f_n = f_1/\tau^{n-1}$ (Eq. 1)

where $n = 1, 2, 3, \ldots, n$
f_1 = lowest frequency
f_n = highest frequency

Taking the log of Eq. 1,

$\log f_n = \log f_1 - (n-1) \log \tau$ (Eq. 2)

Eq. 2 shows that any property shown on a log f scale is periodic with period log τ.

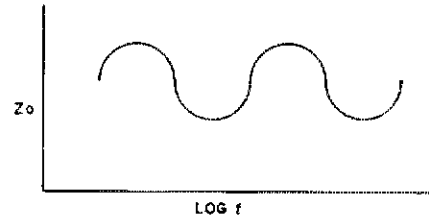


Fig. 1 — Showing the periodic variations of an electrical property of the array versus the logarithm of the frequency.

The design parameter τ is a geometric constant near 1.0 which is used to determine the element lengths, l, and element spacings, d. See Fig. 2. That is,

$$l_2 = \tau l_1$$
$$l_3 = \tau l_2$$
$$\vdots$$
$$l_n = \tau l_{(n-1)} \qquad \text{(Eq. 3)}$$

where l_n = shortest element length,

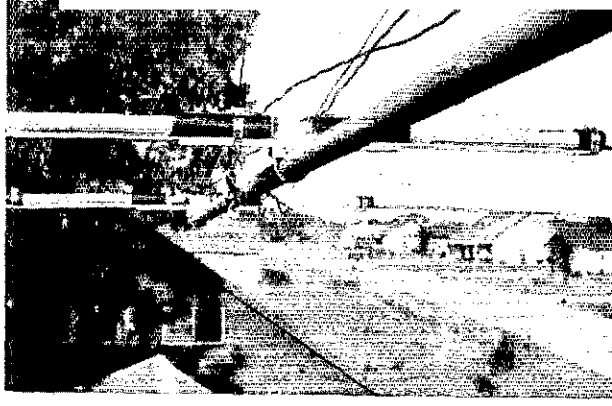
and

$$d_{23} = \tau d_{12}$$
$$d_{34} = \tau d_{23}$$
$$\vdots$$
$$d_{n-1,n} = \tau d_{n-2,n-1} \qquad \text{(Eq. 4)}$$

where d_{23} = spacing between elements 2 and 3.

Each element is driven with a phase shift of 180° by switching or alternating element connections, as shown in Fig. 2. The dipoles near the input, being nearly out of phase and close together, nearly cancel each others' radiation. As the element spacing, d, expands there comes a point along the array where the phase delay in the transmission line combined with the 180° switch gives a total of 360° $(1 - d/\lambda)$. This puts the radiated fields from the two dipoles d apart in phase in a direction toward the apex. Hence, a lobe coming off the apex results when the total phase delay from one dipole to the next is 360° $(1 - d/\lambda)$.[5]

This phase relationship exists in a set of dipoles known as the "active region." If we assume that an LPDA is designed for a given frequency range, then that design must include an active region of dipoles for the highest and lowest design frequency. It has a bandwidth which we shall call *Bar* (bandwidth of the active region).[2] Cheong,[5] using a high speed computer, has made an extensive study of a 12-element LPDA. He determined the individual element currents, both real and imaginary. The dipole nearest resonance is his element number 6. The imaginary parts of the currents in shorter elements 7 to 12 are capacitive, while those in longer elements 1 to 6 are inductive. The capacitive current components in shorter elements 9 and 10 exceed the conductive components; hence, these



This close-up view shows the element-to-boom, mounting arrangement. Two hose clamps secure each half-element to the angle-aluminum and aluminum-bar supports. Above the nearer element the feeder conductors and the strut cables are visible.

elements receive little power from the feeder and act as parasitic directors. The inductive current components in longer elements 4 and 5 are dominant and they act like parasitic reflectors. Elements 6, 7, and 8 receive most of their power from the feeder and act like driven elements. The amplitudes of the currents in the remaining elements are small and they may be ignored as primary contributors to the radiation field. Hence, we have a generalized Yagi array with seven elements comprising the active region. It should be noted that this active region is for a specific set of design parameters (τ = 0.93, σ = 0.175). The number of elements making up the active region will vary with τ and σ. Adding additional elements *on either side of the active region cannot* significantly modify the circuit or field properties of the array.[5]

This active region determines the basic design parameters for the array, and sets the bandwidth for the structure, *Bs*. That is, for a design-frequency coverage of bandwidth B, there exists an associated bandwidth of the active region such that

$$B_s = B \times Bar \qquad \text{(Eq. 5)}$$

where B = operating bandwidth $= \dfrac{f_n}{f_1}$ (Eq. 6)

and f_1 = lowest freq., MHz
f_n = highest freq., MHz

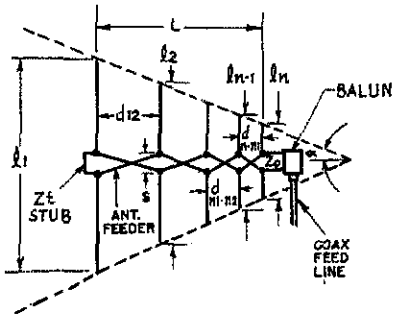


Fig. 2 — The log-periodic dipole array and some of the design parameters.

$$\tau = \frac{l_n}{l_{n-1}} = \frac{d_{n,n-1}}{d_{n-2,n-1}}$$

$$\sigma = \frac{d_{n,n-1}}{2l_{n-1}}$$

$$h_n = \frac{l_n}{2}$$

Where l = el. length
h = el. half length
d = el. spacing
τ = design constant
σ = relative spacing constant
S = feeder spacing
Zo = char. impedance of antenna feeder

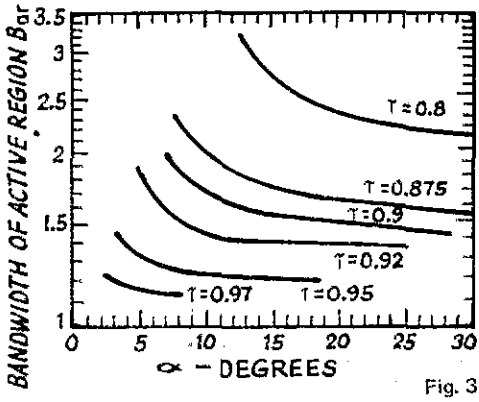


Fig. 3

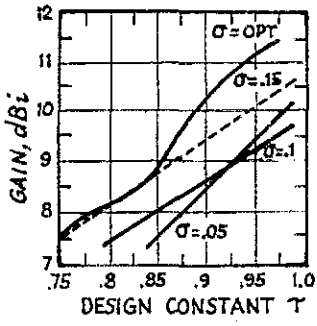


Fig. 4

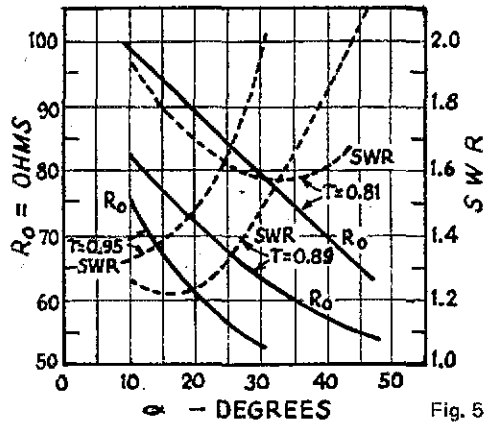


Fig. 5

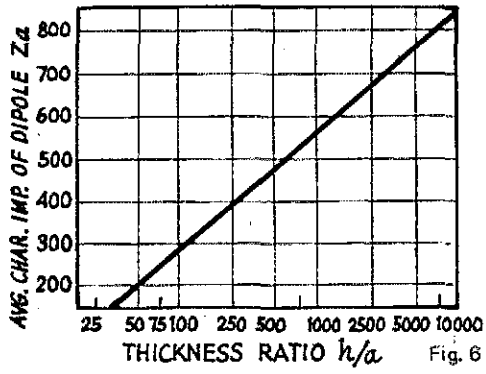


Fig. 6

Bar varies with τ and α as shown in Fig. 3. Element lengths which fall outside *Bar* play an insignificant role in the operation of the array. The *gain of an LPDA is determined by the design* parameter τ and the relative element spacing constant σ. There exists an optimum value for σ, σ_{opt}, for each τ in the range $0.8 \leq \tau < 1.0$, for which the gain is maximum; however, the increase in gain achieved by using σ_{opt} and τ near 1.0 (i.e., $\tau = 0.98$) is only 3 dB above isotropic (3 dBi) when compared with the minimum σ ($\sigma_{min} = .05$) and $\tau = 0.9$, shown in Fig. 4.

An increase in τ means more elements and optimum σ means a long boom. In the construction portion of this article we shall see that a well-constructed, high gain (8.5 dBi) LPDA can be designed in the hf region with $\tau = 0.9$ and $\sigma = .05$. The relationship of τ, σ, and α is as follows:

$$\sigma = (1/4)(1-\tau)\cot\alpha \qquad \text{(Eq. 7)}$$

where α = 1/2 the apex angle
τ = design constant
σ = relative spacing constant

$$\text{also } \sigma = \frac{d_n, n-1}{2l_n - l} \qquad \text{(Eq. 8)}$$

$$\sigma_{opt} = 0.258\tau - .066 \qquad \text{(Eq. 9)}$$

The method of feeding the antenna is rather simple. As shown in Fig. 2, a balanced feeder is required for each element, and all adjacent elements are fed with a 180° phase shift by alternating element connections. In this article the term *antenna feeder* is defined as that line which *connects each adjacent element. The feed line is* that line between antenna and transmitter or Transmatch. The characteristic impedance of the antenna feeder, Zo, must be determined so that the feed-line impedance and type of balun can be determined. The antenna-feeder impedance Zo depends on the mean radiation resistance level Ro (required input impedance of the active region elements — see Fig. 5) and average characteristic impedance of a dipole Za. (Za is a function of element radius a and the resonant element half length, where $h = \lambda/4$. See Fig. 6.) The relationship is as follows:

$$Zo = \frac{Ro^2}{8\sigma' Za} + Ro\sqrt{\left(\frac{Ro}{8\sigma' Za}\right)^2 + 1} \qquad \text{(Eq. 10)}$$

where Zo = characteristic impedance of feeder
Ro = mean radiation resistance level or required input impedance of the active region.
Za = average characteristic impedance of a dipole

$$= 120\left(ln\ \frac{h}{a} - 2.55\right) \qquad \text{(Eq. 11)}$$

h = el. half length
a = radius of el.

$$\sigma' = \text{mean spacing factor} = \frac{\sigma}{\sqrt{\tau}} \qquad \text{(Eq. 12)}$$

Table I — Array dimensions, feet

El. No.	l_n	h	$d_{n-1,n}$ *(spacing)*	*nearest resonant*
1	38.0	19	0	
2	34.2	17.1	3.862 = d_{12}	14 MHz
3	30.78	15.39	3.475 = d_{23}	
4	27.7	13.85	3.13 ·	
5	24.93	12.465	2.815 ·	
6	22.44	11.22	2.533 ·	21 MHz
7	20.195	10.098	2.28 ·	
8	18.175	9.088	2.05 ·	
9	16.357	8.179	1.85 ·	28 MHz
10	14.72	7.36	1.663 ·	
11	13.25	6.625	1.496 ·	
12	11.924	5.962	1.347 = $d_{11,12}$	

From Fig. 5 we can see that Ro decreases with increasing τ and increasing α. Also the VSWR with respect to Ro has a minimum value of about 1.1 to 1 at σ optimum, and a value of 1.8 to 1 at σ = .05. These SWR values are acceptable when using standard RG-8/U 52-ohm and RG-11/U 72-ohm coax for the feed line. However, a one-to-one VSWR match can be obtained at the transmitter end using a coax-to-coax Transmatch.[6] A Transmatch is used at the author's QTH so that the transmitter low pass filter will see a 52-ohm load on each frequency within the array passband. The Transmatch also eliminates possible harmonic radiation caused by the frequency-independent nature of the array.

Once the value of Zo has been determined for each band within the array passband, the balun and feed line may be chosen. That is, if Zo = 100 ohms, a good choice for the balun would be 1 to 1 balanced to unbalanced, and 72-ohm coax feed line. If Zo = 220 ohms, choose a 4 to 1 balun, and 52-ohm coax feed line, and so on. The balun may be omitted if the array is to be fed with an open-wire feed line.

The terminating impedance, Zt, may be omitted. However, if it is used, it should have a length no longer than $\lambda_{max}/8$. The terminating impedance tends to increase the front-to-back ratio for the lowest frequency used and in the construction details a 6-inch shorting jumper wire is shown for Zt. When Zt is simply a short-circuit jumper the longest element behaves as a passive reflector. It also might be noted that one could increase the front-to-back ratio on the lowest frequency by moving the passive reflector (No. 1 element) a distance of 0.15 to 0.25 λ behind element No. 2, as would be done in the case of an ordinary Yagi parasitic reflector. This of course would necessitate lengthening the boom.

As noted in Fig. 7, the front-to-back ratio increases as the frequency increases. This is because more of the shorter inside elements form the active region, and the longer elements become additional reflectors.

Design Procedure

A systematic step-by-step design procedure of the LPDA is to follow. This procedure will provide the amateur with the basic tools for designing any LPDA for any desired bandwidth.

1) Decide on an operating bandwidth B between f_1, lowest frequency and f_n, highest *frequency, using Eq. 6.*

2) Choose τ and σ to give a desired gain (Fig. 4).

$$0.8 \leqslant \tau \leqslant 0.98$$
$$.05 \leqslant \sigma \leqslant \sigma_{opt}$$

The value of σ_{opt} may be determined from Eq. 9.

3) Determine the apex half-angle α

$$\cot \alpha = \frac{4\sigma}{1-\tau}$$

4) Determine the bandwidth of the active group Bar from Fig. 3.

5) Determine the structure (array) bandwidth Bs from Eq. 5.

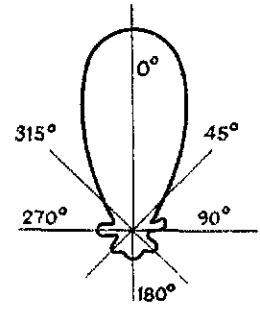


Fig. 7 — Measured radiation pattern for the lowest frequency band of the author's array, 14 MHz. The front-to-back ratio increases as the frequency increases. For this array it is 14.4 dB at 14 MHz, 19.5 dB at 21 MHz, and 21 dB at 28 MHz.

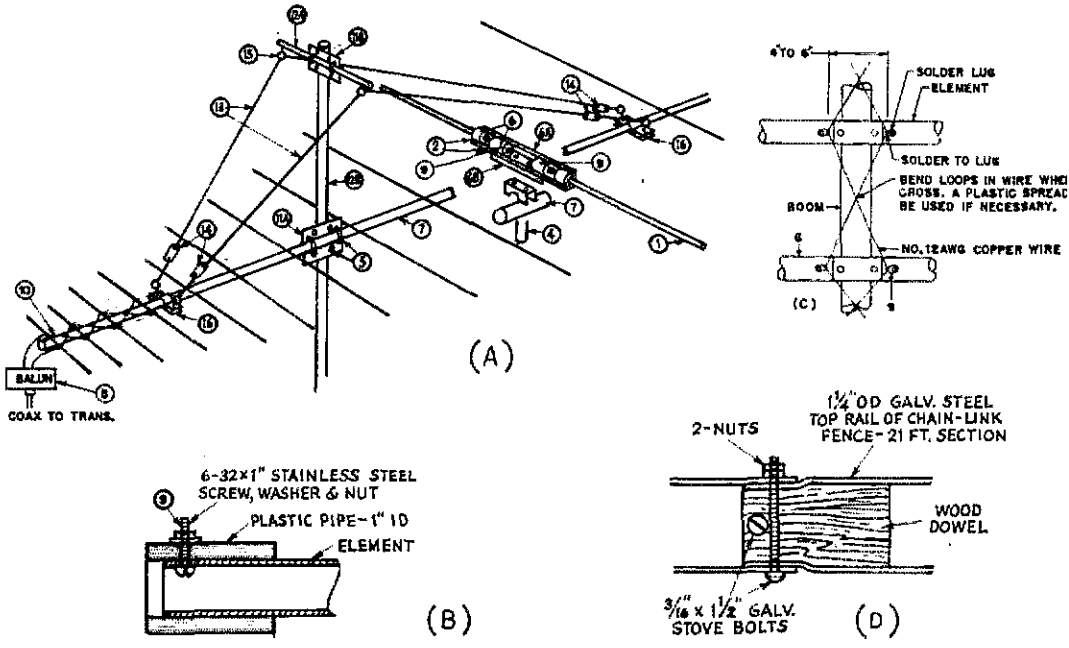


Fig. 8 — Construction diagram. At B and C are shown the method of making electrical connection to each half element, and at D is shown how the boom sections are joined.

6) Determine the boom length, L, number of elements N, and longest element length, l_1.

$$L = \left[\frac{1}{4}\left(1 - \frac{1}{Bs}\right)\cot\alpha\right]\lambda_{max} \qquad \text{(Eq. 13)}$$

$$N = 1 + \frac{\log Bs}{\log\left(\frac{1}{\tau}\right)} \qquad \text{(Eq. 14)}$$

$$l_1 = \frac{492}{f_1}$$

where λ_{max} = longest free-space wavelength = $984/f_1$

Examine L, N and l_1 and determine whether or not the array size is acceptable at your QTH. If the array is too large, increase α by 5° and repeat steps 2 through 6.

7) Determine the terminating stub Zt. (Note: For hf arrays short out the longest element with a 6-inch jumper. For vhf and uhf arrays use:

$$Zt = \lambda_{max}/8.$$

8) Once the final values of τ and σ are found, the characteristic impedance of the feeder Zo must be determined so the type of balun and feed line can be found. Use Eq. 10. Determine Ro from Fig. 5, Za from Fig. 6 and σ' from Eq. 12. Note: Values for h/a Za, and Zo must be determined for each amateur band within the array passband. Choose the element half-length h nearest $h = \lambda/4$, at the center frequency of each amateur band. Once Zo is found for each band, choose whatever combination of balun and feed line will give the lowest SWR on each band.

9) Solve for the remaining element lengths from Eq. 3.

10) Determine the element spacing d_{12} from

$$d_{12} = 1/2\,(l_1 - l_2)\cot\alpha \qquad \text{(Eq. 15)}$$

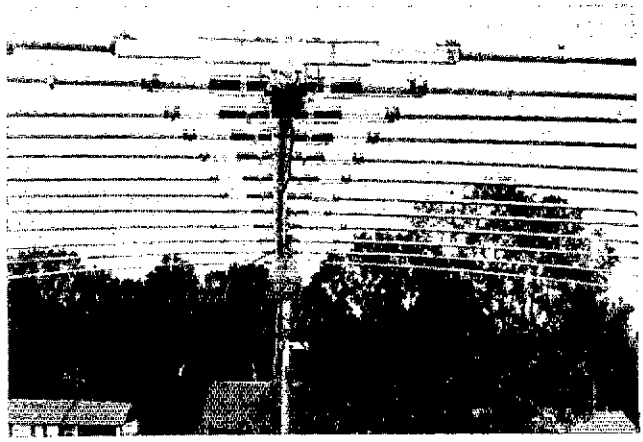
and the remaining element-to-element spacings from Eq. 4. This completes the design.

Construction of an LPDA at the Author's QTH

The final result of this work is the finished project. I wanted one beam antenna which would replace my three stacked monoband 3-element Yagis (10, 15, and 20 meters) and would give comparable performance. The LPDA was chosen, and on-the-air performance substantiates the theory behind it.

The parameters are as follows:

Frequency range, 13-30 MHz
Half-power beamwidth, 43° (14 MHz)
Operating bandwidth, B = 30/13 = 2.3
Design parameter τ = 0.9
Relative element spacing constant σ = .05
Apex half-angle α = 25°, cot α = 2.0325
Bandwidth of active group, Bar = 1.4
Bandwidth of structure, Bs = 3.22
Boom length, L = 26.5 ft
Longest element l_1 = 38 ft (a tabulation of element lengths and spacings is given in Table I)
Total weight, 116 pounds



Looking "down the throat" of the K4EWG hf LPDA.

Wind-load area, 10.7 sq. ft

Required input impedance (mean resistance), Ro = 67 ohms, Zt = 6-inch jumper No. 18 wire

Average characteristic dipole impedance: $Za_{14\ MHz}$ = 450 ohms; $Za_{21\ MHz}$ = 420 ohms; $Za_{28\ MHz}$ = 360 ohms.

Mean spacing factor σ' = .0527.

Impedance of the feeder: $Zo_{14\ MHz}$ = 95 ohms; $Zo_{21\ MHz}$ = 97 ohms; $Zo_{28\ MHz}$ = 103 ohms

Using a toroid balun at the input terminals and a 72-ohm coax feeder the SWR is 1.4 to 1 (maximum).

The mechanical assembly uses materials readily available from most local hardware stores or aluminum supply houses. The materials needed are given in Table II. In the construction diagram, Fig. 8, the materials are referred to by their respective material list number. The photographs show the overall construction picture, and the drawings show the details. Table III gives the required tubing lengths to construct the elements.

The antenna feeder (line connecting adjacent elements) is constructed of No. 12 solid copper wire, with solder-lug connections at each element. The feeder spacing S (Fig. 2) is not critical. From 4 to 6 inches is satisfactory for hf antennas; use smaller spacings for vhf and uhf arrays. For uhf and vhf arrays, S should be small when compared to the smallest wavelength used (i.e., less than $\lambda_{min}/8$.

Results

This beam has been in operation at the author's QTH for several months, and it has performed better than had been anticipated. The front-to-back ratio is approximately 19.5 dB at 21 MHz with a forward gain of 8.5 dB*i*. The radiation pattern, plotted in Fig. 7 shows a good forward lobe at 14 MHz. The beam was well worth the effort, as at a height of only 30 feet it punches through the pileups with moderate power (100 watts).

Table II — Materials list

	Material Description	*Quantity*
1.	Aluminum tubing — .047" wall thickness	
	1" — 12' or 6' lengths	126 lineal feet
	7/8" — 12' lengths	96 lineal feet
	7/8" — 6' or 12' lengths	66 lineal feet
	3/4" — 8' lengths	16 lineal feet
2.	Stainless-steel hose clamps — 2" max.	48 ea.
3.	Stainless-steel hose clamps — 1-1/4" max.	26 ea.
4.	TV-type U-bolts	14 ea.
5.	U-bolts, galv. type	
	5/16" × 1-1/2"	4 ea.
	1/4" × 1"	2 ea.
6.	1" ID polyethelene water-service pipe — 160 psi test, approx. 1-1/4" OD	20 lineal feet
A.	1-1/4" × 1-1/4" × 1/8" aluminum angle — 6' lengths	30 lineal feet
B.	1" × 1/4" aluminum bar — 6' lengths	12 lineal feet
7.	1-1/4" top rail of chain-link fence	26.5 lineal feet
8.	1:1 toroid balun	1 ea.
9.	6 — 32 × 1" stainless-steel screws	24 ea.
	6— 32 stainless-steel nuts	48 ea.
	No. 6 solder lugs	24 ea.
10.	No. 12 copper feeder wire	60 lineal feet
11.		
A.	12" × 8" × 1/4" aluminum plate	1 ea.
B.	6" × 4" × 1/4" alum. plate	1 ea.
12.		
A.	3/4" galv. pipe	3 lineal feet
B.	1" galv. pipe — mast	5 lineal feet
13.	Galv. guy wire	50 lineal feet
14.	1/4" × 2" turnbuckles	4 ea.
15.	1/4" × 1-1/2" eye bolts	2 ea.
16.	TV guy clamps and eye bolts	2 ea.

Table III — Element material requirements

El. No.	1" tubing		7/8" tubing		3/4" tubing		1-1/4" angle	1" bar
	Lth.	Qty.	Lth.	Qty.	Lth.	Qty.	Lth.	Lth.
1	6'	2	6'	2	8'	2	3'	1'
2	6'	2	12'	2	—	—	3'	1'
3	6'	2	12'	2	—	—	3'	1'
4	6'	2	8.5'	2	—	—	3'	1'
5	6'	2	7'	2	—	—	3'	1'
6	6'	2	6'	2	—	—	3'	1'
7	6'	2	5'	2	—	—	2'	1'
8	6'	2	3.5'	2	—	—	2'	1'
9	6'	2	2.5'	2	—	—	2'	1'
10	3'	2	5'	2	—	—	2'	1'
11	3'	2	4'	2	—	—	2'	1'
12	3'	2	4'	2	—	—	2'	1'

This article has dealt with the basic LPDA system. However, there are endless high-gain array possibilities with this type of antenna. Tilting the elements toward the apex will increase the gain 3 to 5 dB. Adding parasitic directors and a reflector will increase both gain and front-to-back ratio for a specific frequency within the passband. The LPDA-Yagi combination is very simple. Use the LPDA design procedures within the set of driven elements, and place parasitic elements at normal Yagi spacings from the LPDA end elements. Use standard Yagi design procedures for the parasitic elements. An example of a single band high-gain LPDA-Yagi would be a two- or three-element LPDA for 21.0 to 21.45 MHz with the addition of 2 or 3 parasitic directors and one parasitic reflector. The combinations are endless.

I wish to thank Ben Painter, W4BBP, who helped in the plotting of the radiation pattern. I also wish to thank the fellows at W3SK, who helped in on-the-air far-field testing.

References

1) Isbell, "Log Periodic Dipole Arrays," *IRE Transactions on Antennas and Propagation*, Vol. AP-8, No.3, May, 1960, pp. 260-267.

2) Carrel, "The Design of Log-Periodic Dipole Antennas," *1961 IRE International Convention Record*, Part 1, Antennas and Propagation, pp. 61-75; also Ph. D. thesis, University of Ill., Urbana, Ill., 1961.

3) Rumsey, *Frequency Independent Antennas*, pp. 71-78, Academic Press, N.Y., 1966.

4) King, Mack, and Sandler, *Arrays of Cylindrical Dipoles*, pp. 244-269, Cambridge Univ. Press, London, 1968.

5) Cheong, *Arrays of Unequal and Unequally Spaced Dipoles*, Ph. D. Thesis, Harvard Univ., Cambridge, Mass., 1967.

6) McCoy, "The Ultimate Transmatch," *QST*, July, 1970, p. 24. QST

The Rollerless Ultimate

(Continued from page 12)

small amount of rf energy to the input connector (no more power than necessary to get a reading on the SWR indicator in its most sensitive position) and adjust both the INPUT and OUTPUT controls while observing the directional wattmeter set for reflected power. Various settings of the capacitors should be used with each switch position until the proper settings are established as indicated by minimum reflected power. The operator may then log the settings and return to them anytime.

In some cases it may be found that two positions of the inductor switch may be used, either of which will provide proper reflected power readings. When this situation occurs, the position which allows the output capacitor to be more fully meshed is the one to use. In tests, the author could match any of the station antennas on *any* band, with the exception of ten meters. The lead inductance and stray capacitance of the circuit makes it difficult to load some "odd" antennas on this band. Ordinary antennas, such as a ten-meter Yagi or dipole can be loaded properly, however.

This Transmatch was designed with 160-meter operation in mind. The final product proved to be marginal in performance since there was not sufficient capacitance available at C2 for loading an 80-meter open-wire-fed dipole on 160 meters. Additional capacitance connected in parallel with C2 solves the problem nicely. A transmitting ceramic 5-kV, 100-pF capacitor is satisfactory for this purpose and can be included along with an appropriate switch if 160-meter operation is anticipated. If there is a need to include an SWR meter in the Transmatch, the constructor is referred to the Monimatch circuit published with the Ultimate Transmatch which appears in *QST* for July, 1971, or any recent edition of *The Radio Amateur's Handbook*. QST

A TTL Message Generator for RTTY and CW

BY JAMES E. BELL,* K4FUP AND
FRED H. SCHMIDT,** W4VWS

THIS MESSAGE GENERATOR is a very useful accessory for the amateur RTTY station. At the push of a button, a station identification message is automatically transmitted on RTTY, followed by automatic cw identification which is required by the FCC. Teleprinter message generators have been described in the past, ranging from punched paper-tape loops to modern solid-state units such as the "ICARUS" by K5ANS.[1] A unit has also been described by Ferrell for cw only[2] and another by Hall for either cw only or RTTY only.[3]

The message generator presented here was developed with the following objectives in mind:

1) Use of transistor-transistor logic (TTL) rather than resistor-transistor logic (RTL) because of lower cost and greater noise immunity.

2) Ease of programming. The diode pattern for each RTTY character is obtained by inspection of the marking pulses for that character.

3) Ability to change the message format without having to re-encode the entire message.

4) Reduction of the number of diodes needed. At most, one diode per marking pulse will be required. For the cw portion of the message, one diode per Morse dot and three diodes per Morse dash will be needed.

There are two basic approaches in generating fixed-format messages. In the first, used by most of the previously described systems, the *bits* are generated serially. Relatively simple circuits are used, but the method requires a large number of diodes. Karnaugh maps are used to reduce the diode count. Generally, it is impractical to change one part of the message without re-encoding a large part or even all of the diode matrix. In the second method, as exemplified by the unit to be described, the *characters* are generated serially, and the *bits* required for each character are selected or encoded simultaneously, i.e., in parallel. A single integrated circuit converts the encoded characters from parallel to serial format. By encoding bits in parallel, we reduce the diode count by a large factor, but the price we pay is the need for a shift register which must have as many stages as the number of characters in the message. Now, if we had to build up a shift register out of *J-K* flip-flops, the circuit would become bulky and expensive. However, we can now obtain 5-stage integrated-circuit shift registers for less than 20 cents per stage — a heartening bit of information in these inflationary times. A 60-stage shift register is normally sufficient for an identification message in RTTY and cw, but the shift register may be made as long as desired. Another advantage of our method is that a fixed-length binary counter will serve for any message length.

Before discussing circuit details, we will briefly describe the 5-unit Baudot code used by virtually all machines in the amateur service. The signal levels are called *mark* (magnet current on) and *space* (magnet current off). The signal consists of a start pulse (space), five data pulses, and a stop pulse (mark). The particular combination of marks and spaces for the data pulses determines the character or function to be sent. There are 2^5 or 32 possible combinations. For 60-wpm operation the start pulse and data pulses are normally 22 ms long. The stop pulse is 31 ms. When generating RTTY signals digitally, it is convenient to lengthen the stop pulse to 44 ms, or two bits. The only effect is to slow the transmission rate by about three words per minute.

The Shift Register and Diode Matrix

Fig. 1 shows a block diagram of the shift register and diode matrix. The shift register outputs are shown as vertical lines. When a pulse is applied to the clear line, all shift-register outputs go low (nominally zero volts). A pulse applied to the preset input of the first stage causes its output to go high. The serial input to the first stage is grounded. When a pulse is applied to the clock line, the output of the first stage goes low and the

* 491 Johanna Pl., Lilburn, GA 30247.
** Department of Statistics and Biometry, Emory University, Atlanta, GA 30322.
[1] For this and all subsequent references, see the bibliography at the end of this article.

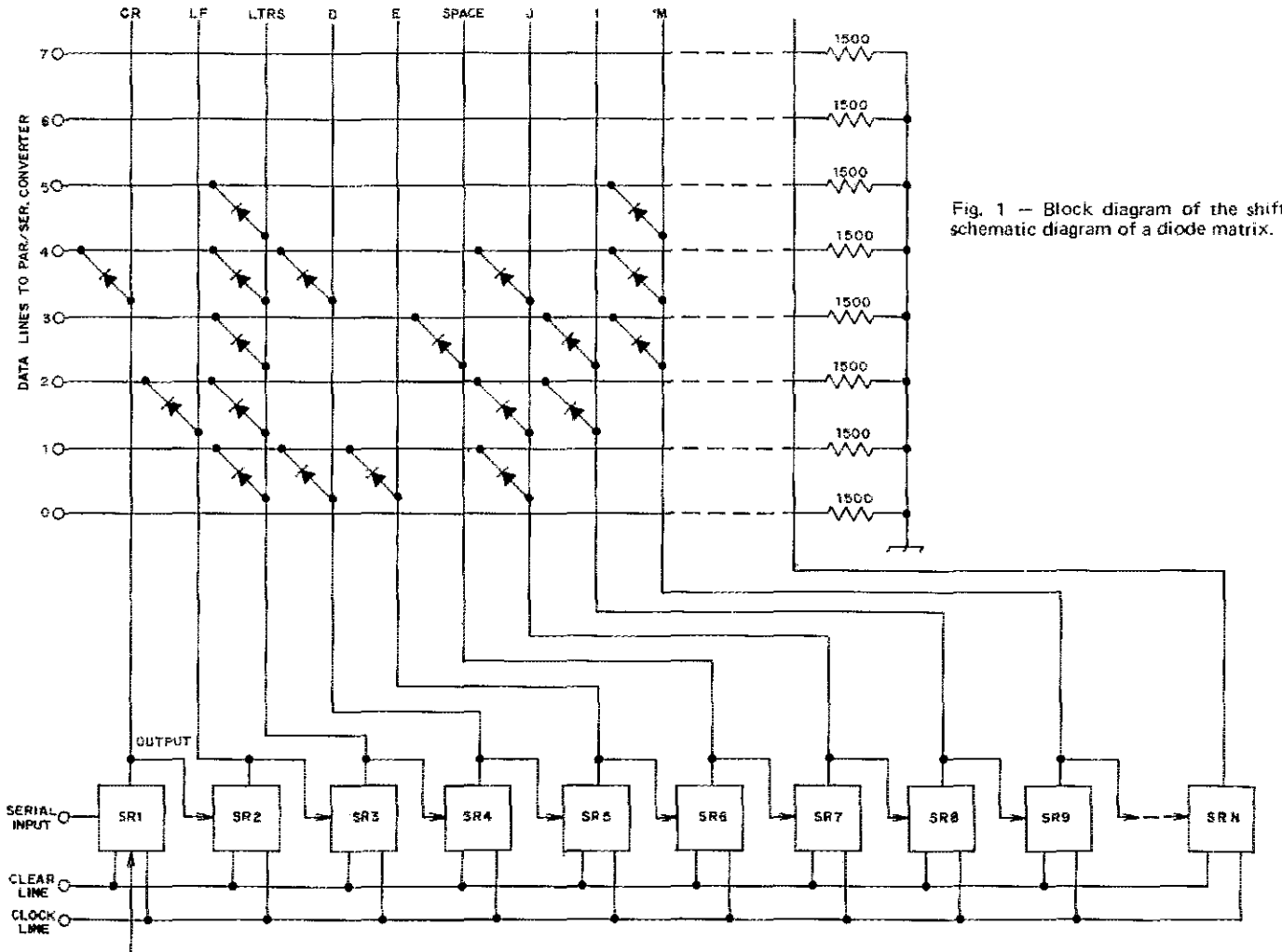


Fig. 1 — Block diagram of the shift register and schematic diagram of a diode matrix.

output of the second stage goes high. Each clock pulse shifts the high bit one place to the right.

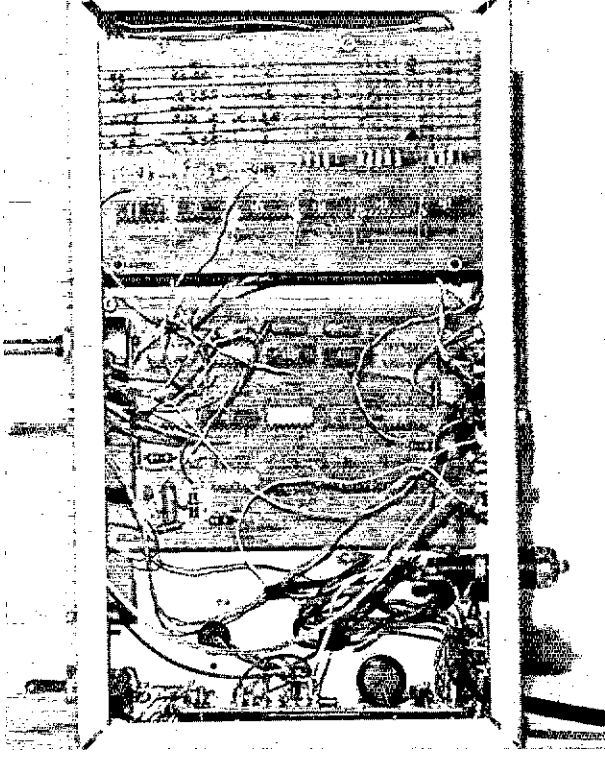
The outputs of the shift-register stages feed the diode matrix which is encoded for the particular message to be transmitted. The matrix output consists of eight data lines, labeled 0 through 7. These are shown as horizontal lines in Fig. 1. Logical zeroes and ones are placed on these lines in parallel by the diodes. The data lines feed a parallel-to-serial converter which sequentially samples data lines 0, 1, 2, 3, 4, 5, 6, and 7, in that order. The integrated-circuit parallel-to-serial converter is the electronic equivalent of the mechanical distributor in a tape transmitter.

For convenience in encoding the matrix, we have chosen to represent marks by a positive voltage (logical 1) and spaces by zero voltage (logical 0) on the data lines. Since the TTY start pulse is always a space, we do not connect any diodes to this line. The stop pulse is always a mark, so lines 6 and 7 must always be high during TTY coding. Instead of using two diodes at each shift register output, we employ a logic circuit to hold lines 6 and 7 high during the entire RTTY message. Lines 0, 6 and 7 are shown in Fig. 1 because they will be used during the cw portion of the message.

Setting up the diode matrix for a particular message is a simple matter of inspecting the Baudot code and placing a diode from the shift register output to the data line where a mark appears in the code. In Fig. 1 this is illustrated for the message fragment $\overline{\text{CR}}$ $\overline{\text{LF}}$ $\overline{\text{LTRS}}$ DE JIM.† The $\overline{\text{CR}}$ function code shows a mark in position 4, so we place a diode from the output of SR1 to data line 4. $\overline{\text{LF}}$ requires a diode from SR2 to data line 2. $\overline{\text{LTRS}}$ requires 5 diodes, one from SR3 to each of the data lines 1 through 5.

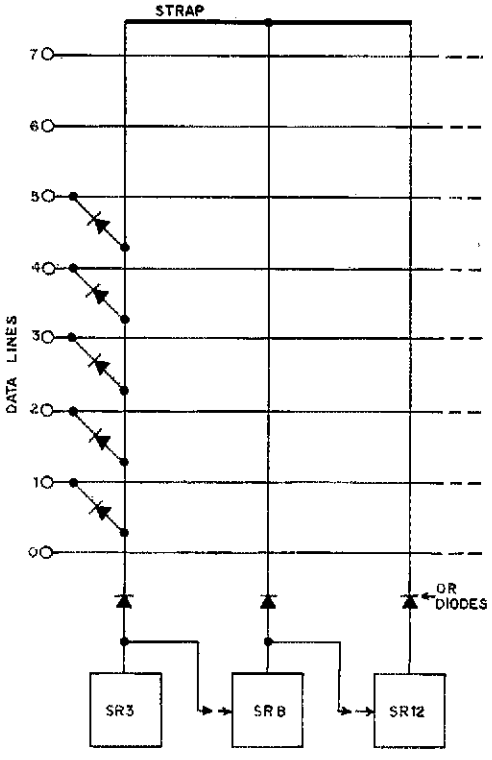
It may be seen from this description that the total number of diodes required will be equal to the number of mark pulses in the RTTY message, excluding the stop pulses. Actually, we could encode each of the 32 characters and functions once, and use them repeatedly as needed throughout the message by means of diode OR gates. Suppose, for example, that $\overline{\text{LTRS}}$ is needed as the third, eighth, and twelfth character in the message. Fig. 2 illustrates how this can be done. Data lines 1 through 5 all go high when the output of SR3 or SR8 or SR12 is high. In this example we have used three OR diodes to save 10 matrix diodes. If the character to be repeated contains one mark pulse, we would spend two diodes to save one diode. If the character contains two marks, we would break even. Clearly, then, if the character contains three or more marks, fewer diodes will be needed with OR gates. However, if a character must be repeated several times, it is more economical to use OR gates even if the character contains only two marks. A case in point is the so-called four-N turn-off code, used in many RTTY amateur and commercial nets to shut down the printer automatically. It is common practice to

†[EDITOR'S NOTE: $\overline{\text{CR}}$ denotes the TTY function for carriage return, $\overline{\text{LF}}$ for line feed, and $\overline{\text{LTRS}}$ for letter shift.]



Bottom view of the complete message generator. Visible in the upper portion of the chassis is the shift-register board, and in the lower portion, the control circuit board.

Fig. 2 — Method of using OR-gate diodes to reduce the number of matrix diodes. A TTY letter-shift function will be encoded on the data lines when the output of either SR3, SR8, or SR12 is high.



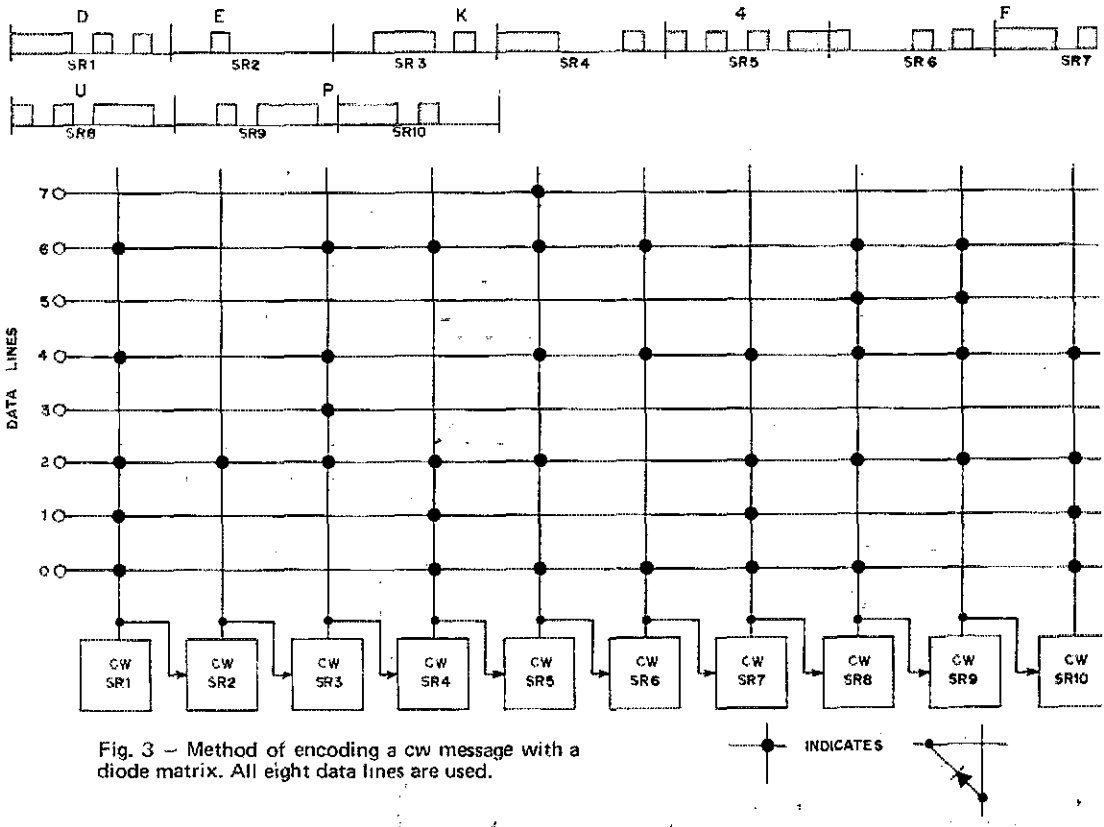


Fig. 3 – Method of encoding a cw message with a diode matrix. All eight data lines are used.

send a string of 7 or 8 Ns to insure that at least four consecutive Ns will be received under conditions of QRM or QRN. The code for N is logical ones on data lines 3 and 4. By means of OR gates, we can encode eight consecutive Ns with 10 diodes instead of 16 as would otherwise be required.

During the cw portion of the message, all eight data lines are used with the diode matrix. The relative duration of the dots, dashes, and spaces are as follows:

Morse dot – 1 bit
Morse dash – 3 bits
Element space – 1 bit
Character space – 3 bits
Word space – 7 bits (sometimes 5 bits are used)

Fig. 3 shows how a typical cw-identification message is set up. The message is broken into groups of eight bits. The first eight are assigned to the first cw shift register, and so on to the end of the message. A dot is encoded as a mark and a dash as three successive mark bits. One diode per dot and three diodes per dash are required. Spaces require no diodes. During cw, the logic circuit which holds data lines 6 and 7 high is automatically disabled.

Control Circuitry

Fig. 4 is a block diagram of the entire message generator. The control circuit contains a clock, a divider, a binary counter, a parallel-to-serial converter, three *R-S* flop-flops, two monostable multivibrators, and several gates to control various parts of the circuit.

The clock is a unijunction oscillator operating from the +5-V power supply. It feeds the divider which in turn drives a three-stage binary counter. The SN74151 integrated circuit is a one-of-eight data selector which performs the parallel-to-serial conversion. Three binary data-select lines from the counter are used by this circuit. The serial output of the converter is routed to an RTTY relay driver or to the cw relay driver. The appropriate driver is selected automatically by the RTTY-cw logic switch.

When the start button is depressed, the start flop-flop is set. This enables the clock through the clock control, and it triggers a 1-μs monostable circuit. The monostable output, labeled ST-P, is connected to the preset input of the first RTTY shift-register stage. This causes the first RTTY character to be placed on the data lines. At this instant, the binary data-select lines going to the parallel-to-serial converter are all 0 (000), and the converter output is connected to data line 0. The binary data select lines, 22 ms later, are 001, and the converter output is connected to data line 1. This process repeats itself every 22 ms until the data-select lines are 111 (binary 7). The next count changes the data-select lines back to 000. The most significant bit has changed from 1 to 0. This signal (*Advance-N*) is inverted (*Advance-P*) and fed to the clock line of the shift register, with the result that the high is advanced from SR1 to SR2. Now the second RTTY character is on the data lines, ready

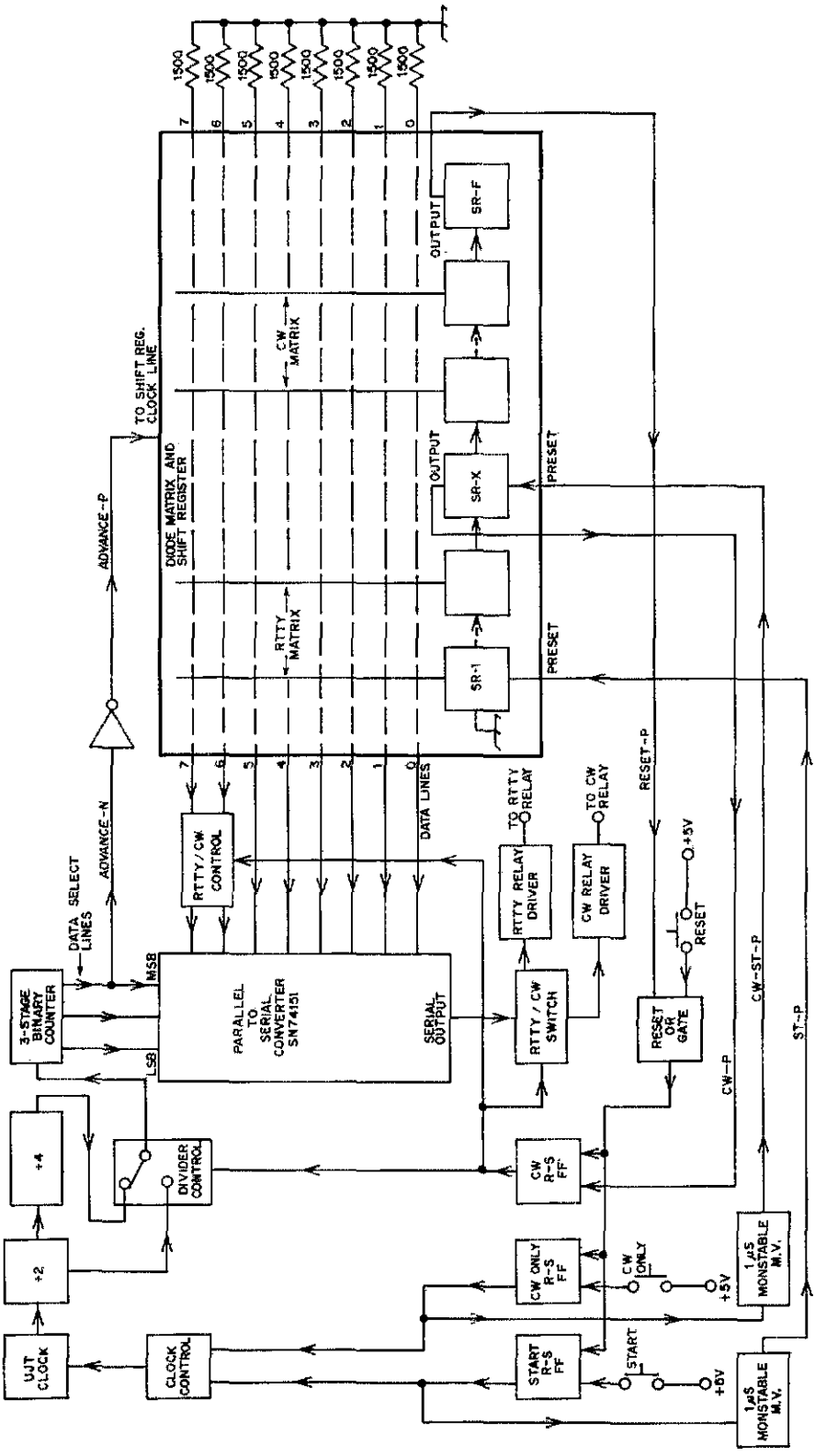


Fig. 4 — Block diagram of the RTTY-cw message generator.

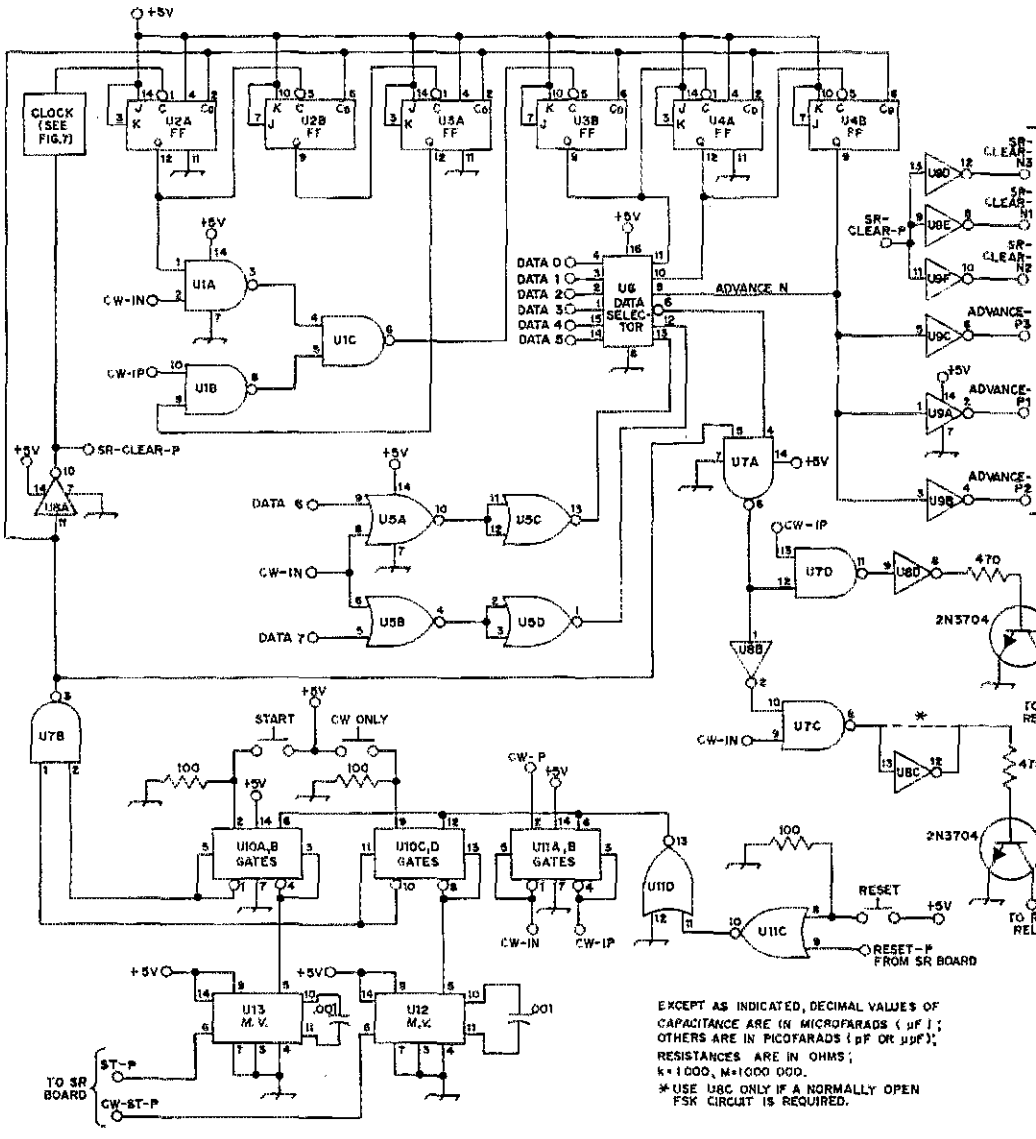


Fig. 5 — Schematic diagram of control circuit. Symbols used for U10 and U11 (A and B) are not shown in the usual style followed in *QST*, for simplification of the drawing. All ICs are dual in-line packages (DIP).

U1, U7 — Quad 2-input NAND gate, type 7400 (1 section U1 unused).

U2, U3, U4 — Dual *J-K* flip-flop, type 7473.

U5, U10, U11 — Quad 2-input positive NOR gate, type 7402.

U6 — 8-bit data selector, type 74121.

U8, U9 — Hex inverter, type 7404 (2 sections U8 unused).

U12, U13 — Monostable multivibrator, type 74121.

to be scanned by the parallel-to-serial converter. The process repeats itself to the end of the RTTY portion of the message.

The output of the shift-register stage following the last RTTY stage is used to set the RTTY-cw flip flop. Three things happen as a result:

1) The RTTY-cw control is disabled, freeing the data lines 6 and 7 to follow coding in the cw portion of the diode matrix.

2) The divider control switches in an additional 2-stage binary divider. This slows down the cw speed by a factor of four. A Morse dot will be 88 ms long instead of 22 ms, for a code speed of approximately 13.6 wpm.

3) The RTTY-cw switch routes the serial output of the parallel-to-serial converter to the cw relay driver. The cw relay is used for narrow-shift keying of the transmitter.

When the high or logical 1 reaches the stage following final cw shift register, its output resets the three *R-S* flip-flops. Resetting the start flip-flop disables the clock and causes the binary counter

and the shift register to be reset. It is not necessary to depress the reset switch before initiating another cycle. This switch is provided in case one wants to terminate the message before completion, or to clear the system when first turning on power.

An important feature of the circuit is the ability to send only the cw portion of the message. When the CW ONLY push button is depressed, the sequence of events is very similar to that described earlier. The clock is enabled, and a 1-ms pulse, *CW-ST-P*, is fed to the preset input of the shift register stage following the last RTTY stage. The operation of the circuit is the same as before, only we have skipped the RTTY portion of the complete cycle.

Schematic diagrams of the unit are shown in Figs. 5, 6, and 7. The 5-V regulated power supply shown in Fig. 8 supplies all circuits. Any well-regulated 5-V supply will be suitable. Total current drain with a 60-stage shift register is about 850 mA.

The clock and clock control are adapted from a circuit by Murphy.[4] We have found that this circuit performs reliably at +5 V with the 2N4948 unijunction transistor. Other UJTs may not work or may require different circuit values. The clock frequency is 90.9 Hz.

All diodes are germanium. Surplus diodes at $.02 each were found to be entirely satisfactory. It would be wise, however, to test them before use. Hall outlines a suitable test procedure.[3]

Type 2N3704 transistors are used to drive a pair of surplus reed relays operating from the 5-V logic supply. Our relays, although rated at 6 V, perform nicely on the 5-V supply. Poly Paks advertises a 6-V, 220-Ω relay for $1.49 (Cat. No. 92CU1275).‡ Although not tried by the authors, it should work quite well. Any relay can be used if it is fast enough to follow the RTTY code. If the relay requires a higher coil voltage, an MJE340 transistor can be substituted for the 2N3704.

In Fig. 5 there are three outputs from the control circuit labeled *Advance-P1, -2* and *-3*, and three labeled *SR-Clear-N1, -2* and *-3*. *SR-Clear-N1* clears the first six chips of the shift register (30 stages). *Advance-P1* feeds the clock line for the first six shift-register chips. Our units contain two shift-register printed circuit boards with 30 stages on each. *Advance-P3* and *SR-Clear-N3* are shown in case the message length requires a third shift-register board.

There are three connections required on the shift-register board which are not shown in Fig. 6 because their position depends on the exact length of the message. On the shift-register board in Fig. 4 it will be seen that the last RTTY stage and the first cw stage are separated by a stage labeled *SR-X*. Connect *CW-ST'OP* to the preset input of *SR-X* and *CW-P* to the output. *SR-X* does not feed the diode matrix. The function of *SR-X* is to set the cw flip-flop after completion of the RTTY message, and to give a delay of about 700 ms before the start of the cw message.

‡ P.O. Box 942, Lynnfield, MA 01940.

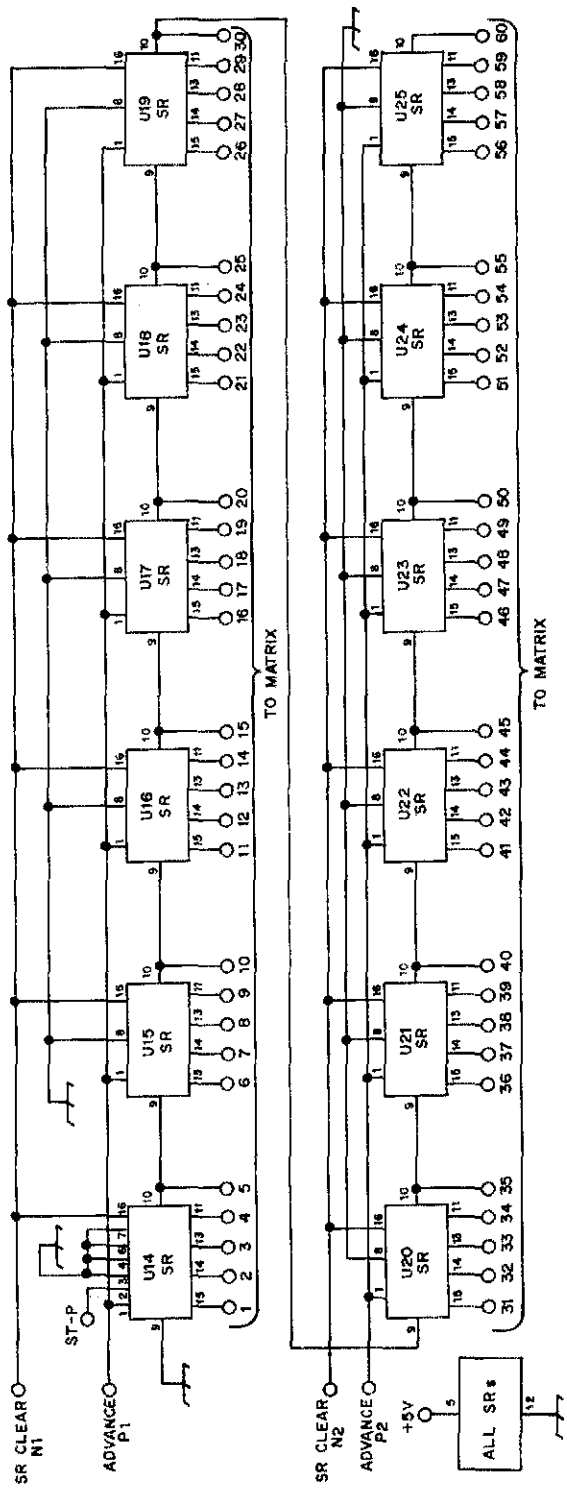


Fig. 6 — Schematic diagram of shift register. All ICs are 5-bit shift registers, type 7496.

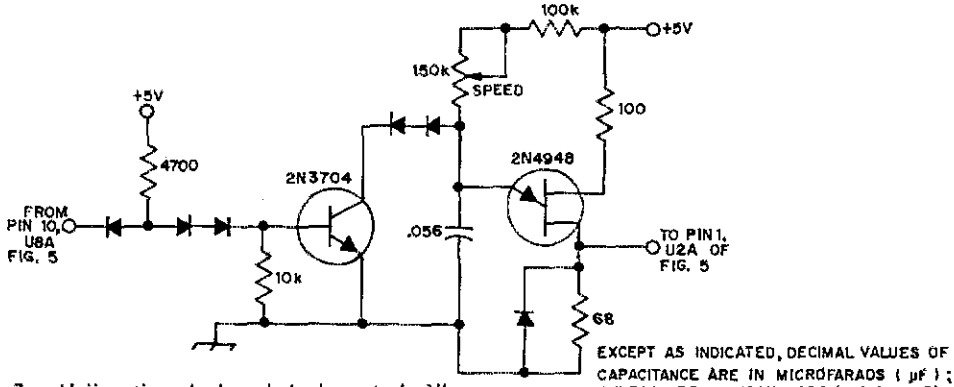


Fig. 7 — Unijunction clock and clock control. All resistors are 1/4 or 1/2-watt. All unmarked diodes are germanium, such as 1N34A or 1N270.

When a preset input is used, it is necessary to tie the preset-enable line high. There is a single preset-enable input for each chip. The unused preset inputs must be grounded. When none of the presets on a chip are used, the preset-enable terminal may be grounded and the preset inputs left open.

Construction

A convenient method of construction is to place all control circuitry on one printed circuit board and to use two pc boards for the shift register and diode matrix. A suitable layout for the shift register board is given in Fig. 9. The matrix diodes are mounted perpendicular to the board. The data lines are overhead, spaced about 3/4 inch (1.9 cm) above the board. They are bent down at the ends, where they are soldered to pads on the board. The two matrix boards are stacked by means of 1 inch (2.5-cm) spacers in the corners.

A unit such as this need not take up space at the operating position. It can be housed in an aluminum box or chassis and tucked away in the knee-well of the teleprinter machine. A cable can be brought out to a small control box containing the three push-button switches, located at the operating position. Stunt-box contacts may be used in place of, or in addition to, the push-button switches.

Connection to Demodulator

The small reed relay is not suitable for use in the 60-mA loop. A more satisfactory method is to use the relay contacts ahead of the keying stage in the tuning unit. The cw relay contacts are connected across the narrow-shift key.

We have successfully interfaced the message generator with two popular RTTY demodulators — the Mainline TT/L[5] and the ST-6.[6] Both units use essentially the same keying circuit, loop supply and fsk driver; the chief difference is the use of a vacuum tube in the TT/L and a transistor in the ST-6. Connection to the TT/L is shown in Fig. 10A and to the ST-6 in Fig. 10B. Some interesting

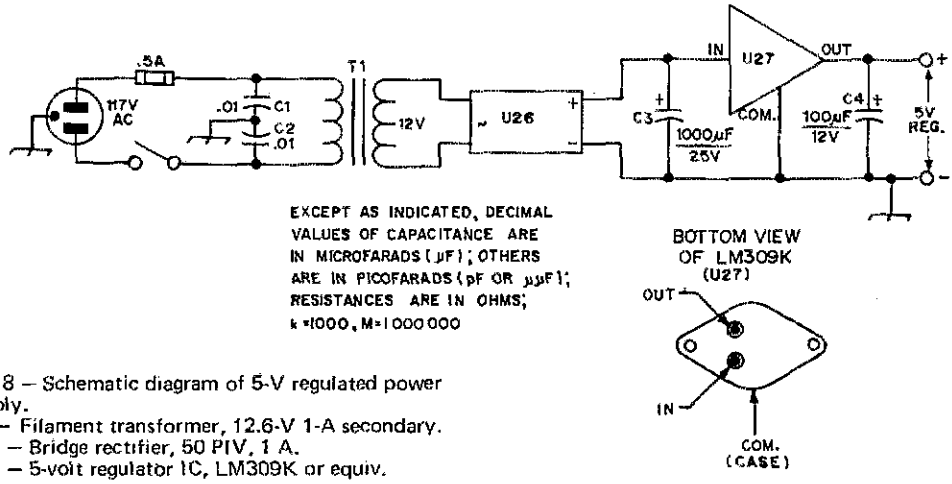


Fig. 8 — Schematic diagram of 5-V regulated power supply.
T1 — Filament transformer, 12.6-V 1-A secondary.
U26 — Bridge rectifier, 50 PIV, 1 A.
U27 — 5-volt regulator IC, LM309K or equiv.

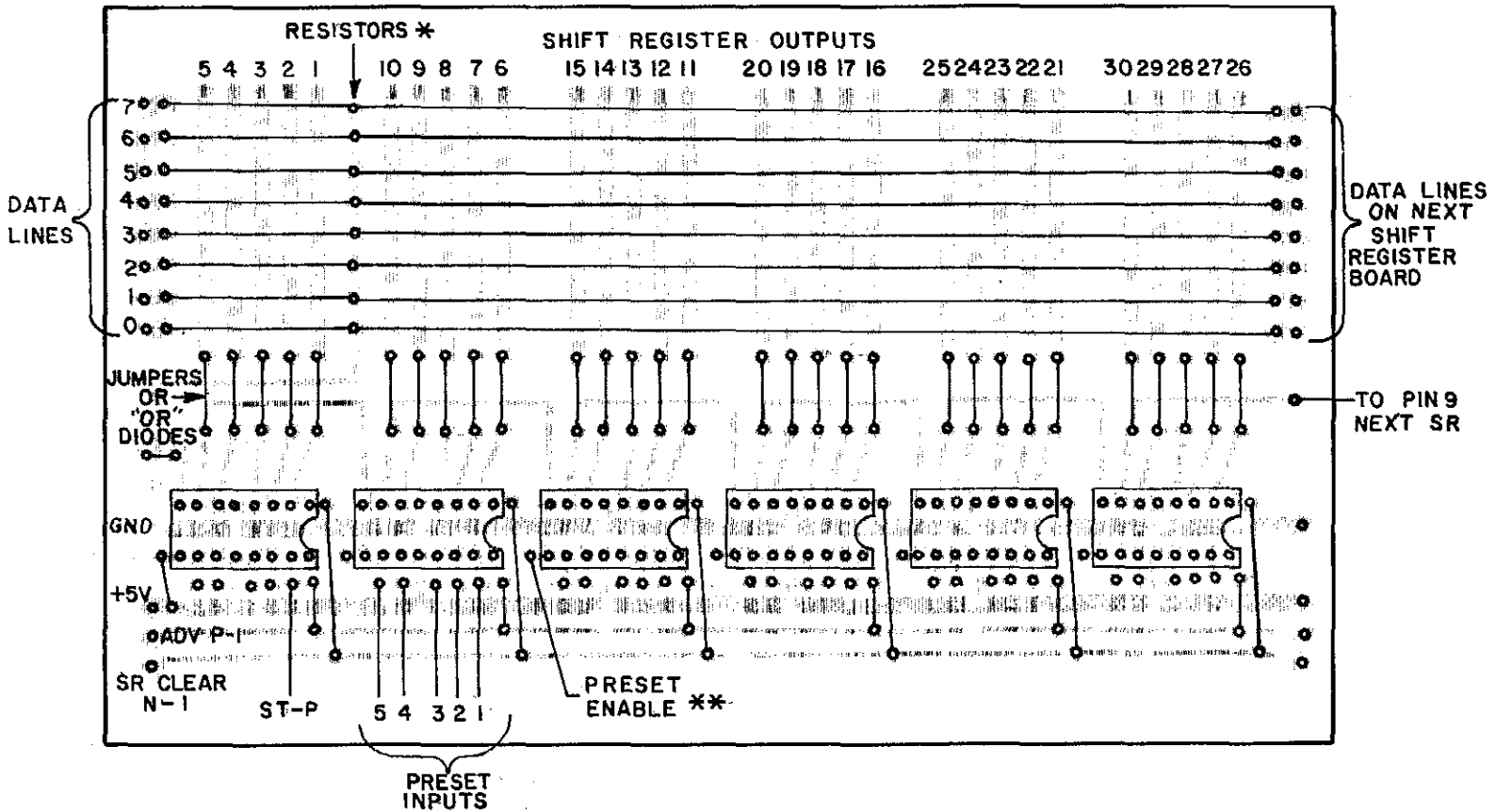


Fig. 9 — Etching pattern and parts layout for shift-register board, as viewed from foil side. All ICs are 5-bit shift registers, type 7496, as shown in Fig. 6. The length of the shift register may be extended by using more than one board of this pattern and making interconnections as indicated. *Pin 9 of the left-most IC, shown on the layout as being grounded, applies to the first shift-register board only. On additional boards, this pin is connected to its preceding board in the shift-register chain, as indicated at the right.*

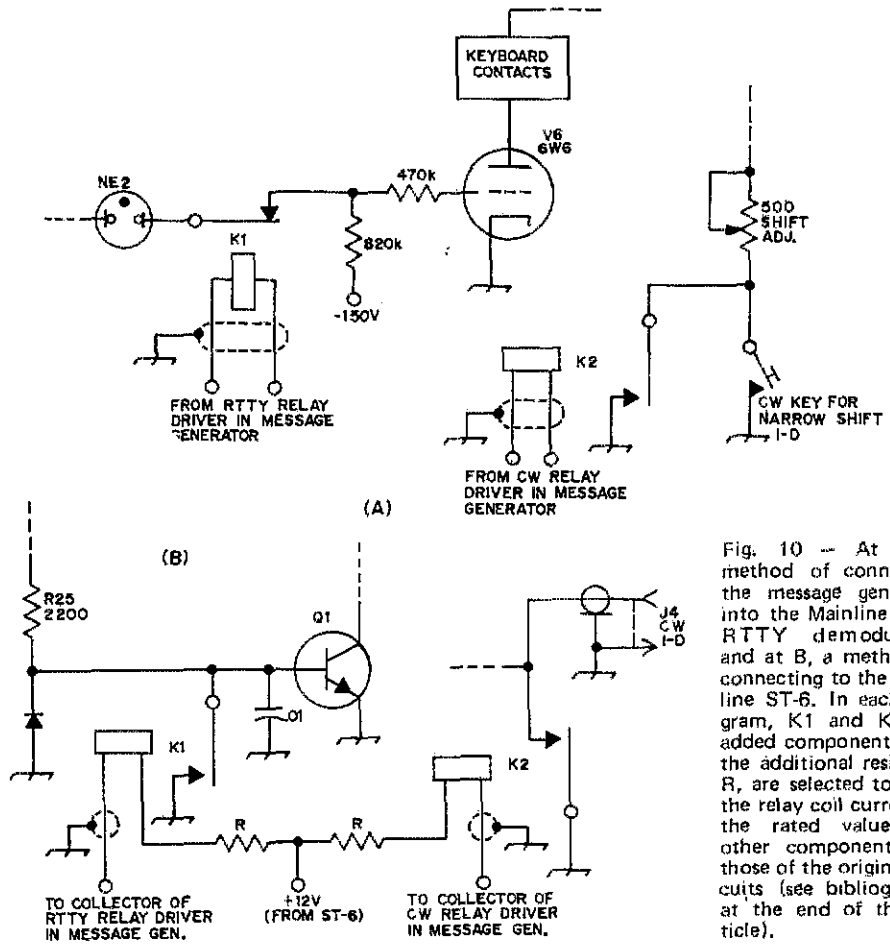


Fig. 10 — At A, a method of connecting the message generator into the Mainline TT/L RTTY demodulator, and at B, a method of connecting to the Mainline ST-6. In each diagram, K1 and K2 are added components, and the additional resistors, R, are selected to limit the relay coil current to the rated value. All other components are those of the original circuits (see bibliography at the end of this article).

problems arose when we first tried these circuits with the relays mounted in the message generator. When the keyer stage is operating, pulses of about 50 V appear on the keyer line. These pulses were interfering with the operation of the TT/L logic in the message generator. The problem was solved by removing the cw relay from the message generator and installing it in the demodulator. It is probably best to install both relays in the demodulator. Another advantage of doing this in the case of the ST-6 is the availability of +12 V for driving the relay coils through a suitable dropping resistor.

Another problem encountered while running an input of 1 kW to the transmitter was rf affecting the ST-6 keying transistor, Q1. This problem does not manifest itself during normal operation because keying is normally accomplished by the keyboard contacts in the *output* circuit of Q1. The problem was solved by installing a .01 μF capacitor from the base to the emitter of Q1, close to the transistor. Capacitors of .001 μF were connected from each side of the external loop to ground. With these precautions, the message generator works flawlessly on all bands with 1-kW input to the transmitter.

It should be noted that the ST-6 RTTY keying circuit in Fig. 10B requires normally open contacts. This is accomplished by feeding the RTTY relay driver from the output of pin 12, U8C in Fig. 5. Although not tried, connection to other members of the Mainline family should be the same since they all have similar keyer and loop circuits.

Adjustment and Troubleshooting

The only adjustment in the circuit is the clock frequency (90.9 Hz). Either a frequency counter or an oscilloscope may be used. The clock pulses are quite narrow, and a scope with high-frequency response will be needed to observe them. However, an ordinary scope can be used to observe the square wave at pin 9, U3B. Adjust the clock potentiometer to obtain a period of 22 ms while in the RTTY mode. If the time base of the scope is not accurately calibrated, the 22-ms interval can be estimated by observing a 60-Hz wave form which has a period of 16.67 ms. The period of four cycles of the 60-Hz wave form (66.67 ms) is approximately equal to the period of three cycles of the square wave (66.0 ms) when the clock

frequency is properly set. If either a counter or a scope is not available, set the clock potentiometer to the midpoint of the range over which good local printer copy is obtained.

In case the unit fails to function, it is not difficult to isolate the trouble with a voltmeter. First, connect the voltmeter from the shift-register clock line to ground. A "fluttering" of the voltmeter (while in the RTTY or cw mode) indicates that the clock, dividers, and counter are functioning properly. Next, connect the voltmeter to the output of the first shift-register stage. There should be a pulse when the START button is pushed, indicating that the start *R-S* flip-flop, the associated monostable multivibrator, and the first shift-register stage are functioning. Monitor the output of shift-register stages 2, 3, 4, and so on to the last stage. A malfunctioning stage can be quickly isolated by this method. The most likely cause of trouble is a shorted diode in the matrix. This will prevent the "high" from being propagated down the shift-register chain. An open diode or a miscoded diode in the matrix will manifest itself as an error in the message and can be located quickly by noting the position of the erroneous character in the matrix. If care is taken in selecting and installing the diodes, no troubles should be encountered.

Parts Procurement and Cost

All components in our circuit are readily available from advertisers in *QST* and other magazines. With a little careful shopping, all material can be purchased for less than $50. At prevailing surplus prices all logic can be obtained for less than $17.

Conclusion

The ideas presented here can be readily adapted to a cw message generator with some circuit simplifications. We can eliminate the divider, divider control, RTTY-cw control, and the RTTY relay and its driver. The clock potentiometer can be used to control the cw speed. One scheme would be to encode the first part of the matrix for CQ CQ CQ and the second part for DE K4FUP AR K. One push button would produce the entire message and the second button would give only the station identification. The second button could be depressed once every 10 minutes to fulfill legal requirements, or it could be used after manually sending the other station's call.

Bibliography

1) Stewart, "The ICARUS-ID, Versatile Station Identifier," *The RTTY Journal*, August and September, 1971.

2) Ferrell, "An Integrated Circuit CW ID Generator," *73*, September, 1970.

3) Hall, "A Digital Morse-Code Message Generator," *QST*, June, 1970. Also see Hall, "The Digital Message Generator with RTTY," *QST*, April, 1971.

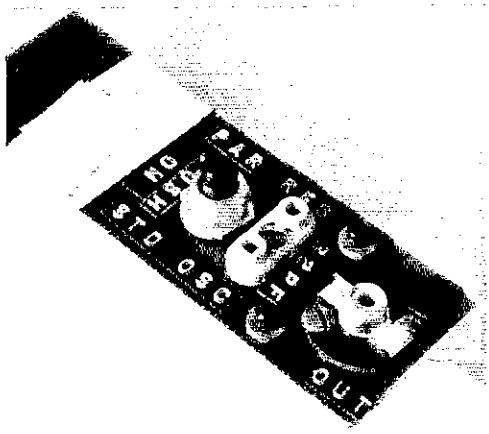
4) Murphy, "Unique Digital TTY Accessories," *73*, March, 1971.

5) Hoff, "The Mainline TT/L FSK Demodulator," *QST*, August, 1965.

6) Hoff, "The Mainline ST-6 RTTY Demodulator," *Ham Radio*, January, 1971. QST

Strays

In case you are wondering, this is the staff car for the Technical Heavies of Maynard (Mass.) 147.84/147.24. The wagon comes complete with 12 antennas, 2-meter base and mobile, TV, antenna tower with aircraft warning beacon, 2-meter repeater, 450-MHz base, and a keg of beer for emergencies. At a recent repeater group camp-out, the staff car equipped each tent/camper with a dial telephone with the switchboard installed in the car. The boys claimed they powered everything with a treadmill generator manned by three mice. *(Photo courtesy W1JTB)*



Top view of the test oscillator.

A Crystal-Correlation Test Oscillator

BY CLIFF BUTTSCHARDT,* W6HDO

THERE IS A NEED for a good, portable crystal oscillator and especially one that is constructed for crystals with typical values. The author has been attempting to specify and purchase inexpensive but repeatable crystal units for channelized amateur communications. In the vhf range this problem becomes especially acute for two reasons. One, a given frequency percentage-tolerance represents a large number of kilohertz. Two, it is most difficult to obtain fundamental (as contrasted to 3rd, 5th and 7th overtone) units at frequencies above 20 MHz. A crystal operating in its overtone mode cannot simply be pulled to frequency by any appreciable extent.

* 275 Chiquita Av., Mountain View, CA 94040.

In an attempt to find a manufacturer of low-cost crystal units, the experimenter soon realizes that only one electrical specification will produce satisfactory results – that is 32-pF parallel (or antiresonant) units. It is assumed that the reason is that the standard military test set, *TS 683/TSM* can be used by the manufacturer. Going to other specifications often produces unsatisfactory results when dealing with less talented suppliers, thus increasing markedly the cost.

A standard, untuned oscillator is described which will work with the 32-pF, antiresonant units. Crystals from 100 kHz to hundreds of MHz will oscillate. Some CT and DT miniature lf crystals prove low on activity since these units are specifically cut for series resonance and exhibit a very low parallel resonant impedance. Vhf crystals so marked will oscillate on the fundamental mode only; that is either 1/3, 1/5, or 1/7 of the designated frequency.

Note that it does not matter what type crystal holder is being used. They all exhibit approximately 7-pF of internal capacitance when mounted in a standard crystal socket. In this test circuit do not wire more than one socket in parallel as this will change the 7-pF value of capacitance. The type of transistor used is relatively unimportant and any suitable small-signal npn bipolar transistor can be used.

(Continued on page 52)

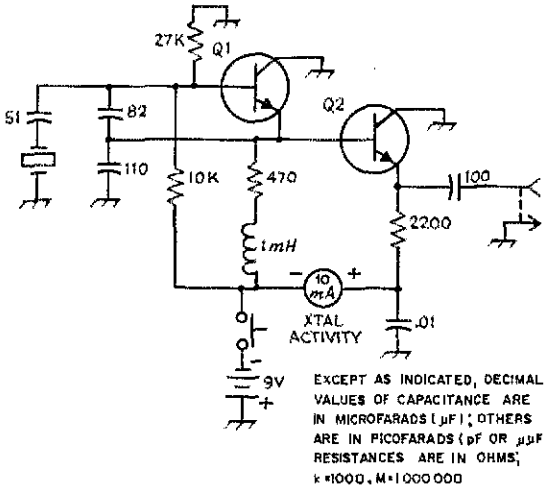
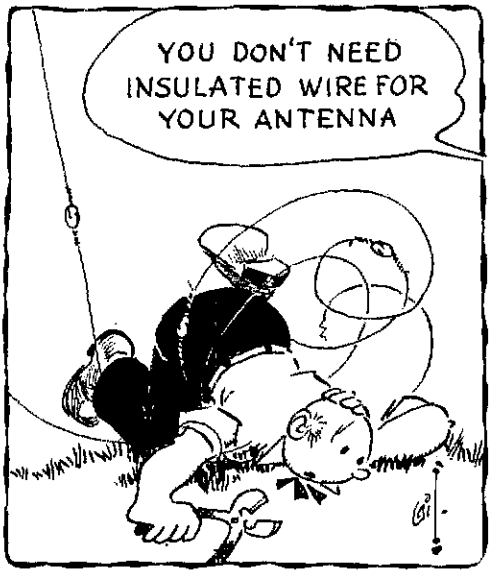


Fig. 1 – Schematic diagram of the crystal test oscillator. Resistors are 1/4- or 1/2-watt composition and capacitors are dipped mica. Some suggested transistors for Q1 and Q2 are: 2N706, HEP 56, 40237, or 2N2222.

Some Frequently Asked Questions —and Their Answers

BY LEW MCCOY,* W1ICP



"I heard that I shouldn't use insulated wire for my antenna because the insulation will have an effect on the radiation of rf. Is this true?"

No, it is not true. The insulation on wire will have no effect on the antenna radiation. The type of insulation, the size of the conductors, and the spacing of the conductors can have an effect on the efficiency of transmission lines, but not on antennas.

"My buddy tells me that a dipole can be any length. One old timer says my buddy is wrong, a dipole must be a half-wavelength long. Who is right?"

First, let's take a look at the dictionary definition: a dipole is "A radio antenna consisting of two horizontal rods in line with each other with their inner ends slightly separated." There is no mention of electrical length. From our study of antenna text books, it becomes apparent that a dipole consists of two conductors, usually in a horizontal plane, both conductors being the same length, and usually separated slightly at the center, or feed point. In amateur radio, the terms change to fit the needs. In the above statement we said "usually in the horizontal plane" but in ham radio, we refer to the inverted V as an inverted-V dipole. This antenna fits the statement except that the elements of the dipole are not in a horizontal plane.

The two conductors in a dipole can be any *length. Probably because so many dipoles* happen *to be a half-wavelength long, hams have come to believe that a dipole* must *be that long.*

"How can I protect my station from lightning."

This is probably the number one question asked by hams. And, believe it or not, is the one that hams shouldn't worry about too much. An amateur antenna is no more an attraction for lightning than the power lines, trees, TV antennas, and so forth that surround your station. It is true that occasionally you'll hear of a ham whose installation suffered a lightning hit, but on the whole one should not have undue worries about it.

About the only positive protection to keep from having a lightning hit reaching your equipment is to disconnect all the feed and control lines

Our mail bag for any given period will produce certain questions that are more common than others. This article provides the answers to those questions. Also, we've added a few "odd balls" that might generate some interesting on-the-air discussions.

* Novice Editor, *QST*.

where they come into the house and ground all the lines directly to a good earth-ground system when not using your station. Most of the lightning arrestors that are sold as lightning protectors will help to discharge static electricity that is common during a storm. However, we would not put any faith in such a device in the event of a direct hit. Those hams who are fortunate enough to live on a mountain top with a 200-foot tower on it, don't need the advice on how to protect against lightning – they already know how – they learn fast!

"A group of hams on the 2-meter repeater got into a discussion the other night about the antenna gains of a quarter-wave whip, a dipole, and a 5/8-wave vertical. The consensus was that the 5/8-whip was the best because it has 3 dB of gain over a dipole. Seems to me I heard somewhere this isn't correct. What is the gain difference of the three antennas?"

The statement that a 5/8-wave whip antenna has a gain of 3 decibels over a half-wave vertical is a myth that is becoming popular in the repeater ranks. The actual gain of a 5/8 whip over a half-wave antenna is 1.2 dB. The gain of a quarter-wave whip (ground plane) compared to a half-wave antenna is minus *1.8 dB. What the hams are doing is making a mistake in comparing the 5/8-wave whip to a 1/4-wave antenna. The 3-dB gain figure is true when comparing the 5/8-wave antenna to the quarter-wave ground plane. We might add that antenna manufacturers like to use gain figures for their vhf antennas compared to a quarter-wave whip – it makes their advertising claims look more attractive.*

"I have a 40-meter dipole for an antenna. Can I use this antenna on other bands or do I need a separate antenna for each band?"

This is a very common question and one that isn't exactly easy to answer. First, any *antenna can be used on* any *band. For example, a 15-meter dipole* could *be used on 80 meters but how well it would work is another story. Generally speaking, the larger an antenna is, the better it will work. How much "better" becomes the important question. To give the reader an idea, let's take the 40-meter dipole and use it on 80 – in other words, it is a half-size antenna. The difference in performance between the full size versus half size is only on the order of a few decibels in field strength. Suppose the guy you are working has an S meter calibrated at 6 dB per S unit. The difference in signal strength from a full-size dipole to a half-size one would probably be no more than 1/2 an S unit.*

There are two problems when using a dipole that is resonant on a given band for all-band operation. The first problem is the matter of loading and tuning the transmitter. Depending on the design of the transmitter, it may not be capable of handling the complex antenna load. One way around the problem is to use a Transmatch with the antenna system. The Transmatch is an adjustable matching network that converts the antenna load to one that the transmitter can handle. The other problem is the loss in an antenna system where a "lossy" type of transmission line is used. Coax feed lines can have appreciable losses when

they are operated with a high standing wave ratio. A 40-meter dipole, fed with 50-ohm-impedance coax, can have an SWR on the order of 80 to 1 when the antenna is used on 20 meters (and that is a high SWR!). One can easily live with an SWR of 3 or 4 to 1 on coax but with larger mismatches, the losses can become prohibitive. On the other hand, using open-wire feeders or a good grade of 300-ohm TV twin line, one can tolerate a high SWR because these lines have very low losses.

As we said, it isn't an easy question to answer The amateur has to consider these points before making a decision. However, there is one rule you can always follow: don't be afraid to try the antenna on other bands; you may be pleasantly surprised.

"When I opened the mail this morning I found a citation from the FCC. They said that I had a spurious signal around 7400 kHz. I *was* transmitting on 80 meters at the time of the violation. What should I do?"

The first thing to do is reply to the FCC! What happened in your case is not uncommon. The

second harmonic from your transmitter was being radiated and that is what FCC heard. You can tell the FCC you were not aware that you had a spurious signal being radiated and that you will take immediate steps to correct the problem.

In a properly tuned transmitter, the normal attenuation of the second harmonic in the final amplifier is about 30 decibels – and this takes in most of the transmitters that are in use these days. Let's assume that the Novice transmitter is running 75 watts input with 50 watts output. With 50 watts output and 30 dB attenuation, this would mean that a second harmonic of 50 milliwatts would be radiated. How far can one be heard with 50 milliwatts? A few years ago, WICER of our staff was experimenting with a transistor oscillator on 40 meters. The output was calculated to be no more than 20 milliwatts and he made several contacts with good reports over distances up to 1000 miles! Keep in mind that we said with a properly tuned transmitter one could expect 30 dB attenuation of the second harmonic. More likely than not the rig may be mistuned, so the attenuation could be much less.

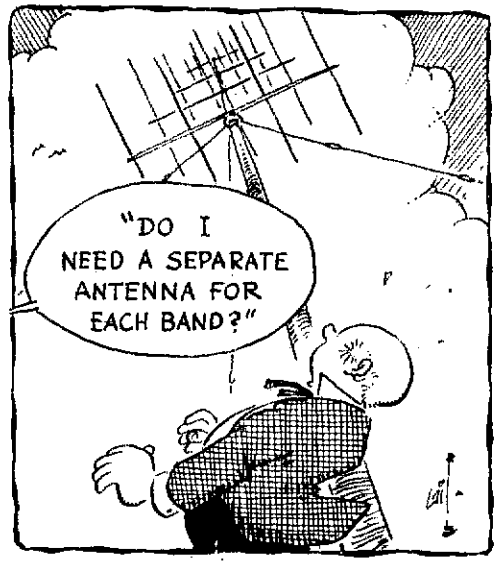
First, make sure when you tune up you do not use more than the rated grid drive for the final amplifier. Too much drive will increase the harmonic output of the amplifier stage appreciably. Be sure that the final stage is always tuned to resonance. One precaution that will nearly always provide additional protection is to use a Transmatch between the antenna system and the transmitter. A Transmatch can provide about 30 dB additional harmonic attenuation.

"Some hams tell me that radiation of rf from my coax feed line will cause TVI. Isn't there more rf coming from the antenna and isn't this radiation stronger? What gives?"

This is another myth that many hams believe – that if your feed line radiates, you are likely to have TVI – or a better chance of causing interference. Frankly, such an assumption is slightly ridiculous. The argument is that because such feed-line radiation is likely *to be in the vertical plane, and the television feed line is also* likely *to be in the vertical plane, one is* likely *to have TVI when the transmitter feed line radiates. What these people seem to forget is that the same argument could be used that the TV antenna is usually horizontally polarized and so is the amateur antenna; consequently more TVI. What we seem to overlook is that a TV feed line may be partly vertical and partly horizontal and it really has no respect to one type of radiation over another. And, as you reasoned in your question, the transmitting antenna itself puts out the really strong rf field.*

What we are really concerned with is the problem of fundamental overloading of the TV set from our strong rf field. The answer is to have a high-pass filter on the TV set which helps reduce fundamental overload. Then we don't need to worry about feed-line or antenna radiation.

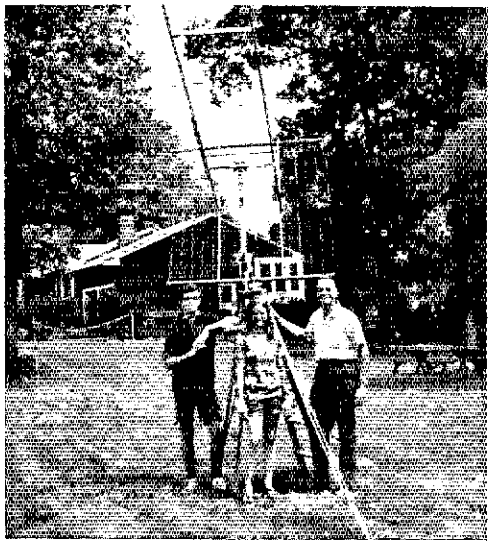
"On both my 6- and 2-meter beams I use 300-ohm Twin-Lead for feeders. At the station I have a Transmatch which is connected to the rig



via 50-ohm coax. I adjust the Transmatch for an SWR of 1 on the coax. However, I realize that this doesn't mean I have an SWR of 1 on the Twin-Lead. How can I use this setup to match my antennas to the 300-ohm impedance of the feed line?"

First, you need a dummy load of 300 ohms. Four 1200-ohm, 1-watt resistors in parallel will provide such a load, with 4 watts capability. Remove the feed line from the Transmatch and place the dummy load on the Transmatch. Reduce power and then tune up the Transmatch so that the SWR bridge in the 50-ohm coax connecting line shows a match, as indicated by an SWR of 1. Next, remove the dummy load and place the feeders on the Transmatch at exactly the same point as the dummy load was connected. Do not *touch the settings of the Transmatch or transmitter. The next step is to adjust the antenna matching network, at the antenna, so that an SWR of 1 is indicated on the bridge in the 50-ohm line. Once you have this indication you know that the antenna is matched to the 300-ohm line.* QST

OSCAR NEWS



In New Jersey, (l-r) WB2FUE, WN2QPE, and W2YFM have built a six-turn helix for Oscar 6 from an article in November 1965 *QST*. This three-ham family keeps the basement warm with separate operating positions. It doesn't take much transmitter power to access Oscar with an antenna like this!

W7ZC has provided Utah to many a satellite-WAS chaser. Mid points out that Oscar provides a useful outlet for the energies of frustrated vhfers in poor or remote locations; his QTH is surrounded by high mountains. Mid's vhf interest dates back to 1931, and he's an early Amsat member. ▶

SATELLITE DX ACHIEVEMENT AWARD

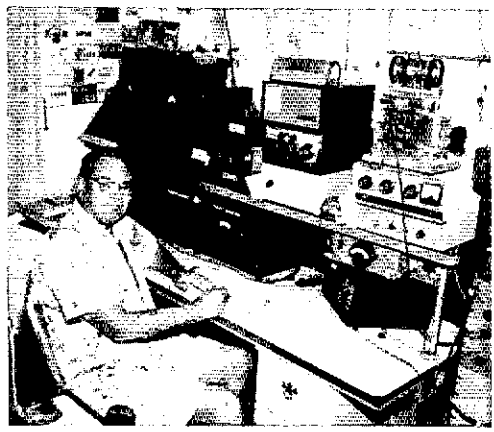
"1000"

The "1000" award recognizes 2-way communication via Oscar 6. To qualify, a station must accumulate 1000 points as follows: Each contact with a new station counts 10 points, each new country counts 50 points, each new continent counts 250 points. For example:

15 QSOs	= 15 × 10	= 150 points
3 countries	= 3 × 50	= 150 points
2 continents	= 2 × 250	= 500 points
		800 points

Thus, 200 additional points needed for "1000" award.

QSLs must confirm 2-way communication via Oscar 6, contain a date of Dec. 15, 1972 or later, plus usual QSL info. Photocopies of the QSLs are not acceptable. Only one contact per station, regardless of mode. Postage of $1 is required if you wish cards to be returned via registered mail. When you're about ready to apply for the award, request the appropriate application form from ARRL Headquarters.



◀ DU6EG of Bacolod City, Philippines, claims to have the first successful Oscar-mobile in Oceania. He uses an fm transceiver modified for cw operation and homebrew skew-planar Big Wheel (November 1963 *QST*) for uplink, and a helically wound whip and Yaesu FT-75 for downlink. Ed has already worked seven stations through Oscar with this fine installation.

A 7-MHz Vertical Parasitic Array

BY ROBERT W. JONES,* KH6AD

SEVERAL YEARS AGO I had regular QSOs with W4EWS maritime mobile on 7 MHz while he was on an interland run (as he called it): Oahu, Hawaii, to Manhattan Island, N.Y. Dick often told me how strong my signal was at 500 and 1000 miles out from Honolulu. A little reflection showed that except for those few times when Dick was transiting the Pacific I was wasting the rf radiated by my horizontal antenna on an uninhabited expanse of the Pacific Ocean.

My home QTH is in Kaneohe, Oahu, with a mountain range to my southwest side. I needed an antenna that would direct the radiation away from the mountains and concentrate it in low vertical angles. After about ten months of building and testing, the arrangement described in this article evolved.

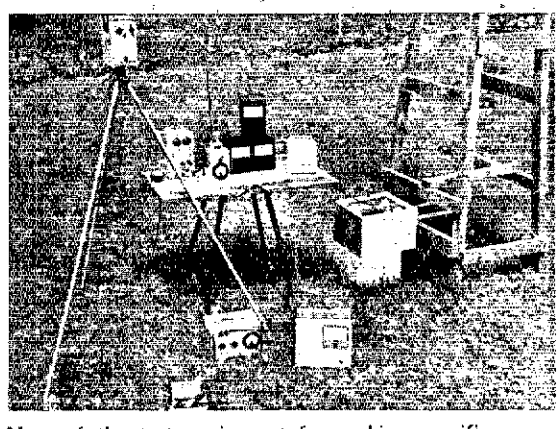
This three-element 7-MHz vertical parasitic array uses a driven element and two directors working against a ground screen of 17 radials that extends beneath the verticals in the direction the array is aimed. The gain in the forward direction was measured at 6-1/2 dB over a 1/4-wave vertical ground plane using the same ground screen. Included in this article are details on construction of the antenna as well as methods of measuring gain of the array.

* Electronics Department, Honolulu Community College, 874 Dillingham Blvd., Honolulu, HI 96817.

Equipment

The gear used for testing the various vertical-beam combinations included the following: 7-MHz crystal-controlled transmitter (variable output 2 to 20 watts); SWR indicator; Simpson 260 multimeter; rf voltmeter; field-strength meter (with remote indicator); Macromatcher[1]; grid-dip oscillator, and a small transistorized receiver.

[1] Hall and Kaufman, "The Macromatcher," *QST*, January, 1972.



Most of the test equipment for making specific measurements of gain is homebuilt.

The field-strength meter uses a 2N3638 transistor. A curve for meter reading versus decibels was plotted using a Hewlett Packard Model 606A signal generator. The SWR meter is a Johnson Directional Coupler type 250-3 with two 0-1 mA meters installed to read forward and reflected energy simultaneously. The 0-1 mA meter would not indicate reflected power when using low power with the 7-MHz transmitter, so the reflected-power milliameter was disconnected and the 50-microampere range of the Simpson 260 was used.

The matching network to the antenna is an *L* network consisting of a variable capacitor and variable inductor. Using the 50-microampere range, it is possible to adjust the *L* network for an SWR of 1.

The rf voltmeter is a circuit from the ARRL *Handbook* and is used only to indicate relative

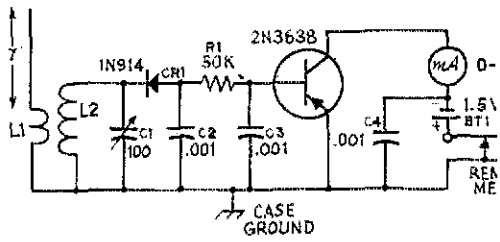
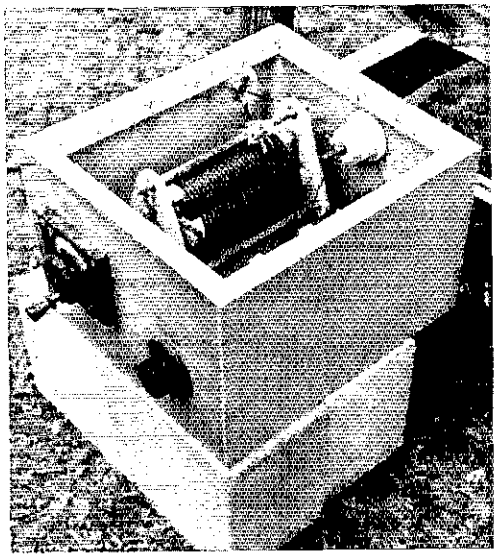


Fig. 1 — Circuit diagram for the field-strength meter. L1 is 5 turns, L2 is 30 turns wound over a single Amidon T68-2 core (Amidon Associates, 12033 Otsego Street, North Hollywood, CA 91607).



The *L* network is located at the base of the driven element in a sealed box.

power into the antenna.[2] The rf-voltmeter circuit is built on a Vectorbord with alligator clips to connect it across the *L*-network input; the indicating meter is connected with about six feet of shielded twisted-pair wire. It is necessary that the power into the driven element be constant if the gain is to be measured for different combinations of radiator and parasitic elements. The rf voltmeter worked better than an rf probe on a VTVM.

Ground System

Approximately 800 feet of wire are buried for a ground screen. All the radials are No. 18 copper wire. At their vertex, the wires are soldered into lugs (about 4 wires per lug), and the lugs are connected to a copper plate which serves as a common connector for the radials and the *L* network tuner box. The radials are buried about three or four inches deep. The photo with string stretched over the ground shows the approximate location of the radials. The ground-screen wires are tied together at four points: their vertex, 13 feet from the driven element, 25 feet from the driven element, and at the end of screen. All joints are soldered. There's no magic to the shape of the radial layout; that's what would fit in my backyard!

After the radials had been buried a few months, I tried to locate one of them and was unable to find it using the usual probing techniques. With the antenna system connected to a low-power transmitter, I was able to locate the radials with a portable 7-MHz receiver and a 2-inch loop of wire connected to a length of coax. With the loop placed parallel to the ground, the signal builds up as the underground wire is approached and a sharp null is heard in the headphones when the loop is directly over the buried wire. I was able to locate wires buried about four inches.

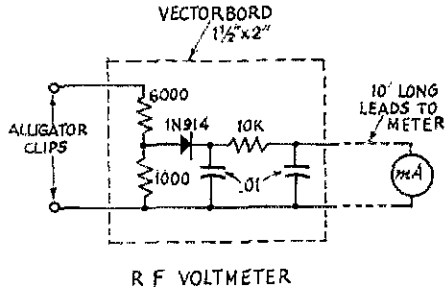
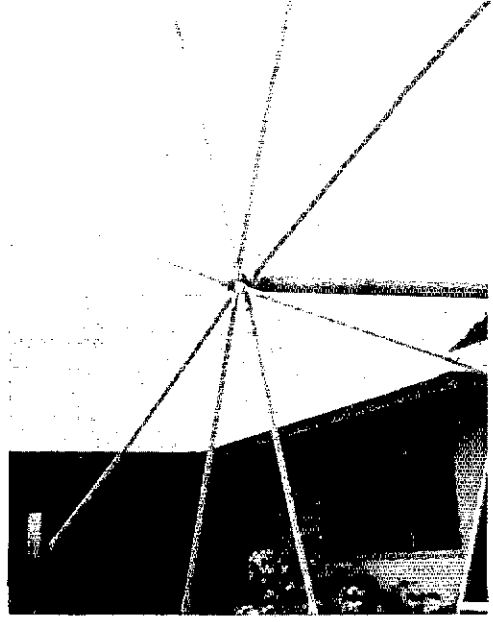


Fig. 2 — Circuit diagram for the rf voltmeter.

[2] ARRL *Handbook*, 1968-1970 Editions.



Constructional details for the capacitance hat. Each rod is 44 inches long. The rods are salvaged from an old TV antenna.

Verticals

The driven element was originally a tilt-over support for a rotor and a series of experimental antennas. The two parasitic elements are mostly old booms and elements from salvaged beams. The height of each vertical was dictated by the materials on hand. The top loading hats are made of eight very lightweight TV antenna elements each 44 inches long (measurements made with a grid-dip oscillator indicate that the 88-inch diameter top-loading hats are equal to approximately sixteen additional feet of antenna height).

The guy lines on one parasitic element are nylon-center plastic clothesline. The other vertical element uses copper-wire guys with egg insulators. The base insulator for director number one is a surplus type; number two director is insulated from ground with a section of plastic pipe.

The Macromatcher was used to measure the impedance of each element in the presence of the others. The measurements were made at 7010 kHz:

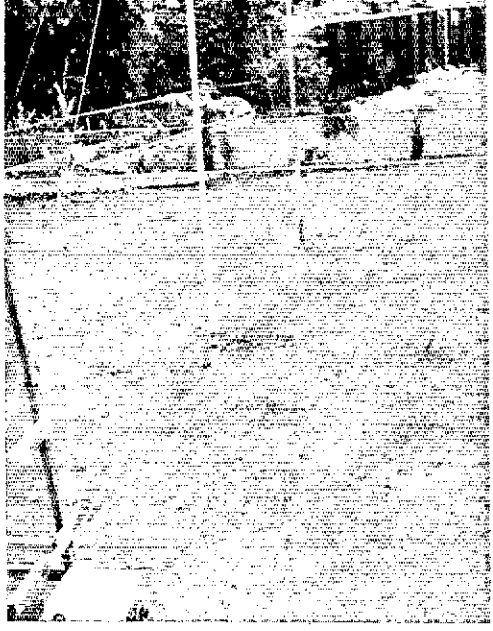
Driven element – $80 + j160/f$
Director No. 1 – $70 + j100/f$
Director No. 2 – $110 + j150/f$

All three elements are physically long (inductive side of resonance). The driven element is matched to the coaxial feed line with an *L* network. The two directors are shifted to the capacitive side of resonance by small (receiving type) variable capacitors (140 pF) connected between the bottom of the director and the ground screen. The variable capacitors on the two parasitic elements are mounted inside plastic containers provided by the XYL.

Table I

Antenna	*Field-Strength Meter Reading**	*dB gain over 1/4-wave vertical element*
1/4-wave vertical	0.1	0
36' top-loaded vertical	0.23	1.6
36' top-loaded vertical (driven) plus one 32' top-loaded vertical parasitic director spaced at 13 feet from the DE.	0.56	4.4
36' top-loaded vertical (driven) plus one 34' top-loaded vertical parasitic director spaced at 25' from the DE.	0.55	4.3
36' top-loaded vertical (driven) plus two parasitic directors: one 32' top-loaded vertical at 13' and one 34' top-loaded vertical at 25'.	0.92	6.6

* Above readings taken with field-strength meter located approximately 250 feet from the transmitting antenna. Frequency of measurement was 7010 kHz.



String has been stretched out over the positions of the radial wires to demonstrate the basic pattern.

After the two directors had been adjusted for maximum forward gain, the connections between the capacitors and the ground screen were opened and the impedance of each director measured. The Macromatcher was connected between the ground screen and the variable capacitor with the following results:

Director No. 1 $60 - j100/f$
Director No. 2 $80 - j230/f$

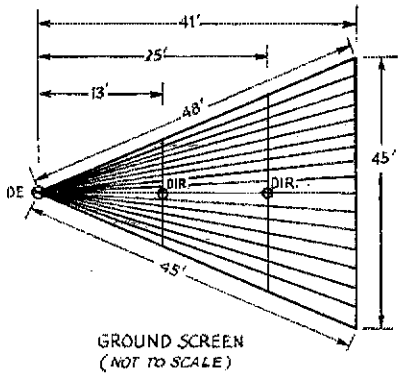
It is also possible to adjust the parasitic elements to the inductive side of resonance and have them act as reflectors. Adjusting a parasitic array such as this for maximum forward gain requires a signal source, SWR indicator, and a field-strength meter. The field-strength meter should be set up at least two wavelengths away from the array. If this is impossible however, the elements can be tuned with the meter placed only 15 or 20 feet in front of the array. The peak will be broad with a closely positioned field-strength indicator.

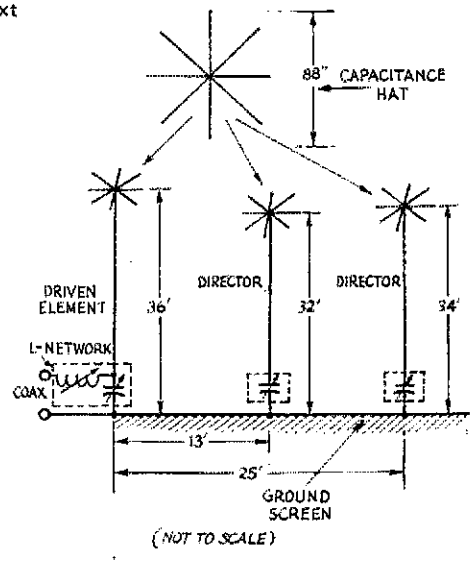
Gain Measurements

For those interested in the results of the actual gain measurements, the information given in Table 1 is presented. To make these measurements, the two parasitic elements were lowered to the ground, the top-loading hats removed from the radiator, and the radiator shortened to 33 feet. If the two parasitic elements are left erect, even if shorted to ground, they will affect the field-strength readings.

With power applied to the antenna (33-foot vertical, 1/4 wavelength), the transmitter output was adjusted for a reading of 0.1 milliampere on the field-strength meter. The L network was adjusted for an SWR of 1. The rf-voltmeter reading was recorded, its actual value in volts is not important; the reading is used to assure that power into the antenna is constant. The top hat and additional length on the radiator were reinstalled, the L network was readjusted for an SWR of 1 and the transmitter output was adjusted to obtain the correct rf voltage into the L network (same voltage obtained using the 1/4-wavelength vertical). Field-strength-meter readings were recorded. The parasitic elements were set up next (one at a time) and the series capacitors were adjusted for maximum reading on the meter (keeping the rf voltage constant and the SWR at 1). Field-strength meter

Fig. 3 — Ground-screen pattern details. See text and photographs for complete information.





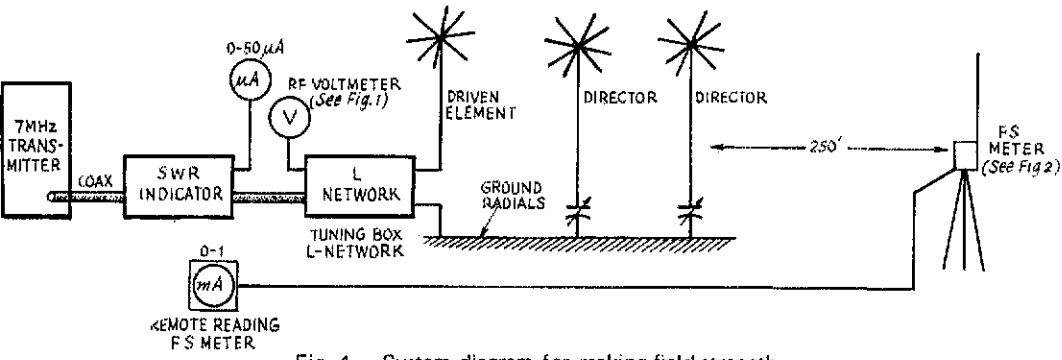


Fig. 4 – System diagram for making field-strength measurements.

readings were read and plotted on the calibration chart to give gain in dB over a 1/4-wavelength vertical element. A reflector, driven element and director array was tried but the maximum gain obtainable was only 4.8 dB.

An antenna of this type could be used as a switchable array: one driven and two parasitic elements. The outside parasitic elements could be switched from director to reflector and vice versa. At KH6AD the reverse direction is right into Haiku Mountain; the antenna is oriented at 62 degrees (just north of Los Angeles) and gives good coverage of W/K land.

Very little information is available on ground-image antennas as parasitic beams. The recent articles by W2FMI, however, are excellent sources.[3,4]

[3] Sevick, "The Ground-Image Vertical Antenna," *QST*, July, 1971.

[4] Sevick, "The W2FMI 20-Meter Vertical Beam," *QST*, June, 1972.

[5] Jasik, "Antenna Engineering Handbook," McGraw Hill, 1961.

Jasik states that closing the ends of a screen reflector is equivalent to widening the screen.[5] With this in mind, the ends of all the radials were tied together. The difference in gain was not measurable.

Results

In the rush for contacts immediately after completing the beam I always told my contacts that I had a new antenna and was anxious for reports. After a few days of this I felt that my question was prompting some of the glowing reports, I stopped mentioning the new antenna and unsolicited glowing reports continued! Long-haul signals were stronger than before and troublesome QSB almost disappeared.

(Continued on page 52)

KH6AD makes some adjustments to his array. The meter is connected to the field-strength device located 250 feet away. The driven element is shown in the background.

Technical Correspondence

ON PRECISE FREQUENCY MEASUREMENT

Technical Editor, *QST*:

The article by W8GRG on precise frequency measurement[1] was read with great interest. The ability to measure "off the air" frequencies with great accuracy is of great value to all amateurs. He is to be congratulated for taking much of the mystery out of the procedure.

In his description of the technique of measuring frequencies that are close to a marker or close to 5 kHz from a marker, he suggests the use of the BFO as a form of transfer oscillator. Doing this injects another variable into the measuring chain and with it a question of the short-term stability of the BFO. Many BFOs are far from stable.

If you can adjust your thinking to the fact that markers do not have to be at 10-kHz intervals, a simpler and better solution is readily available. If the last divider in the frequency-divider chain, usually a 7490 or similar divide-by-10 IC, is replaced by a 7493 4-bit binary counter, 10-kHz and 12.5-kHz markers are available. In the case of the unknown frequency near the marker or near the 5-kHz point, the divisor can be changed to 8 and an approximate 2.5-kHz offset occurs with the same degree of accuracy as the ÷10 method.

The article by Grillo, WB2MEX, describes the use of the 7493 as a ÷10 counter. In his Fig. 5A this is accomplished by adding two diodes to sense the eleventh count and using it to reset the IC – thus a division by 10 (0 through 9) is accomplished.[2]

To divide by 8, the diodes are disconnected and the output is taken from the *C* output of the 7493 (pin 9). If required, the *D* output will provide markers at 6.25 kHz. Thus, the replacement of a 7490 with a 7493 and the addition of two diodes and a dpst switch at a total cost of less than $3 can add materially to the accuracy and convenience of the measurement method. Incidentally, my standard has four ÷10 and four ÷2 stages, switchable to any desired combination of division. — *Warren H. Clark, W6COK, 2165 E. Ocean Blvd., Balboa, CA 92661.*

[1] Shreve, "Precise Frequency Measurement with Amateur Equipment," *QST*, May, 1973, p. 22.

[2] Grillo, "A Frequency Counter with Binary-Coded Decimal Readout," *QST*, August, 1969, p. 24.

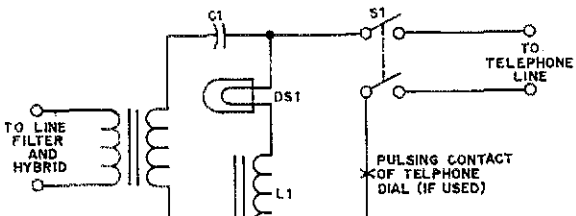


Fig. 1 — Schematic diagram for a telephone-line holding bridge.
C1 — 2 μF or greater value, 200 V.
DS1 — 5- to 12-V 35-mA pilot lamp.
L1 — 2 H or greater value, 75 mA, 100- to 150-ohms dc resistance.
S1 — Dpst.
T1 — Audio transformer, 1:1 primary to secondary turns ratio, 1 mW.

A HOLDING BRIDGE FOR TELEPHONE CONNECTIONS

Technical Editor, *QST*:

Telephone companies usually prohibit direct connection to their local service lines. A few exceptional situations may be found in countries other than the U.S., in independent telephone companies, or where a switchboard is privately owned, e.g., at some government or military bases. If the approval of competent authority can be obtained, direct connection may be made. Such connection is sometimes made with the help of a circuit called a "holding bridge." The function of the holding bridge is to simulate a telephone set electrically so that proper supervisory signals will be provided to the central office or switchboard. The bridge isolates the phone patch from the dc potential that is present on the line and makes it unnecessary to have a telephone instrument, connected to the line, left in the "off-hook" condition while a patch is in progress.

A schematic diagram of a holding bridge is shown in Fig. 1. The bridge should provide a dc path (for the central office line current) of at least 120 ohms but not more than 200 ohms (higher values apply to some systems outside the U.S.). The line current will normally range from 27 to 75 milliamperes. As indicated on the diagram, a pilot lamp can be arranged to operate from line current and serve as a visual indication that the holding bridge is connected to the telephone line. The shunt impedance of the bridge in the voice-frequency band should be relatively high so that the impedance presented to the telephone line will be that of the patch-circuit line filter (nominally 900 ohms). — *George Schleicher, W9NLT, 1535 Dartmouth Ln., Deerfield, IL 60015.*

ACTIVE PHASE-SHIFT NETWORK

Technical Editor, *QST*:

I've followed with interest the designs in *QST*. As a working engineer, I find myself fully immersed in electronics, but with no time to try out ideas for new ham gadgets, so I'll pass one on to you that might be of interest.

The new Motorola Linear Data Book describes the MC1312P IC, which is called an *SQ* decoder, for quad sound. While the application information is a bit thin, it appears to be the solid state equivalent of the B&W 2Q4 phase-shift network. With the addition of a few standard-value parts it is a 90° all-pass circuit with phase ripple of ±8.5° from 100 Hz to 10 kHz. This chip might be the foundation for a simple SSB rig, since the big problem with phasing rigs, aside from tuning, seems to be the need for the old-fashioned octal size phase shift network.[3] — *W. Parrott, W6VEH, 2636 28th St., Santa Monica, CA 90405.*

[3] [EDITOR'S NOTE: The 2Q4 phase-shift network is still available in single-order quantities from Barker & Williamson, Inc., Canal St., Bristol, PA 19007.]

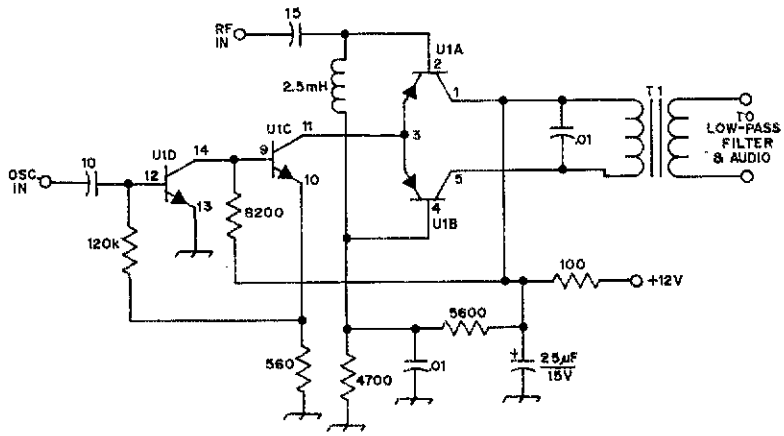


Fig. 2 — Product detector for direct-conversion receiver. U1 — RCA CA3046 IC.

THE CA3046 IC IN A DIRECT-CONVERSION RECEIVER

Technical Editor, *QST*:

Recently the CA3046 was suggested to me as a possible substitute for the CA3028 product detector in a direct-conversion receiver.[4] I thought you'd be interested to know that the CA3046 performs flawlessly. The VFO is an old 3.5- to 4.0-MHz oscillator built from the back half of an old 274N Command transmitter. The only modification from the original circuit was the direct substitution of a 2N3819 transistor for the old 6J5 oscillator tube.

The CA3046 was wired per Fig. 2. You will note that an added level of sophistication has been incorporated by using one of the extra transistors in the array as a VFO buffer. This requires no more parts than the original version would have required, but it provides bias stabilization for the constant-current transistor and some amplification of the BFO output. It works like crazy! — *Al Phares, K4IIR, 2009 Woodmore Dr. S.E., Huntsville, AL 35803.*

SAFETY IN MOBILE INSTALLATIONS

Technical Editor, *QST*:

I have been in the automobile insurance-claim business for 23 years and have been vitally concerned with the many developments in automobile design and manufacturing which have contributed to the safety of the individual. In recent years, I have operated more than 200,000 miles amateur mobile.

While earlier contemplating the approaching mobile season and the work yet to be done to install the rig in the latest vehicle, I recalled reviewing an engineering study relating how vehicle owners had installed add-on devices which had contributed to occupant injuries. These had greatly increased injury-causing potential, or had unwittingly defeated injury-reducing designs of the vehicle itself. Was my hf mobile installation typical of these? Had I defeated some of the injury-reducing features? Was my rig or my operating a hazard to the occupants of my vehicle? In cold truth, my transceiver, rigidly mounted on the transmission hump, with its sharp corners, protruding brackets and knobs, and loose cables, was extremely hazardous. Not only could an occupant be seriously maimed if he should strike the rig, but the location and rigid mounting prevented the occupant from being protected by the injury-reducing features built into the vehicle by the manufacturer.

Clearly, some rethinking was in order, along with a better understanding of the injury-reducing features of a late-model American car. Remember that occupant injury most frequently occurs from the occupant striking some object inside the car, and may occur as a result of panic stops, leaving the roadway without striking anything, as well as in a relatively minor collision. Occupant-protection devices fall into two broad categories: occupant restraints, and energy-absorbing devices. The single most effective means to protect yourself and your vehicle occupants is to use seat and shoulder restraints. If you and your vehicle occupants are secured in position, in the event of moderate mishap, it is highly unlikely that injury will occur or that your rig will be contacted by an occupant.

In the area of energy-absorbing devices, the most well known is the energy-absorbing steering column. All U.S. cars less than five years old and most, if not all, foreign cars of the same age have some version of this device. Broadly speaking, the steering wheel forms a wide impact-distributing platform, which, when contacted by the driver, spreads the force over a wider area of the body. If the force is more than moderate, the upper portion of the steering column will move downward and forward in relation to the instrument panel, greatly absorbing the energy of the driver's body contacting the steering wheel. Note that any device mounted so as to restrict the movement of this device could eliminate its ability to protect the driver. I once saw an SWR indicator mounted between the steering wheel and the instrument

[4] DeMaw, "A 40-meter CW Receiver," *QST*, January, 1973, p. 11.

panel, which could have killed the driver! Other devices in the energy-absorbing category are padded windshield pillars, sunvisors, rear-view mirrors, instrument panels, knobs, and control levers. Special materials are used for instrument panels, heater and air conditioning ducts that will yield and absorb energy rather than form a solid, injury-producing barrier. From 1971, many windshields have much greater energy absorbing ability than before.

Any object placed between the occupant and the energy-absorbing devices mentioned greatly increases the potential for injury by occupant contact. Think of the injury-producing potential of a metal-case speaker clipped to the driver's sunvisor, a microphone hanging from the rear-view mirror, a 2-meter rig or a tape deck mounted below the instrument panel in such a way that the rigidity of the panel is increased, destroying a part of the absorption ability of the panel and presenting sharp corners to strike in an otherwise protected area. Now recognizing many of the hazards my rig presented, I have taken these steps to reduce the injury potential of my mobile rig:

1) I insist that all occupants of my vehicle use restraint belts at all times. (After all, I don't want them smashing my rig.)

2) I removed a very wicked-looking microphone clip from the side of the rig, that, if contacted, could rip and tear flesh.

3) I am using a nonrigid saddle on the transmission hump to hold the rig, that, if contacted, will yield to impact.

4) I mounted the rig so the center of the front seat may not be occupied, to prevent exposure of that passenger to exceptional hazard.

5) I placed my speaker under the rig and routed the cables so I may not become entangled in them while driving.

I urge you to review your own mobile installation as I did mine. You may find some unpleasant surprises that can be corrected before an injury occurs. Your chances are one in ten that you will be involved in an automobile accident within the next twelve months. With odds like that, we must take all available means to protect ourselves. — *Dean B. Harris, WA4BAT, 3481 Sabrina Ct. N. E., Marietta, GA 30060.*

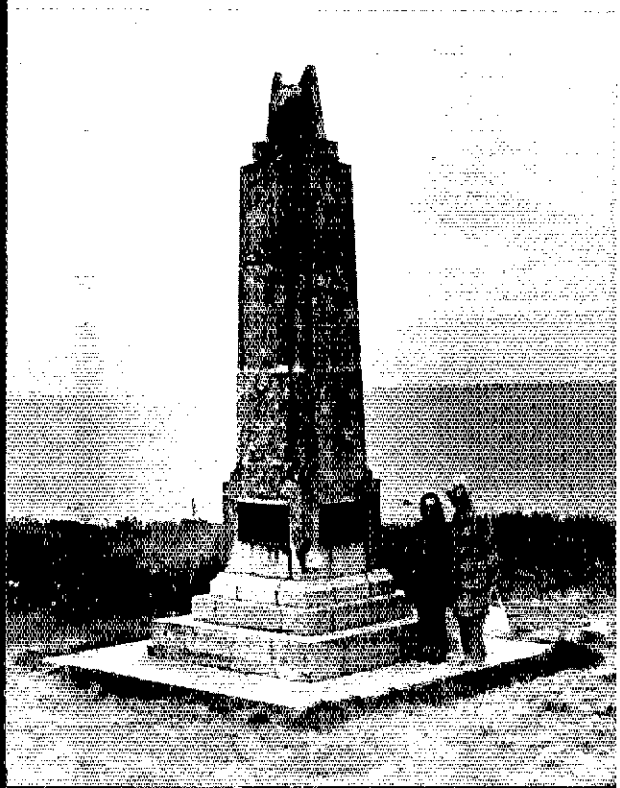
FEEDBACK

Was it gremlins which crept into Part IV of Maxwell's series of articles, "Another Look at Reflections" (*QST* for October, 1973)? A portion of the information in footnote 22 (p. 23) was omitted, garbling the meaning of the content. The last three sentences should read, "For example, in a 50-ohm system 150 ohms becomes 3.0 ohms. To convert back to the 50-ohm system, simply reverse the process and multiply the normalized values by 50. For example, the normalized impedance $z = 0.6 - j0.8$, found at $L = 45°$, becomes $Z = 30 - j40$. In the drawing for Fig. 6A, p. 24, the $\bar{E}^{rr}$ resultant vector should be shown with a value of $\bar{\rho} = 0.52\angle 0°$, rather than $60°$. In the caption for Fig. 7, p. 27, the last few words should read ". . . stub length goes to zero."

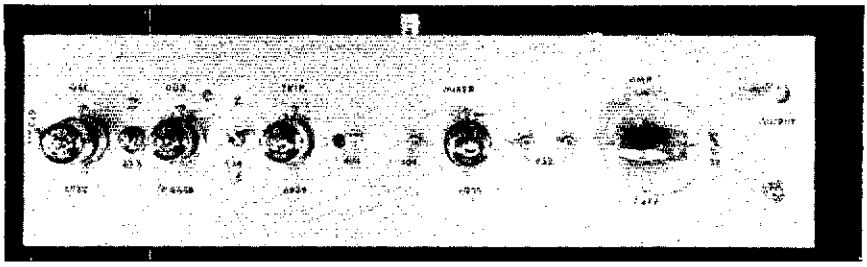
Strays

Special station VK5BP will operate from December 30 to January 5 from the site of the 10th Australian Scout Jamboree in South Australia, where some 10,000 Scouts are expected to be in attendance. Basic operating frequencies are 1.819, 3.625, 7.050, 14.190, 21.190, and 28.190 MHz on ssb, but it might pay U.S. stations to keep an eye on the low edge of our phone bands for contacts with the station. Two transmitters are expected to be in continuous operation.

Found at the New England Div. Convention, Hyannis, one gold wedding band, please identify — *WIICP*



The Atlantic was first bridged by wireless signals transmitted in 1901 by Marconi from Signal Hill, Newfoundland to Poldhu, in an area of Cornwall in the Southwest of England known as the Lizard. The Poldhu station was closed in 1934 and today the site overlooking Mounts Bay is commemorated by the monument shown in this photo taken by W5PM during a recent visit to England. That's Jack's XYL and a friend who braved the elements on a cold, wet and windy summer's day to read the story on the brass plaques at the base of the marker.



A Heterodyne Exciter for 432 MHz

A new Oscar, this one with an input on 432 MHz in addition to the 144 MHz-input repeater, was recently announced (see page 92, QST for October 1973). How do you get your ssb signal on 432 MHz? A practical approach is described in this article by W2AIH. Details on a companion amplifier will appear in a future issue.

BY CARMEN F. MORETTI,* W2AIH

ESTIMATIONS INDICATE that approximately 90 percent of all single-sideband equipment on the amateur bands today is produced commercially. However, commercially built single-sideband equipment is not readily available to the uhf enthusiast, and in order for him to use this mode on the higher frequencies he must still "roll his own."

The 432-MHz heterodyne unit described, unlike some circuits, is not marginal in design but rather offers a great deal of flexibility in all of its stages. The unit is free from spurious frequencies and demonstrates excellent stability with 28-MHz injection from an HT-46 sideband transmitter. Economy was not a major factor in the design considerations. However, aside from the tubes that are used, the other components are normally found in the experimenter's junk box, or can be purchased on the surplus market or from a regular supply house at reasonable prices.

* 1619 Boulevard, Peekskill, NY 10566.

Circuit

The multiplier chain, shown in Fig. 1, starts with a 6922 dual triode tube in a Butler oscillator circuit with a 67.33-MHz overtone crystal. This circuit has been used successfully in other uhf applications at this station, and gives the same performance in this unit. The plate circuit of V1B is coupled capacitively to the input of the 6688 pentode doubler, V2, which in turn drives a 6939 tripler V3, for an output frequency of 404 MHz. Inductive coupling is used between the tripler and the 6939 mixer, V4, and between the output of the mixer and the 7377 twin-tetrode amplifier. The 7377 tube is a "natural" for this low-voltage unit. It was chosen because of its low internal capacitances and short lead lengths which permit efficient operation at the ultrahigh frequencies.

Other than the two closed-circuit jacks, shown in Fig. 1, connected in the grid and plate circuits of the 7377 amplifier, no other metering is necessary. All of the circuit values given have been tried and

This side view of the exciter, taken with one side panel not in place, shows the position and shape of the plate- and grid-circuit inductors. Output is on the right.

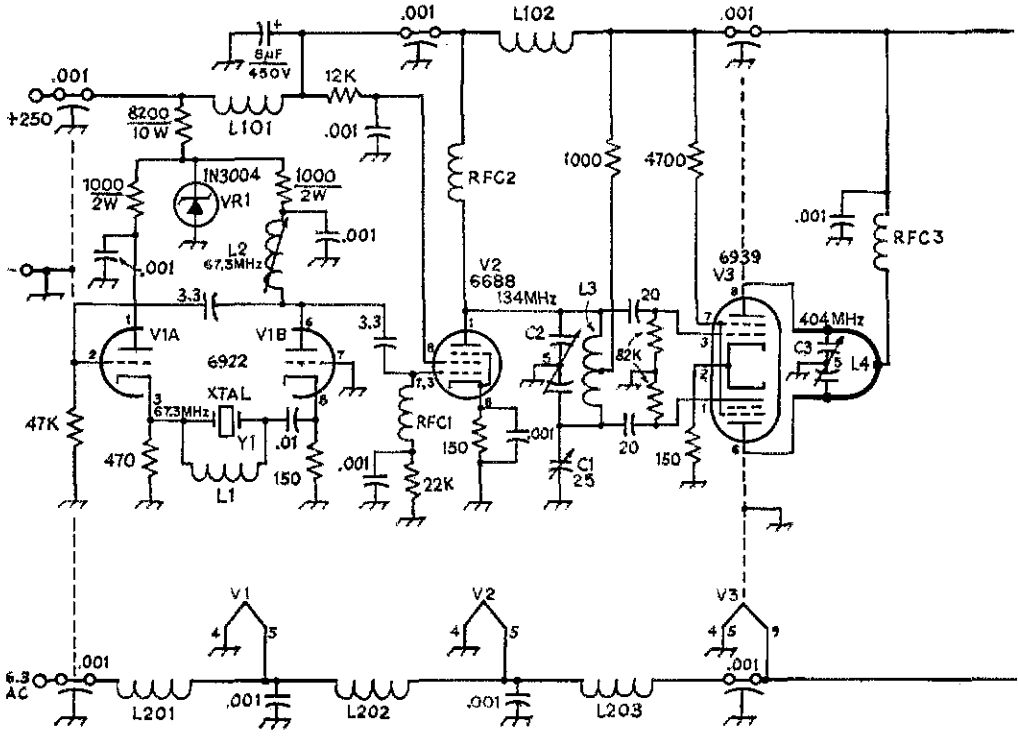


Fig. 1 — Schematic diagram of the heterodyne exciter for 432 MHz.

C1 — 5-25-pF ceramic trimmer.

C2, C3 — 1.8-5-pF air variable. (E. F. Johnson 160-205.)

C4, C5, C6, C7 — 1.5-3-pF air variable. (E. F. Johnson 160-203.)

C8 — 1.5-5-pF air variable. (E. F. Johnson 160-102.)

J1, J4 — Coaxial connector, type BNC.

J2, J3 — Closed-circuit jack. Insulate from chassis.

L1 — 21 turns No. 26 enam. close-wound on 3/16-inch dia plastic rod.

L2 — 7 turns No. 20 enam. close-wound on 3/8-inch dia slug-tuned form.

L3 — 5 turns No. 16 enam. 1/2-inch dia, center-tapped, turns spaced one wire diameter.

L4, L6 — Hairpin loop, 1-7/8-inch long, 7/8-inch wide, No. 14 tinned.

L5, L7 — Each two pieces No. 14 tinned, 3 inches long. Formed as shown in Fig. 3 and the photographs.

L8 — Hairpin loop 1-7/8-inch long, 1 inch wide, No. 12 enam., with plate connectors. See Fig. 4.

L9 — Hairpin loop 1-inch long, 1-inch wide, No. 12 enam., spaced 1/8-inch above L8.

L101-L104, incl. — 4 turns No. 20 insulated hookup wire, 1/4-inch dia, close-wound.

L201-L205, incl. — 4 turns No. 18 insulated hookup wire, 1/4-inch dia, close-wound.

RFC1 — 22 turns No. 26 enam. on 3/16-inch dia plastic rod. Spaced one wire dia.

RFC2-RFC5, incl. — 5 turns No. 22 insulated hookup wire, 3/16-inch dia.

RFC6, RFC7 — 5 turns No. 26 enam., 1/8-inch dia, close-wound.

VR1 — 90-volt, 10-watt Zener diode, 1N3004 or equiv.

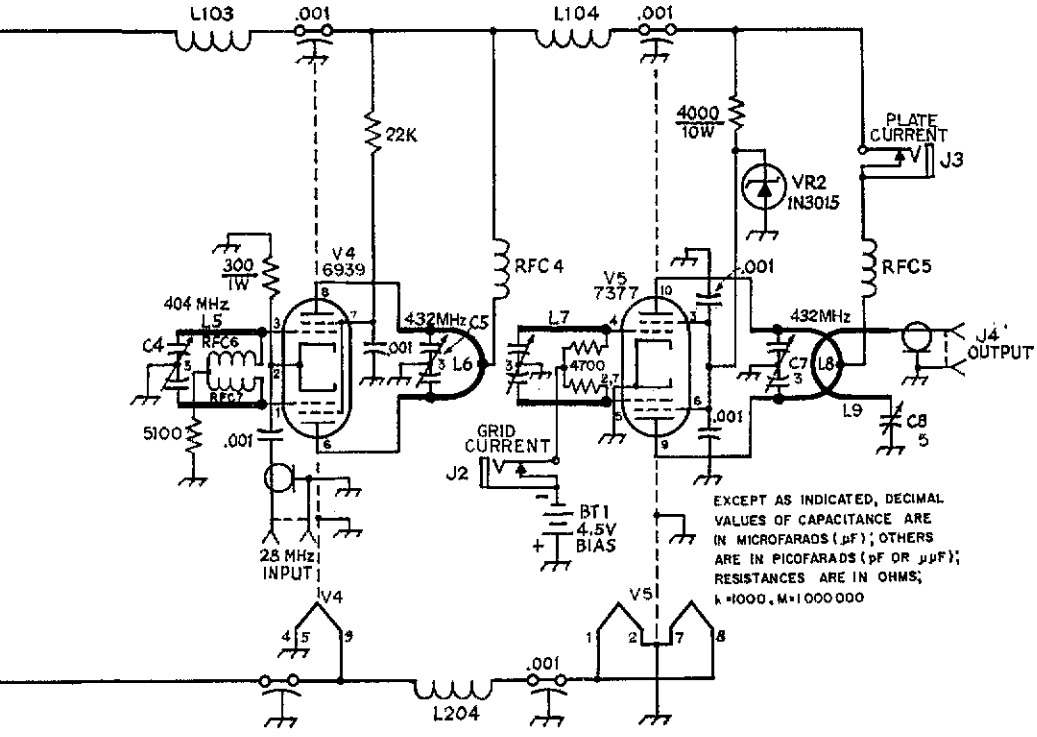
VR2 — 200-volt, 10-watt Zener diode, 1N3015 or equiv. For direct chassis mounting of the diode, use the reverse-polarity version of VR1 and VR2, i.e., 1N3004R and 1N3015R, respectively.

Y1 — Overtone crystal, 67.333 MHz.

if those shown are used, good performance should result. The unit has been in operation for almost two years, and at no time has it been necessary to adjust other than the PA plate tuning and loading controls.

Construction

Most of the construction details are apparent in the photographs. The chassis, which measures 4 × 15 × 2 inches, (10.16 × 38.1 × 5.08 cm), was built from five pieces of .094-inch (.023 mm) thick double-sided pc board. Soldering of the sides of the chassis was aided by using a piece of aluminum extruded angle as a jig while the soldering operation was performed. This, of course, should only be done after all of the top holes have been drilled and the tube sockets are mounted. Next, the three shields should be positioned to straddle the V3, V4 and V5 sockets, then soldered to the chassis. In lieu of fabricating your own chassis, an easier method is to make the top piece of the printed-circuit board two inches longer. Then it can be mounted on a standard 4 × 17 × 3-inch (10.16 × 43.18 × 7.62 cm) chassis. The same layout

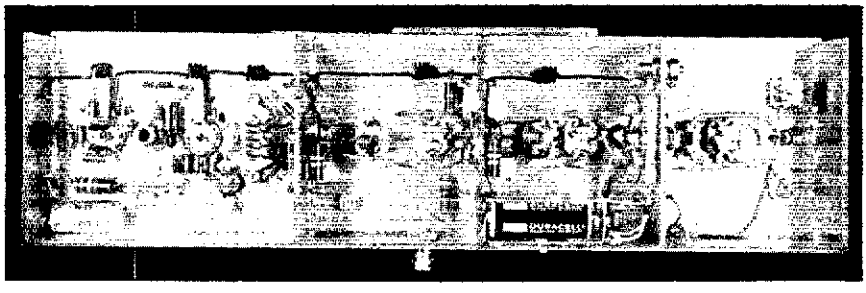


dimensions would be used, but you would end up with an additional space on each end (which is no problem).

The next assembly operation is that of wiring the filament and B+ leads to the .001 feedthrough capacitors which are mounted in each shield partition. The five rf chokes in the filament circuit, and the four in the plate circuit, are wound from the same type of insulated wire. Follow this by wiring in as many components as possible, before connecting the grid and plate coils.

Positioning of the grid and plate coils in the last three stages is important, but if the dimensions in the layout are followed, the sockets for V3, V4, V5, and capacitors C3 through C7 will be positioned to accept the hairpin loops and series-tuned half-wave lines, as shown in the photographs and drawings.

The 7377 amplifier is a ten-pin tube. Eight of the pins plug into a standard eight-prong socket. The other two are the plate pins, but are offset from the rest and project from the glass envelope beside the socket when the 7377 tube is inserted. Cutout "D" in Fig. 2 provides the necessary clearance. Now some method must be found to connect the plate loop, L8, to the two plate pins. The easiest way would be to solder the plate loop to the pins, but this would not be very practical if you ever wished to remove the tube from its socket. Fig. 4 shows the solution, and with some care the part can be made easily.



Shields are positioned across each tube socket. The dark objects in a row near the top are decoupling chokes for the filament circuit. They are formed from the same length of hookup wire that is used to connect the tube sockets and the feedthrough capacitors in each shield.

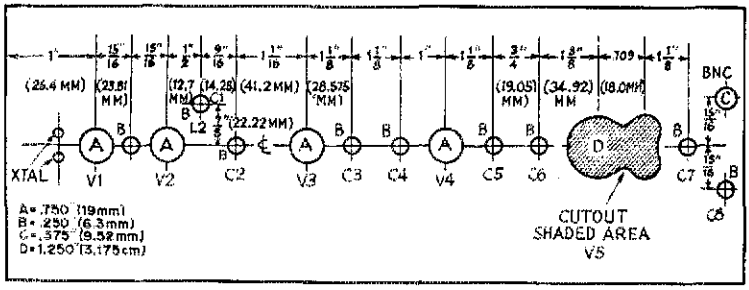


Fig. 2 — Dimensions for locating holes for tube sockets and variable capacitors. The spacing between V3, V4, and V5 is critical and should be followed closely. Double-sided pc board is used as a chassis base.

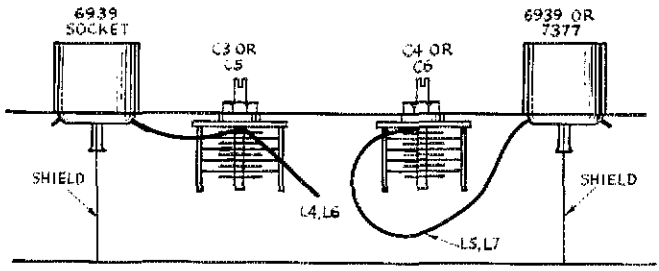


Fig. 3 — A sketch of the approximate shape and position of L4, L6 and L5, L7. Shields are positioned across the center of each socket to isolate the input and output circuitry.

If the builder is not fortunate enough to find a 7377 in the surplus shops, and does not want to invest in a new tube, he can make substitution by using a 6939 tube as the final amplifier. The end result will not be quite the same but you should still end up with a nice unit. The design will be essentially the same circuit as that of the mixer, except that the cathode is grounded directly and an external bias voltage is provided for the grid. The screen must be regulated by means of an 1N3014 Zener diode. Physically, the 6939 amplifier layout would have to be exactly the same as that of the mixer.†

Adjustments

Getting the heterodyne unit to work is simply a matter of making sure that the various circuits are tuned to resonance at the proper frequencies. Resonance is most easily determined by the use of a grid-dip meter. All of the circuits can be adjusted initially before applying power and retrimmed later (as necessary, with power) using the GDO as an indicating wavemeter. The power supply must be able to deliver approximately 250 volts at a minimum 250-milliampere capability.

With a 28-MHz injection signal (approximately 0.5 watt) to the mixer cathode, great care must be used to assure that the mixer output circuit and the final-amplifier tank circuit are tuned accurately to 432 MHz. Last but not least, make sure that the coupling between L3, L4 and L5, L6 is as loose as possible while still providing adequate drive for both 6939s and the 7377 amplifier. Drive for linear-amplifier service is very easily obtained. Care must be taken to avoid overdriving the mixer cathode with the 28-MHz signal from the single-sideband exciter.

(Continued on page 95)

† [EDITOR'S NOTE: This suggestion for replacing the output stage with a 6939 tube was followed in building a model of this exciter in the ARRL lab. A description of that circuit, and the amplifier that followed, will be presented in a future issue of *QST*.]

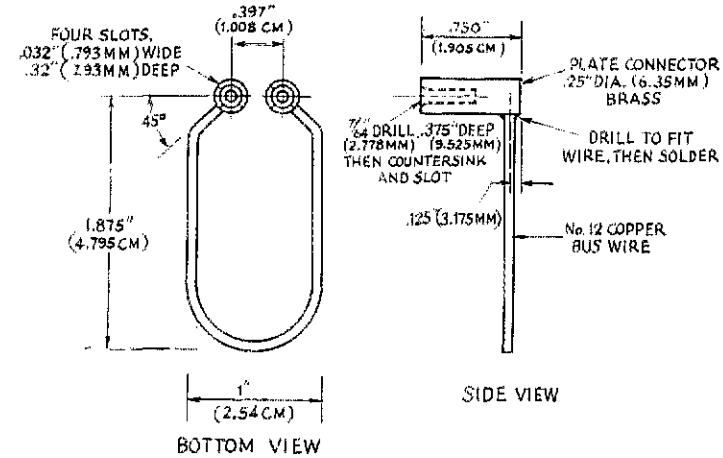
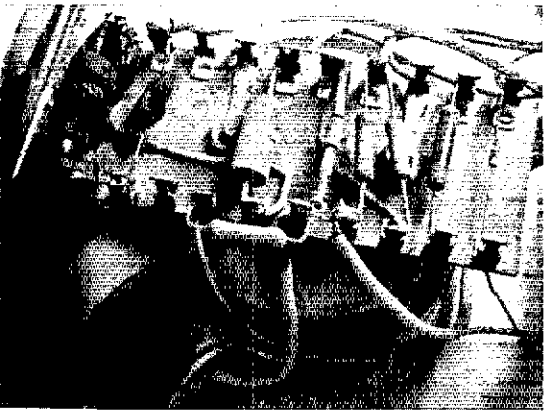


Fig. 4 — Dimensions for forming the final amplifier plate circuit, L8. The plate connectors are fabricated from brass rod. Tubing may be used if it has the correct inside diameter to grip the plate pins.

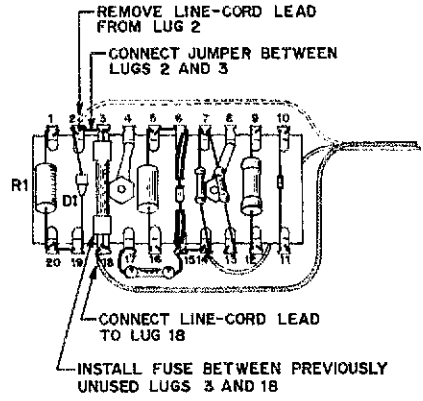
Hints and Kinks For the Experimenter

FUSE PROTECTION FOR THE HEATH LINE-VOLTAGE MONITOR

Most equipment which is connected to the 117-V ac power line for operation is fused for protection against damage which may otherwise result if an internal short develops. The Heath IM-103 line voltage monitor has no such protection. (The basic diagram of the circuit appears in *QST* for September, 1972, p. 55.) The accompanying photograph shows what the inside of my monitor looked like after a short developed in the rectifier diode, D1. The 100-ohm, 2-W resistor, R1, shown at the left of the terminal strip in the photo, is charred, and soot is deposited over everything else inside the enclosure. Surprisingly, all other components were undamaged except the terminal strip itself, which was burned away beneath R1.



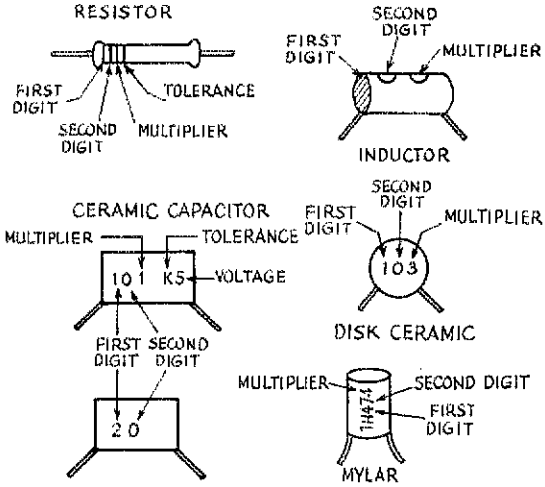
R1, D1, and the terminal strip were replaced, and all other parts were stripped from the monitor and thoroughly cleaned before the assembly was rebuilt. I decided I didn't want to repeat that tedious task if a similar short should reoccur, so I found a simple solution. A fuse may be added to the terminal strip and only one wire need be moved to complete the modification. The accompanying sketch shows how the fuse may be installed. A pig-tail fuse may be used, but I removed the clips from an old fuse-clip assembly and soldered them directly to the lugs of the terminal strip. The spacing between the lugs is more than adequate to install the standard-size 1-1/4-inch glass fuse. I used an AGC-type 1/4-A fuse, but an MDL (slow-blow) 1/4-A size would be better. For highest accuracy of the monitor indication, it should be recalibrated after the fuse is installed, as low-current fuses have inherent resistance. – *KIPLP*



Modification to install fuse in Heath IM-103 Line Voltage Monitor.

DETERMINING THE VALUES OF JAPANESE COMPONENTS

Some months ago we had fun trying to figure out the coding on Japanese components. A copy of the code was found in the modification kit for my FT-101. The color code is the same as the one for resistors and capacitors as tabulated in *The Radio Amateur's Handbook*. The drawing indicates how to interpret the markings on the Japanese components. The values are in ohms, microhenries and picofarads.



For example, an inductor marked brown, red and black would be 12 × 10⁰, or 12 μH. A ceramic capacitor marked 301K5 would be 300 pF, 10-percent tolerance, and 500 volts. In general, the working voltage for ceramic capacitors is 500 unless otherwise noted. – *Noel B. Eaton, VE3CJ*

7-MHz Vertical *(Continued from page 43)*

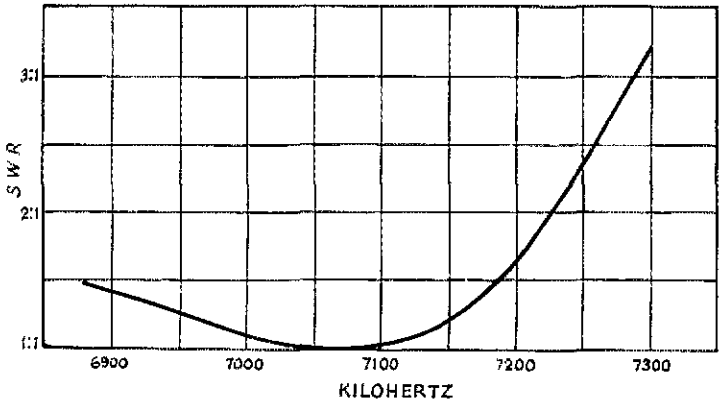


Fig. 5 — SWR curve as measured at the base of the driven element with the test equipment mentioned in the text. The *L* network was adjusted for approximately 7050 kHz.

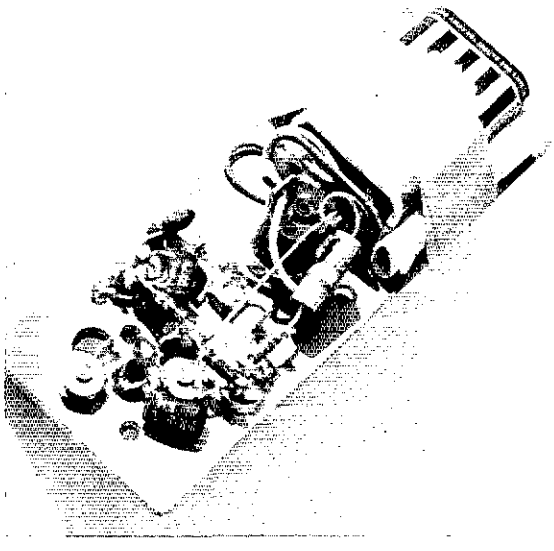
It was decided to make a high-*Q* inductor to replace the variable one in the *L* network. A new inductor was wound on a high-power toroid core. The difference between inductors was not measurable. For someone wishing to experiment with a beam of this nature the only requirement is a ground screen, vertical radiator and parasitic element (or elements) that are on the inductive side of resonance. This will permit easy adjustment to proper parasitic operation with a series capacitor. The center element (No. 1 director) also serves as a flag pole on national holidays. QST

Test Oscillator *(Continued from page 34)*

Relative crystal activity can be measured by placing a meter (0-10 mA) in the −9-V lead to the Class C emitter-follower output stage. *For fundamental-mode blanks,* the higher the current the more active the crystal unit. The emitter follower produces an output that is very rich in harmonic energy and harmonics from 8-MHz crystals can be heard on 2 meters with ease.

It is possible to replace the 51-pF series capacitor with 0- to 100-pF trimmer to be certain a given crystal will "pull" to a desired channel frequency. Be sure, however, that the trimmer is replaced with 51 pF when returning to the 32-pF standard capacitance. No switching of this capacitor should be attempted because of the additional capacitance introduced by the switch.

A test circuit of this kind has proven extremely useful when a 32-pF antiresonant, parallel-mode crystal is desired. It has proven helpful when odd overtone units must be correlated. Construction of the unit has resulted in a miniature electrical and mechanical package such that correlation difficulties and cost have been minimized. QST



Bottom view of the test oscillator.

Strays

QST congratulates . . .

Hugh Aitken, WA1FBE, Professor of Economics at Amherst College, recipient of a Guggenheim Foundation fellowship for 1973-74 to undertake research in the early history of radio communications in Europe and the U.S.

Reginald J. Iversen, K4QZ, awarded the Veteran Wireless Operators Association's Marconi Memorial Gold Medal for his achievements in radio communications while chief radio engineer of the *New York Times.*

Ray Meyers, W6MLZ, recipient of the first National "Ham of the Year" award at the 1973 Dayton Hamvention.

FM REPEATER NEWS

The public notice issued by FCC on August 30th mentioned new repeater and remotely controlled station licensing forms (p. 89, October *QST*). ARRL has obtained the forms, and while FCC has stated these are not *official* government forms, the use of this material would expedite the processing of a repeater application. There are three forms; the first covers a basic repeater, the second, a remotely controlled station, and the third, control station and auxiliary link. There are two additional sheets that show typical functional control circuits and a system outline drawing. ARRL is making a mailing of these forms to all repeaters who are listed in the ARRL *Repeater Directory*. Anyone else can obtain a set of the forms by writing to ARRL, s.a.s.e. please. One other point: FCC has told us informally that if an applicant has his repeater application returned for any reason, it would be to his advantage to remake the application on these forms.

Repeater Licensing Delays

While the recent FCC public notice granting an indefinite extension to repeater applicants who have not received their license was met with considerable relief, there is still a serious problem facing many applicants. The notice took care of stations who were operating prior to Oct. 17, 1972 as repeaters. However, any *new* repeaters who applied after Oct. 17th and before August 30th, 1973 must wait for their license before putting the repeater on the air. Additionally, there will be that group of applicants who are just now filing, or planning to file.

Word from FCC is that they are badly overloaded and understaffed, in Washington and in Gettysburg. The outlook for any speed-up of repeater licensing is grim and it may take *many* months before you hear anything about your license.

We have discussed this problem with FCC, particularly about the group of applicants who were not licensed before October 17, 1972, but have filed by August 30th, 1973. It is possible that some procedure can be worked out to expedite the licensing of these applicants. However, we need your help now to assist FCC. If you have filed within the dates mentioned above, and *were not* licensed as a repeater or remotely controlled station prior to Oct. 17, 1972, please send us information in the following order: the name of the applicant or trustee, the call, the address, and the name of the club or group if applicable.

Portable and Mobile Repeater Operation

In recent informal discussions with FCC a clarification of the methods for using a repeater portable or mobile was discussed. Any amateur station can be operated portable or mobile with the exception of a remotely-controlled station, an auxiliary-link station, and a military-recreation station (except by special permission of FCC). A *nonremotely* controlled repeater (manned, in-person control) *can* be operated portable or mobile. There are two important guide lines to follow when operating a repeater portable, aside from the proviso of on-site control. The erp for the HAAT of portable site must be used. The simplest method in this case is to use the minimum power alllowed for the band in use. For example, if you never run more than 100 watts erp on 2 meters, you can operate anywhere in the U.S.A. because that is the minimum power for that band. The other proviso is that the portable or mobile operation must be in the same band as your repeater license permits. In other words, if you are licensed as a 2-meter repeater, then your portable operation must be in this band.

These ground rules certainly make it easier for us in the event of an emergency. It should be no great problem for a repeater group to have an emergency repeater they can transport when the need arises. Keep in mind that your regular repeater can be kept in operation while you are using the same call portable.

Chicago FM Club Licensed

The Chicago FM Club recently received WR9ABY. What is unusual is, to our knowledge, this is the first repeater system that uses remote "voting" receivers to be licensed. The club has three remote receiving sites on the north, south and west sides of Chicago with the transmitter in the downtown area. Quite simply, with a voting system, the amateur with the signal that has the greatest degree of quieting, captures the repeater.

This is probably the most complex repeater system to be licensed. John Johnston, K3BNS, who is head of the rules and legal section of the amateur division of FCC provided the club with his personal help when he visited Chicago at the Expo ham convention (Now if we could just get John out on the road to visit all the repeater clubs! Too bad the FCC budget can't handle that; it would certainly be a help.)

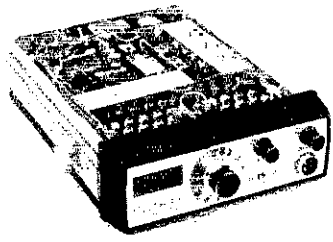
Canadians Going 600 kHz?

At the recent Radio Society of Ontario convention in Kingston, Ontario, there was considerable discussion of a standard 2-meter band plan in Canada. The general consensus appeared to be along the lines of the plan used in the U.S.A. that now has nationwide acceptance. This calls for 600-kHz separation of inputs and outputs, low in/high out from 146 to 147 MHz and high in/low out in the top MHz. We can't help but hope the Canadians accept such a plan because it would make it easier for VEs when they visit in the U.S.A. and for Ws visiting to the north.

On a similar subject, Howard Cowling, VE3WT, has just been appointed a member of the ARRL Repeater Advisory Committee. Howard would welcome any thoughts on band plans or other repeater subjects from his Canadian constituents. Howard's address is 64 Dunkeld Ave., St. Catherines, Ont., Canada. – *W1ICP/WR1ABH*

Recent Equipment

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



This view shows the front panel and receiver circuit board. Directly behind the panel is the crystal switching section and the netting capacitors for each crystal. The cover, mounting bracket, and microphone have been removed in the interests of clarity.

SBE Linear Systems

SB-450

UHF/FM Transceiver

THE SB-450? Sounds like one of those new 450-watt hf-band ssb transceivers, doesn't it? Well, it isn't. Not only doesn't it run QRO, but it can't work on hf and won't work on ssb. What it does do is to put out more than 5-watts of phase-modulated rf in the 420- to 450-MHz (70-cm) band. Into a box which measures 6-1/2 inches wide, 2-1/4 inches high and about 10 inches deep (including knobs and connectors), SBE has managed strategically to stuff 29 transistors, 24 diodes, 4 ICs, one SCR and scads of other, albeit mundane, components and make them work (very well indeed) at 450 MHz.

Typical of what one would expect of an fm rig on the two-meter band, this little box comes complete (less antenna) and ready for under-the-dash mounting. It is already set up for 446.0-MHz simplex operation and for 449.5/444.5-MHz repeaters. Connect +13.8 volts and a matched 70-cm antenna and you're on uhf fm – yes, the state of the art *is* moving that fast these days. Only a few years ago rigs for 144 MHz with these features were just coming into prominence. Now the compact-equipment frontier has shifted to 70 cm without sacrificing any of the features considered so necessary for today's operation.

Receiver Section

Two bipolar transistors (in cascade) are used in the rf stage of the receiver, placing four tuned circuits between the antenna and the receiver mixer. Front-end selectivity and sensitivity requirements are thereby acknowledged and met. The receiver oscillator/multiplier chain is quite conventional. The required crystal frequency can be found by subtracting the receiver i-f (10.7 MHz) from the operating frequency and dividing that figure by 12. Crystals in the 36-MHz range are needed.

The output of the mixer goes into a crystal-lattice filter and from there through an i-f/limiter strip which contains two ICs, two bipolar transistors, and three unspecified devices which are, presumedly, ceramic filters. The discriminator feeds a rather elaborate af system consisting of four bipolar transistors and an IC. The resulting 2 watts of audio really can rattle the cone of the built-in 2-1/4-inch speaker. A rear-apron jack is provided for use of an external speaker, if desired: its use disables the built-in speaker.

Sensitivity is 0.5 μV for 20 dB of quieting. Although we lacked adequate local activity, tests made in the ARRL lab using signal generators indicated the SB-450 has good rejection characteristics of near-frequency signals at substantial amplitude levels.

Transmitter Section

The phase-modulated transmitter employs nine bipolar transistors in the rf portion and one bipolar type and an IC in the modulator. Output from the modulator is split into two equal branches and applied to a pair of voltage-variable-capacitance diodes, each located across the tuned circuit of a lightly coupled band-pass filter at the output of the oscillator. See Fig. 1.

Multiple-tuned circuits and shielded band-pass filters are much in evidence throughout the design. Transmitter output is very clean. And speaking of power output, there's a fair amount of it, too. We measured approximately 5-1/2 watts into a 50-ohm

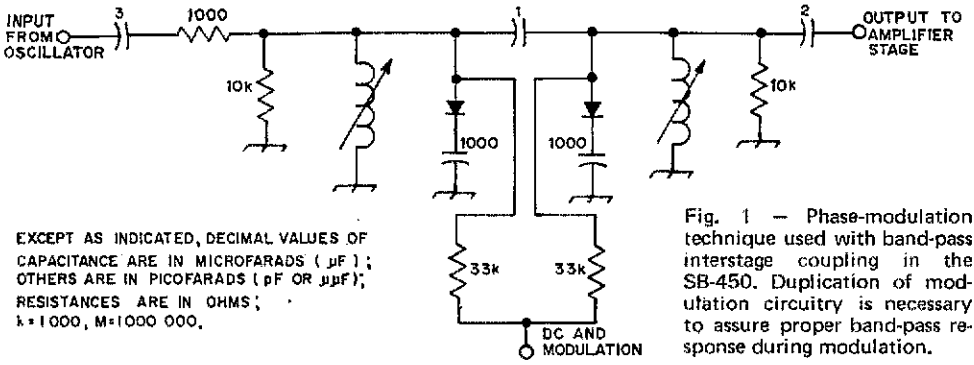


Fig. 1 — Phase-modulation technique used with band-pass interstage coupling in the SB-450. Duplication of modulation circuitry is necessary to assure proper band-pass response during modulation.

dummy load. Tweaking for maximum output at one frequency can produce up to 6 watts at the sacrifice of power at other frequencies.

The proper transmitting crystal frequency may be determined by dividing the desired output frequency by 18. Crystals in the upper reaches of the 24-MHz range are used. The final amplifier is protected in the usual shutdown manner should the rig be operated into an open or short circuit or too high an SWR (over 2). The manual details adjustment of this circuit.

Pluses

Obviously a unit of this general type is not something that just gets slapped together in haywire fashion. A great deal of thought went into the design of this package. For example, in addition to the aforementioned provisions for an external speaker, another rear-apron jack is provided for remotely keying the unit. These features, together, make it possible to trunk-mount the unit out of the sight of would-be thieves. The feature may be a handy thing for big-city dwellers. Because its designers were far thinking, the SB-450 has 12-channel capability on both receive and transmit modes. All 24 crystals are separately trimmed for exactitude of netting.

Another attention-to-detail feature is the low current demand of the circuitry. The receiver idles at less than 200 mA with no signal input; with a fully modulated, full-quieting signal and the af gain running wide open, the current drain is less than 450 mA. On transmit an output of 5-1/2-watts may be obtained with only 1.7 amperes being drawn.

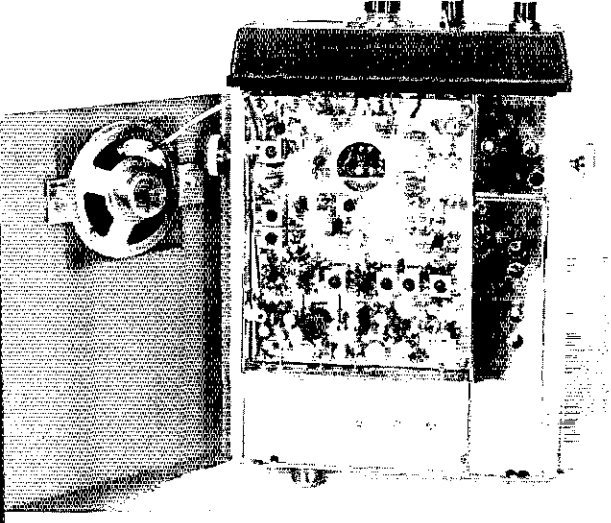
Minuses

Nothing negative could be found with the unit itself, but the manual leaves great room for technical-information improvement. As an operator's manual, it's fine. The only circuit described therein is the final-amplifier protection circuit. Some, but not all, of the pc boards and subassemblies are diagrammed; board layouts for certain sections of the transmitter are unaccountably missing. There are test points on the boards which don't show up in the schematic diagram. Because of the compactness of the unit and the paucity of the manual, troubleshooting could be trying to all but the most tenacious and experienced technicians.

SBE Linear Systems
SB-450 UHF/FM Transceiver

Power requirements: 13.8 V dc, nominal, negative ground only. Less than 450 mA on receive and less than 1.8 A on transmit.*
Channel capability: 12 channels each on receive and transmit; all have adjustment trimmers.
Dimensions (HWD) and Weight:
2-1/4 × 6-1/2 × 8-1/4 inches (less mounting bracket, knobs and connectors); 4 pounds, 10-1/2 ounces less mounting bracket (5 pounds 8 ounces with mounting bracket).*
Crystal holder type: HC-25/U for both receive and transmit.
Transmitter power output: 5.5 watts.*
Transmitter deviation: Adjustable 0-15 kHz.*
Transmitter crystal frequency: Output frequency divided by 18.
Receiver crystal frequency: Operating frequency minus 10.7, divided by 12.
Frequency range: 420-450 MHz.
Receiver i-f: 10.7 MHz, single conversion.
Receiver sensitivity: 0.5 μV for 20 dB quieting.*
Receiver filter: Crystal lattice type.
Price class: $400.
Manufacturer: SBE Linear Systems, Inc., 220 Airport Blvd., Watsonville, CA 95076.

* Measured in ARRL Lab.



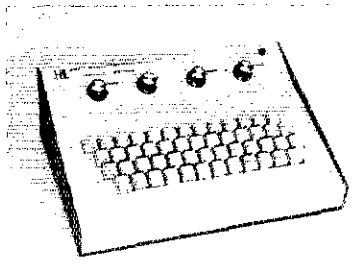
Bottom view showing the transmitter board. The output band-pass filter is along the bottom, directly above the UHF connector. The 70-cm amplifiers are in the shielded areas to the right.

Summary

The manual notwithstanding, the SB-450 is a fine package. It's very compact and multifeature laden. When the gang wakes up to uhf fm, SBEs SB-450 will be there waiting. It's tomorrow's rig today, in the truest sense. *WIGRE*

QST —— QST —— QST

Hal MKB-1 Morse Keyboard



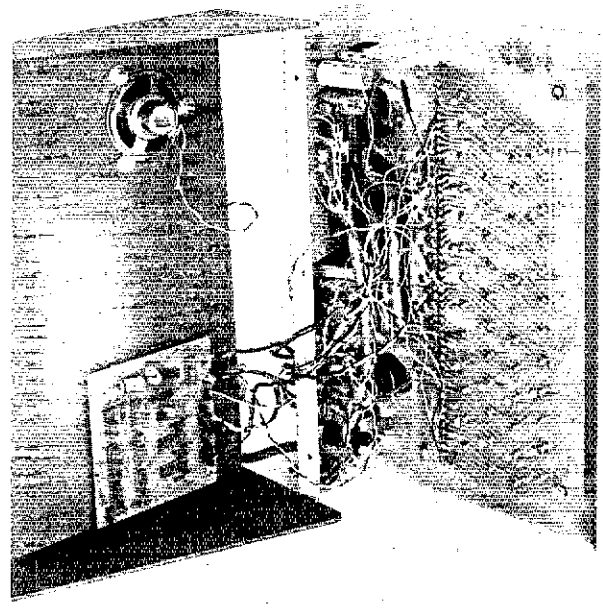
A RECENT addition to the growing list of equipment offered to the amateur by HAL Communications Corp. is their MKB-1 self-contained Morse-code keyboard keyer. In appearance it is similar to the HAL RKB-1 TTY keyboard,[1] but in function it is entirely different. The TTY keyboard sends Baudot code and the Morse keyboard sends Morse code; other than the fact that both are operated by depressing keyboard keys, there is little other similarity in their operation. (To be technically correct, the MKB-1 keyboard sends International Morse, or Continental code.)

Keyboard-operated keyers have been around for a number of years, long before the days of modern solid-state electronics. A few early versions were constructed by using rather complicated arrangements of relays and interconnecting wiring. One of the first all-electronic solid-state keyboard keyers to be published appeared in *QST* for May, 1961.[2] Since that time, several articles on keyboard keyers for home construction have appeared in the various amateur magazines, and a number of models have become available commercially.

In general, all of the recently designed keyers work in the same fashion. The operator pokes the keyboard key corresponding to the code character he wishes to send, and out comes the proper code. Punch another key, and out comes the code for that character. Of course there's a speed control to vary the rate at which the code is sent. In most keyers, depressing and holding one key will initiate a string of identical code characters, separated by the proper spacing interval. (In a few keyboard keyers, depending on the circuit design, it is necessary to release the key and depress it again in order to repeat a character.) In operation, the various keyboard keys are depressed in the desired sequence, one after the other. Because the code characters vary in their duration, it is necessary for the operator's fingers to linger on some keys, such as the J, Ø Y, and Q, and to move quickly off of other keys, such as E and I. To the touch typist and "hunt and peck" artist alike, typing various

[1] See Recent Equipment, "The HAL Communications RVD-1002 RTTY Video Display Unit and the RKB-1 TTY Keyboard," *QST*, April, 1973.

[2] Johnson, "Codamite," *QST* for May, 1961.



The key switches of the MKB-1 keyboard keyer are affixed to the large circuit board mounted on the top (sloping) panel, shown at the right in this view. Components on the logic-section circuit board can be seen to the left of the key-switch circuit board, shown on the upper portion of the rear panel here. The circuit board at the left is mounted on the base or bottom of the enclosure, containing the automatic identification circuitry.

characters at different rates requires a bit of practice. (Some deluxe keyers contain a memory for a few characters, to avoid the necessity of this variable-speed typing. Characters typed at a uniform rate are stored in a memory and "clocked out" at the correct time.) Proper spacing between words or groups is usually an operator function on most keyers, and therefore there is no space bar, as there is on a typewriter or teleprinter keyboard. (The only time there is a real need for a space bar is when the keyer contains a character memory.)

In these respects, the HAL keyboard keyer is like most others. It is not the type which has a character memory such as that described in the above paragraph, and therefore the operator must use the variable-speed typing procedure and provide the proper word-spacing interval between code groups, as mentioned, for the smoothest sounding code. This is just a matter of practice, though, and in a relatively short time it isn't difficult to find one's self sending flawless code, as if it were being machine sent.

The method of generating the Morse code in the HAL keyboard keyer is the same as that used in the popular Touchcoder II which appeared in *QST* a few years ago.[3] Seven tiny toroidal coil forms are used as the basis for seven transformers, the "primary winding" for each being a single wire passing through the center hole. Several primaries for each transformer are obtained by passing a number of wires through each, a single-wire conductor from a particular keyboard key being threaded through the appropriate toroids, according to the code for that keyed character. The reader is urged to review the original *QST* article for further information on character generation.

Using modern TTL ICs, op amps, and transistors, the logic section of the keyer occupies relatively little space on the rear panel. It, the sidetone generator, and the power supply rectifiers and regulator are contained on a circuit board which measures only 3 × 5-3/4 inches. Most of the rest of the rear panel contains controls and jacks for external connections to other station equipment. Provision is included for solid-state keying of either a cathode- or grid-block-keyed transmitter.

[3] Bryant, "Touchcoder II," *QST* for July, 1969.

Available as an optional feature for the MKB-1 is an automatic identifier. The keyer we tested was programmed to send DE K1PLP – all at the push of a single keyboard key, labeled HERE IS. No information was provided by the manufacturer on this circuit, but its electronics, 9 transistors and 11 7400-series ICs, are contained on a separate circuit board measuring 3-1/2 × 4 inches. With this feature comes the additional use of two other keyboard keying functions. One key initiates the Morse code for DX, and another initiates CQ. Punching just three keys in the proper sequence sends CQ DX DE K1PLP. And as with most of the other keyboard keyers, holding a single key down continuously causes the code for that key to be repeated, so that sending CQ CQ CQ DE K1PLP K1PLP K1PLP K requires the pushing (and holding for an appropriate period of time) only three keys. (The DE portion of the HERE IS message is not repeated when the key is held closed continuously.) Without resorting to a fully preprogrammed device, a keyboard keyer such as the MKB-1 makes it about as effortless as possible to send good code. – *K1PLP*

HAL MKB-1 Morse Keyboard

Dimensions (HWD) and Weight:

4-1/2 × 12-3/4 × 9-1/2 inches, 5-1/2 pounds.

Power requirements: 117 V ac, 60 Hz.

Price class: Kit, $175; assembled, $275; wired and tested with automatic identification feature, $325.

Manufacturer: HAL Comm. Corp., Box 365A, Urbana, IL 61801.

ARRL 10-Meter Contest

SOME 20 YEARS AGO, ARRL sponsored a 10-meter WAS-type contest of particular appeal to the then General-class licensees. This group had no other hf phone band within which to do their contesting. With the abolition of the old Class A and Class B type licenses and the opening of other voice bands to Generals et al, the rationale disappeared and the contest became obsolescent.

A new day and a new rationale exists. In particular during the past months, evidence has been seen of a growing desire for such a contest, but with varied reasons in mind. Great interest continues to be shown in 10 meters in association with the 5-band awards. Occupancy is an important issue of the day as is proof that there's life in the old band yet. At a recent convention the matter was raised and met with enthusiastic response. Rather than postpone the idea for another year, the consensus was "let's give it a try for '73," prompting a recommendation by the Contest Advisory Committee.

A basic outline of the rules is as follows: The contest runs from 1200Z December 15, 1973 to 2359Z December 16, 1973 with no operating time limit. If you want to stay up all night and listen to receiver hiss go right ahead. All QSOs must take place on 10 meters. Anybody can work anybody. DX to DX, US to US, VE to VE, DX to US, DX to VE and VE to US are all ok. The exchange is signal report and state or province for the 50 states and Canada and signal report and consecutive serial number starting with 001 for others. Stations that are not land-based send signal report and ITU region (i.e., Region 1, 2 or 3). Each completed two-way QSO is worth 2 points. If you have a two-way with a W or K Novice it is worth 4 points. Novices in KZ5 and KG4 have strange callsigns – a Canal Zone Novice has an "N" at the end of the call, such as KZ5AAN. A Novice in Guantanamo Bay has an "N" after the number, such as KG4NAA. All others replace the K with a W (i.e., WL7, WH6, etc.). If you work a station once on cw you can work him again on phone. Oscar QSOs also count. All cw QSOs must be made between 28.0-28.5 MHz. This is to prevent the "now listen for my cw signal" syndrome in the phone band. To determine your multiplier add the following:

1) Different states

2) Different Canadian call areas (VE1-VE8, VO – total possible of 9)

3) Different countries as determined by the ARRL Countries List

4) Different ITU regions from non-land-based stations.

You cannot count a state or Canadian call area again as a country. So, if you work Ohio, VE6, KH6, Florida and YV you have 5 multipliers. Your final score is points times multipliers. Easy, huh?

Ten meters is big. Some suggested frequencies for contest activity are:

cw	28000-28050
Novice	28100-28150
SSB	28500-28600
AM	28800-29000

If you have not been on 10 for some time (or even at all) take some time to read "Tips for Ten" in March 1973 *QST*, page 22. It's a very easy way to learn of some of the different propogation characteristics ten displays.

Please avoid 29.45-29.55. These are the Oscar downlink frequencies.

Read the rules carefully and then send off for some of our 10-meter contest log sheets. If you don't want ours, use some of your own – we're not choosy.

GL – *WA1PID*

Rules

1) Eligibility: This contest is open to all amateurs worldwide.

2) Object: To exchange QSO information with as many amateur stations in any and all parts of the world as possible.

3) Contest Period: The contest shall run from 1200 GMT December 15, 1973 to 2359 GMT December 16, 1973. This is a 36-hour period with no limitation on operating time.

4) Conditions of Entry: Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority and the decisions of the ARRL Awards Committee.

5) Entry Classification: Entries will be classified as single or multiple-operator stations. Single operator stations are those in which one person performs all transmitting, receiving, spotting and logging functions. Multiple-operator stations are those obtaining any assistance, such as from spotting or relief operators, or keeping the station log or records. Multiple-transmitter stations are prohibited. The use of electronic or mechanical devices and/or any other method of simultaneous operation of two or more transmitters is prohibited.

6) Exchange: Amateurs in the 50 United States and Canada will transmit signal report and state or province. Others will transmit signal report and consecutive serial number starting with 001. Note: Those amateurs licensed by the U.S. Government or branch thereof not located in a state (i.e. KP4 KW6 KZ5 KC6, etc.) will transmit the consecutive serial number. Stations that are not land-based transmit signal report and ITU Region.

7) Valid Contacts: A station may be worked once on cw and once on phone. All contacts must be either cw to cw or phone to phone. Crossmode contacts do not count for contest credit. Oscar 6 contacts may be counted. All cw QSOs must take place between 28.0-28.5 MHz except those made through Oscar 6.

8) Scoring: Two points are earned for each completed two-way exchange. Four points are earned for a completed two-way exchange with a W or K Novice. Incomplete QSOs will not count for contest points and/or multipliers. Multipliers: The multiplier will consist of the number of different states, Canadian call areas (VE1-VE8, VO), ITU Regions (as sent by non-land-based stations) and countries as determined by the *ARRL Countries List. A state or province cannot* be counted again as a country. Final score = QSO points times the multiplier.

9) Reporting: Contest work may be reported either on the forms available from Hq. or on a reasonable facsimile. Send a self-addressed stamped envelope to ARRL for the appropriate forms. All entries must be postmarked no later than January 21, 1974 in order to be eligible for *QST* listing and awards. An entry consists of the log and summary sheet. Check sheets are not mandatory.

10) Awards: Awards will be issued on a section or country basis. A certificate will be awarded to the highest scoring single operator station in each section, Canadian call area and foreign country. Multiple-operator and Novice stations will receive an award if three or more such entries in a section are received or if the entry displays exceptional effort. Region awards for non-land-based stations will be issued if participation warrants.

11) Judges: All entries become the property of ARRL and none can be returned. All entries will be passed upon by the ARRL Awards Committee whose decisions will be final. The committee will void or adjust entries as its interpretation of these rules may require.

12) 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 scoring discrepancies.

If a participant is disqualified, he will be barred from submitting an entry in the next annual running of that specific contest.

The calls of all disqualified participants will be listed in the *QST* report of the contest.

Any participant on the borderline of disqualification but not actually disqualified will 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.

ARRL 160-Meter Contest

The 4th annual ARRL 160-Meter Contest will be held December 7-9, 1973.

Please remember to keep the "DX-window" (1825-1830 kHz) clear. This is the spot DX goes to get away from stateside QRM. Don't call there – they usually listen from 1800-1805 and, in any case, will announce exactly where they are listening. Listen for KH6-types in the 1995-2000 range.

Don't forget to use the 1830-1850 portion. It will help spread out the QRM that is so noticeable in the bottom 25 kHz.

Send for our 160-Meter contest package. It is *imperative that your entry include a check sheet* and the special summary sheet (or reasonable facsimile) filled out on *both sides*. Since logs are not required we do not stock them. – *WA1PID*

Rules

1) This contest will start at 2200 GMT Friday, December 7 and end at 1600 GMT Sunday, December 9, 1973. This is a 42-hour period with no limitation on operating time. Cw only.

2) The contest is open to all amateurs. A QSO with an amateur in an ARRL section (see page 6, *QST*) is worth 2 points. QSOs with amateurs not in an ARRL section are worth 5 points. DX to DX QSOs will not count.

3) Multipliers are the 74 ARRL sections, VE8 and each foreign country worked.

4) The exchange will be the report, plus ARRL section for those in an ARRL section. Those participants outside of an ARRL section will send a report and the name of their country.

5) Competition is within the section and non-W/VE country for certificate awards. Division high scorers will have their section award endorsed with an appropriate seal. Multioperator work is permitted with scores to be shown after single-operator listings (no certificates).

6) To report, use one of the special ARRL summary sheets and an alphabetical list of stations worked (Operating Aid 6), or equivalent. Effectively, your "dupe" sheet and complete special summary constitute your entry. *A copy of your log is not required*, unless specifically later requested by ARRL Hq. Illegible entries and entries without the special summary (or complete information contained thereon) and an Op. Aid 6 will be classified as invalid.

7) Entries become the property of ARRL, none can be returned. Awards Committee decisions are final. Send an addressed stamped No.10-envelope for appropriate entry forms. All entries must be received at ARRL Hq. no later than Jan. 10, 1974 to be eligible. Mail entries, photos, soapbox, ideas for contest improvement, etc. to ARRL, 225 Main Street, Newington, Connecticut 06111.

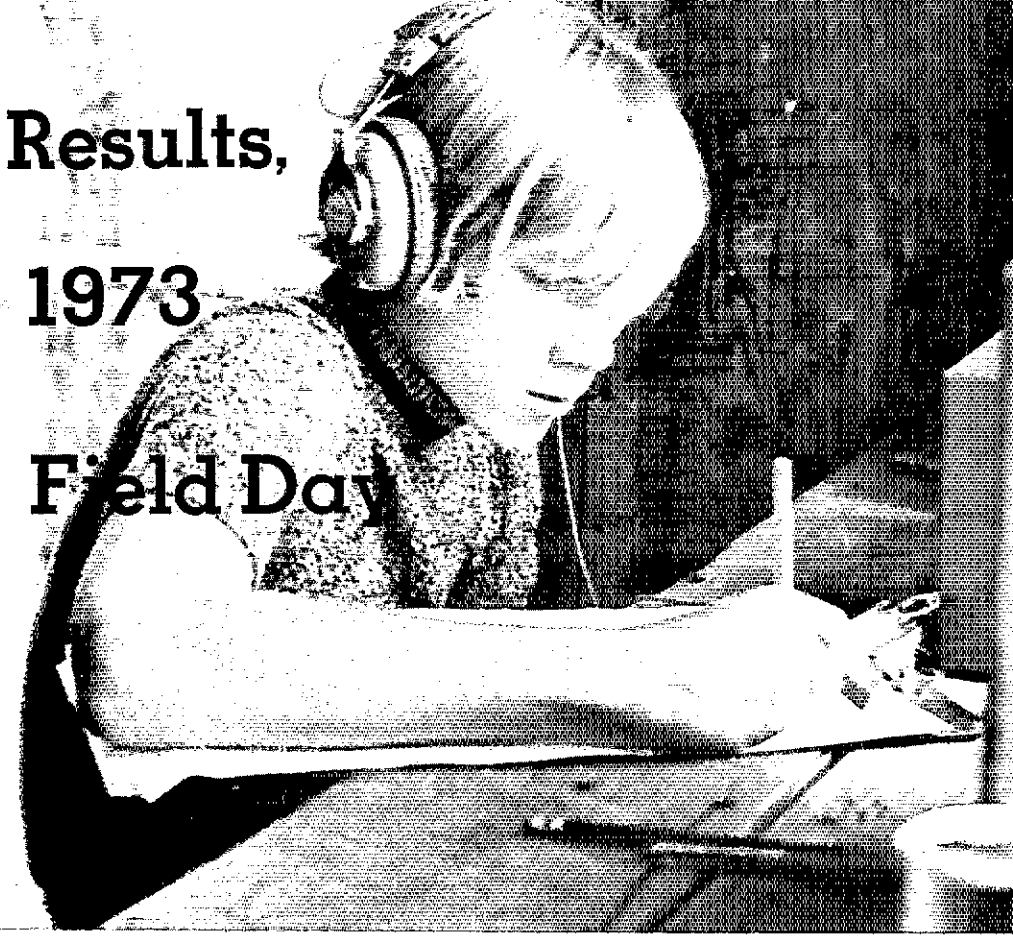
8) If the claimed score of a participant is reduced by 2 percent or more, the log may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, banned countries, and/or scoring discrepancies.

If a participant is disqualified, he will be barred from submitting an entry in the next annual running of that specific contest.

(Continued on page 95)

Results, 1973 Field Day



REPORTED BY RICK NISWANDER, *WA1PID/WA8VRB

UP, UP, UP! Everything was up in the 1973 Field Day held June 23-24. Conditions were great – 15 was open almost 'round the clock, 10 showed signs of life, 80, 40 and 20 were packed to the gills as usual, and 6 and 2 helped many a QSO total increase.

Participation was up. In fact, the 12,221 participants we had this year are the most since 1967, when over 15,000 hardy souls braved the rigors of this annual event. This year 1132 logs were submitted, representing 2805 transmitters – both of these figures are healthy increases of about 20% compared with 1972.

Class 2A took honors as most popular, with 240 entries – closely followed by 3A with 221 logs. The only other classes to break 100 entries were 1A with 153, and 1B with 117. Class 4A is increasing in popularity – it had 96 entries this time around, more than ever before. The under-10-watt-battery-only classes are gaining in strength also – up to 51 entries in all classes from last year's 34. Comments have been made by some regarding the power multiplier for battery-powered stations. Since battery stations compete only among themselves, an increase in the multiplier would make no difference in the standings. However, these comments, and any other suggestions, will be passed on to the Contest Advisory Committee: W1BGD (chairman), W2EIF, W3BQV, K4BAI, K5TSR, W6DQX, K7NHV, WØHP, VE2NV and KH6IJ for study.

Records were broken faster than lumber at a karate convention. W5YL/5, K9MTE/9 and K5YHX/5 all broke the 1A QSO record of 1749 set by K6YNB/6 last year with W5YL/5 holding the new mark of 2124. K9IU/9 planted antennas at 150 feet on top of the Indiana University football stadium and broke the 2A record of W9YT/9 by over 150 QSOs. In 3A, W4FU/8 had over 4000 QSOs before dupes, but had to settle for 3791

*Asst. Communications Mgr.,

1974 Field Day June 22-23 1974

CLUB AGGREGATE MOBILE SCORES

Radio Amateurs Mobile Society (CA)	1595
Mobile ARC of South Bend (IN)	344

after duping (pity). This smashes the old record of 3000 set by W1ARR/1 in 1971. WA9BWY and WA9AUM tacked an amplifier onto their Signal-One and knocked off the 1B QSO record with a fine 1843-contact effort. The gang at W3IN/3 (9A), Potomac Valley RC, broke the long standing overall QSO record, garnering 5366 QSOs with help from some amplifiers. W1ARR/1 (14A), Murphy's Marauders, had the most points this year with 11,960 (5255 QSOs) – the highest score recorded since the FD scoring rules were changed in 1971.

Hither and yon (yawn?) . . .

In 1939, W2FBA and W2JBQ banded together for FD. Today, 35 years later, they're still at it – having missed not a one in between. Their calls have changed (FBA is now W2AB and JBQ is W2DW), their score has improved (18 QSOs in 1939 – 863 this year) and it's getting harder to climb those leafy antenna supports, but from *wherever they happened to be each year, these two* have gathered to participate in FD. A fantastic record. Anybody top that?

A couple of entries moved the clock back a few years with their FD gear. W3EAN and W3FBY (1B) used a National SW3 of 1930s vintage for receiving and a t.p.t.g. (tuned-plate, tuned-grid) for transmitting. The t.p.t.g. was of breadboard construction and used type 45 tubes. They had a hard time figuring out where they were in the band since the tx blocked the rx over a wide range. W7LNG (1B, Battery) used a 210 Hartley oscillator running 10 watts and a 6L6 at 6 to 8 watts for his transmitting setup. Construction details for the 210 can be found in October 1928 *QST* and info on the 6L6 is in June 1947 *QST*.

We always get comments on the food (good or bad) eaten (sometimes) by FD groups, but K5TCK and WA5EBQ (1B) have to take the cake (chocolate frosting and all) this year. Their FD entry included a menu listing the delectably delicious delights they had to suffer through at mealtime. For Saturday lunch they had sandwiches, chips, cole slaw, lemonade and Cokes. Saturday evening and Sunday noon they forced down fried chicken, meat loaf, potato salad, baked beans, vegetable relishes, rolls, iced tea and chocolate cake. On sunday they woke up to orange juice, bacon and eggs, toast, cinnamon rolls, milk and coffee. If, after gorging themselves at mealtime, they got hungry later they could snack on assorted fresh fruit, cookies, chips, candy and sandwiches. Praise the Lord and pass the Alka Seltzer.

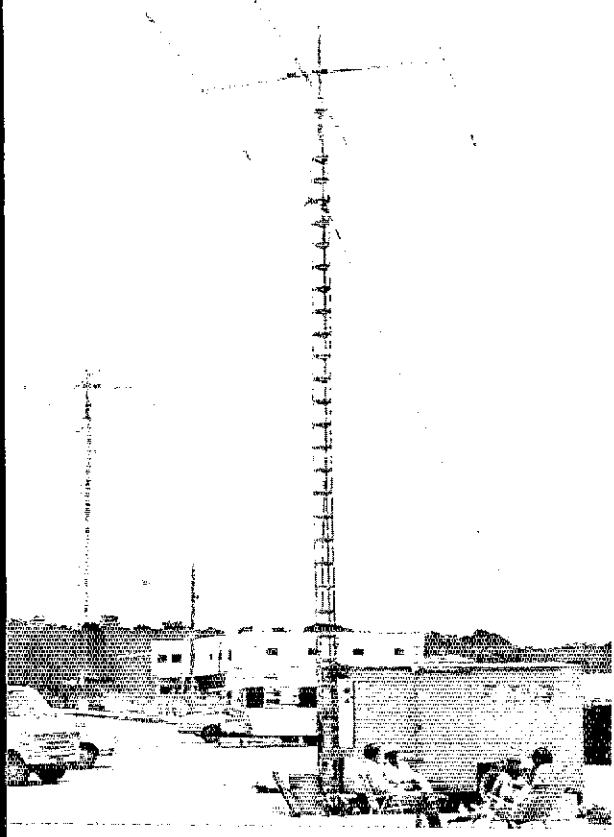
Each year comments received range from food to Murphy to generators, but we are always sure we'll get a bunch on insects, especially the biting kind. Our resident philosopher, V.Y. Senny Tree, was sauntering by one day as I was reviewing the "insect stories" we received and he paused to

Class-A Call-Area Leaders

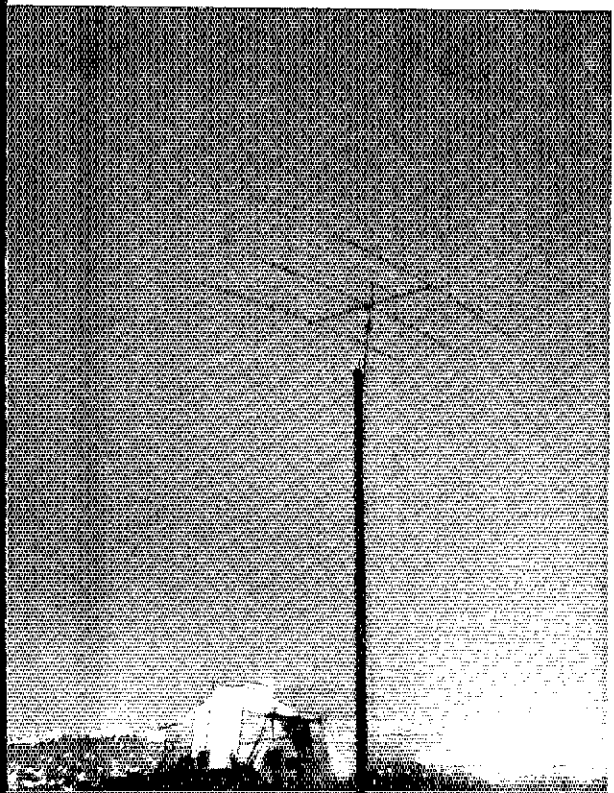
(Calls in bold face represent over-all class leaders)

1A	4A	7A
VE2CAR/2	VE3HB/3	VO1AT/1
W1TM/1	K1ACL/1	W1FTS/1
WB2TQC/2	WA2DZE/2	K2AA/2
WA3UTV/3	W3SGJ/3	K3IEC/3
K4CG/4	W4RKW/4	WA4YZY/4
W5YL/5	W5GAD/5	W5DPA/5
K6YNB/6	WB6NVY/6	W6SD/6
K7MKG/7	W7NCW/7	W7AIA/7
WA8RWU/8	W8ACW/8	W8VPV/8
K9MTE/9	W9CCU/9	W9YH/9
KØBIX/Ø	WØBYZ/Ø	WØLB/Ø
2A	**5A**	**8A**
VE1FO/1	VE3OW/3	VE3VM/3
W1HEB/1	K1MUJ/1	W1BIM/1
WA2SRQ/2	K2AE/2	K3ERM/3
W3ALD/3	K3SSC/3	K4BFT/4
W4MRF/4	W4CUE/4	K6HAI/6
W5SBX/5	K5QHD/5	W8FT/8
W6OAT/6	W6FQ/6	**W9IC/9**
W7LC/7	W7YN/7	**9A**
WA8FCM/8	WB8JBM/8	VE3NAR/3
K9IU/9	K9BPL/9	W2LI/2
WØLJF/Ø	WØNJ/Ø	W4HAW/4
		10A
3A	**6A**	W2GSA/2
VE3NSR/3	VO1AA/1	**13A**
W1TX/1	W1GLA/1	W7DK/7
W2NVB/2	. . . .	
W8GFG/3	WA3PJQ/3	**14A**
W4SKH/4	W4RL/4	VE3WE/3
K5RWK/5	WA5ZAA/5	W1ARR/1
W6AB/6	K6QEZ/6	**19A**
W7FR/7	K7LED/7	W2RJ/2
W4FU/8	W8TO/8	W6HE/6
W9FU/9	W9DUP/9	
WØDLJ/Ø	WBØKRA/Ø	

Second in 6A is W4RL/4, Sterling Park ARC, here operated by WB4SPG. Keep the rate up, Jim.



A pair of tribanders at 40 feet and some wires helped W4RYZ/4 the Panama City ARC, nab 9th spot in 3A. Clear, blue sea water is just to the right of the picture.



Night shot at W6ULI/6 (5A) the Fullerton Radio Club. The steps on the telephone pole make it much easier to climb.

throw in his two cents worth in limerick form. It's title – "Oh insect, where is thy sting?" or "When you're out of 6-12, you're out of luck."

A forgetful young man named Ray Frump
Left his "Off" on a shelf by his pump.
He was bitten with ease
By mosquitos and bees
And late Sunday he looked like a lump.

How was *your* Field Day?

Soapbox

Fire tower operation is like sea duty. Even a light wind brought on a green feeling. – (W3IWT/3, 2B). High winds and heavy rain ripped antenna in half and tore up tents forcing shutdown for several hours. Any bonus points for inclement weather? – (W9ESA/9, 1A). A 20-10 meter trap vertical was installed in the center of a pond. During the installation K8IIA tipped the boat and sank himself and K8HVA to the bottom. Both survived. – (K8IIA/8, 4A). Our first helium balloon exploded before we could get it up but the second one stayed at 150 feet. – (WA2URS/2, 1B). Many unexpected things happened as they always do in a Field Day type operation. I suppose the biggest was our running out of drinking water. One sure does get thirsty when he learns that all the water is gone. – (W4QEE/4, 2A). Our long wire and its balloons ended up in a thorn bush. – (W9INX/9, 4A). First club Field Day caught WN9ICE in a sudden gale which blew him (together with a 4 man tent, the complete Ten-Tec line, table, chairs, etc.) 20 feet downwind. Fortunately no one was injured (physically) and all antenna systems remained standing, including a 40 meter quad. – (WB9MOF/9, 4A). How come the logkeepers suddenly start writing like doctors – undecipherable? – (K9GXU/9, 3A). Our generator turned into a pumpkin and quit at midnight. – (KØHMN/ø, 3A). Two inches of rain, a broken KWM-2, an electric line about a full-wave at 80 meters near the antenna and a postal service that says 225 Main Street, Newington, Conn. does not exist. Do ya think Murphy was lurking? – (W5DX/5, 3A). Maybe we had better choose a different field as we just about lost the tribander to a crop-duster during Sunday breakfast. – (WØAZR/ø, 2A). We should order our meals from McDonalds. – (WA1PHJ/1, 2A). The fun started when WA3MPO untied the guy holding the tower he was on. – (K3MTK/3, 3A). A severe hail and rainstorm drenched equipment and completely vaporized a 60 foot tree 50 feet from the antenna. A great time had by all. – (WB4EVL/4, 1A). Any extra credit for four publicity clippings? – (WB6CEP/1, 1B). We must have been hearing things – there were signals on 15 meters. – (KH6HIQ/KH6, 3A). The food was great. One op brought steak (yes, steak), potatoes, peas and wine. – (VE3NSR/3, 3A). After cleverly pre-mixing 15 gallons of gas and oil for our 2-cycle generator it promptly died one hour into the contest. A hurried trip to the local rental outfit turned up only one generator . . . you guessed it – 4 cycle. – (W6IPC/6, 2A). Murphy strikes in many ways. One of our ops got an angry hornet in his pants. Two

OSCAR 6 USERS

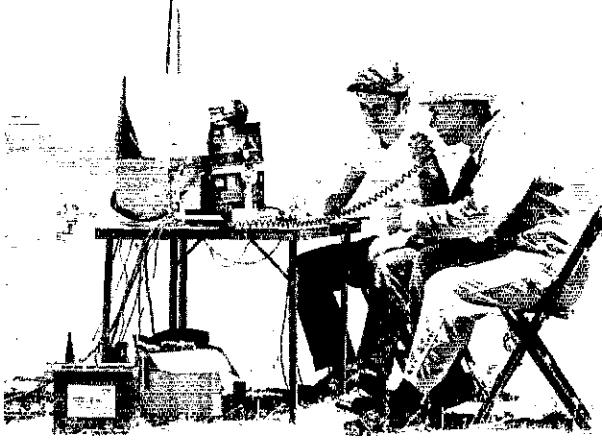
1A	W4CVY/4
K4JM/4	W4VTA/4
2A	K6YA/6
K4GFG/4	W7YE/7
W4ABK/4	WB9FDZ/9
W5DW/5	WØHNV/Ø
W9KM/9	5A
WØIW/Ø	K2AE/2
3A	W3VD/3
W1TX/1	W6CX/6
W4DW/4	W6FQ/6
K5RWK/5	K9BPL/9
W5TSV/5	8A
W8FO/8	WA6BGS/6
W9FU/9	13A
4A	W7DK/7
W2FR/2	14A
WA3JZR/3	W1ARR/1

others literally got "nailed" when they stepped on some boards hidden in high weeds and our "cube tap" at the generator lit up like a Christmas tree when the rain struck in the middle of the night. – (W8GFG/3, 3A). Our Oscar Station was a thing of beauty. The transmitter was a Sidewinder to an 8 element beam mounted on K2KIR who functioned very well as an azimuth/elevation rotator. – (W2FR/2, 4A). With about 2 hours to go the operators went berserk and threw each other in the pond. – (WB8JBM/8, 5A). We wondered why the rig wouldn't tune, why the band was dead, etc. Murphy, it seems, stole the center pin from our BNC to PL-259 adapter. – (WA1LAK/1, 2A). We wish to express our gratitude to the club which entertained Murphy thereby making our efforts a success. Hope he stays there next year as well. – (WB4CWF/4, 1A).

Scores

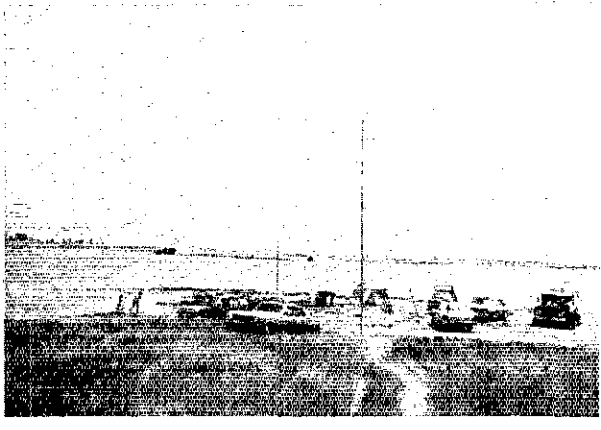
Class A stations are clubs and groups in the field with more than 2 operators. Scores are tabulated according to the number of transmitters operated simultaneously at each station. The figures and letters following each call indicate the number of valid contacts, the highest dc input power used, the number of participants at each station and the final score. The "power classification" used in computing the score is indicated by the letter A, B, C and D after the number of QSOs shown. A indicates power up to and including 10 watts (multiplier of 3); B indicates power over 10, up to and including 200 watts (multiplier of 2); C indicates power over 200 (multiplier of 1). An asterisk following the station callsign indicates set-up operations did not begin until 1800 GMT on Saturday.

Located on an island in Woodward Reservois was the group at W6SF/6 (4A). They had to drive their cars (and truck) through about 100 feet of water (wide, not deep) in order to reach their operating site.



Fifth spot in 2B goes to WA6JVZ/6 with help from WA6CCM (holding the side). The two made about 25% of their QSOs on VHF.

WA9NRI shown on 2 meters at W9PCS/9 (5A), York Radio Club. On 40 they used a quad which greatly improved their totals on that band.



1A - Battery

W8NP/8*	Massillon ARC	685-	A-	15-	2205
K6MQX/6*	NOAHS ARC	404-	A-	4-	1362
W3NNL/3*	Schuylkill River Rats.	288-	A-	4-	1024
W3TV/3	Friendly AR Transmitters Society	123-	A-	5-	469
WB8BZK/8*	Hpyt-Freq D.J. ARC	117-	A-	5-	451
WB2URF/2	Midnight Riders	131-	B-	5-	362
W4GHV/5	Barry,Jorgensen,Farley	93-	B-	3-	286
WB4EVL/4	Milliwatt Marauders	39-	A-	3-	267
VE1YT/1	Shearwater ARC	41-	A-	4-	223

1A

W5YL/5*	Thibodaux ARC	2124-	B-	18-	4398
K9MTE/9*	Thursday Nite Trashing Group	1926-	B-	3-	3952
K5YHX/5*	YHX JVO IUT OVW	1814-	B-	4-	3728
K6YNB/6*	Alexander,Desloge & Overbeck	1746-	B-	3-	3642
DJ6RD/W9*	Independent Contest Operators	1566-	B-	7-	3282
WA8RWU/8*	Gary,Terry,John	1414-	B-	3-	2928
W8OK/8	Miami Val. AR Contest Soc.	1368-	B-	9-	2836
W9AML/9*	Central Illinois RC	1220-	B-	5-	2670
W5EXI/5	Lafayette ARC	1246-	B-	15-	2642
KZ5USA/KZ5*	USARSO MARS Station	1224-	B-	9-	2598
K4CG/4*	U.S. Coast Guard ARC	1193-	B-	5-	2486
KØBIX/Ø*	Warrensburg ARC	1099-	B-	16-	2398
K4JM/4	Central Va. Contest Club	1010-	B-	7-	2220
KH6RS/KH6	Maui ARC	1018-	B-	8-	2186
WAØWEZ/Ø	Minn. Wireless Assoc.	1025-	B-	3-	2150
KØMVC/Ø*	Barbers Bombers	1001-	B-	9-	2102
KØKYK/Ø*	Tri-State ARC	901-	B-	10-	1952
K4TP/4	Gastonia Gas Lighters	857-	B-	7-	1914
WØDCW/Ø	Suburban RC	907-	B-	17-	1914
W8RTR/8*	Canton ARC	881-	B-	16-	1912
KØDIA/Ø*	Aether Tweakers	867-	B-	7-	1884
K9BGL/9	Belleville AR Foundation	814-	B-	3-	1828
WB8HZH/8*	Indian Hill HS ARC	803-	B-	9-	1756
W9BF/8*	non-club group	753-	B-	6-	1706
WØQQQ/Ø*	Kansas State Univ. ARC	743-	B-	6-	1686
W5TNT/5*	Ozark Contesters	789-	B-	3-	1678
W9EJ/9	Soc. of Radio Operators	763-	B-	33-	1626
WA5KAS/5*	Trans-Texas Joint Effort	729-	B-	6-	1608
K6RQ/6*	non-club group	750-	B-	3-	1600
KØAXU/Ø*	Northwest St. Louis ARC	796-	B-	3-	1592
WA3UTV/3*	Maverick ARC of Del.	714-	B-	17-	1578
WA3JBW/3*	Brandywine ARC	671-	B-	4-	1542
W6KWO/6*	Marina ARC	708-	B-	18-	1516
WØMOW/Ø*	Goldfield RC	683-	B-	7-	1516
W8EDU/8	Case ARC	696-	B-	3-	1492
K3SWG/3	Martys Marauders	691-	B-	6-	1482
W1TM/1*	Windsor Mountaineers	663-	B-	10-	1476
K3QBD/3*	First State ARC	661-	B-	19-	1472
WA6AXA/6*	Murphy's Law-Yers	677-	B-	5-	1454
KØSOQ/Ø*	Hastings ARC	618-	B-	9-	1436
WB4MZT/4*	South Eastern Va. Wireless Assoc.	624-	B-	6-	1398
WB4CWF/4	Jessamine Am. Wireless Soc.	596-	B-	5-	1392
WA8BBB/8	Derby Wireless Assoc.	620-	B-	9-	1390
WØAWB/Ø*	non-club group	594-	B-	4-	1388
WB9JDY/9	RCA ARC	588-	B-	8-	1376
KH6FAH/KH6	non-club group	611-	B-	6-	1372
W8HJL/8*	Erradic Erectors	609-	B-	4-	1368
KØOYM/Ø*	Mid-Mo ARC	578-	B-	15-	1356
W1QI/1*	Candlewood ARA	597-	B-	19-	1344
K7MKG/7	Teledyne Wah Chang Radio Amateurs	591-	B-	6-	1332
KP4DJI/4	Bluegare	589-	B-	4-	1328
W9NN/9*	Point Radio Amateurs Ltd.	587-	B-	14-	1324
WB2TOC/2*	non-club group	609-	B-	3-	1318
W4HQM/4*	Humboldt ARC	572-	B-	10-	1294
WB4HPC/4*	Inter. Harvester ARC	554-	B-	11-	1258
W9IWC/9	Bradley Univ. ARC	1148-	C-	4-	1248
W7VNE/7	Anaconda ARC	558-	B-	9-	1216
K8NPH/8*	K & W Soc.	550-	B-	6-	1200
K3BE/3	Bowie ARC	542-	B-	12-	1184
K6LDA/6*	Crescent Bay Emerg. AR Net	489-	B-	13-	1178
K8RMN/8	Tri-County Radio Telegraphy Soc.	514-	B-	7-	1178
W5TC/5*	Univ. of Okl. ARC	484-	B-	12-	1168
K8NQW/8*	John Marshall High ARC	460-	B-	5-	1120
W9CCD/9*	Nutty Net	506-	B-	7-	1112
WB6HYD/6*	Minnis,Morrice & Barthelow	504-	B-	3-	1108
W8EQ/8*	Lima Area ARC	476-	B-	15-	1102
WAØSSU/Ø*	Ottumwa ARC	471-	B-	-	1092
WA8LBR/9	non-club group	487-	B-	8-	1074
W7LRA/7*	Utah ARC	436-	B-	14-	1072
KØNL/Ø*	Hiawatha ARC	432-	B-	16-	1064
WØOGH/Ø*	Sand Hills ARC	480-	B-	3-	1060
WB2PJH/2	Richmond County ARC	479-	B-	4-	1058
WB5BAM/5	807-West Texas Axis	454-	B-	5-	1058
K8DAA/8	Holland ARC	452-	B-	6-	1054
W3ABT/3	Univ. of Pa. ARC	525-	B-	3-	1050
WØZSJ/Ø	Mitchell RAC	475-	B-	12-	1050
W5HTK/5	Enid ARC	437-	B-	12-	1024
WA8TMK/8	Zonkers	460-	B-	4-	1020
VE2CAR/2	Chateauguay ARC	429-		B-	1008
WA4UCE/4	Tenn. Tech ARC	450-	B-	3-	1000
W6UQI/6*	Imperial Valley ARA	414-	B-	7-	978
W9LJ/9*	Lake County ARC	414-	B-	6-	978
WØUL/Ø	Fort Dodge ARC	405-	B-	7-	960
W7FO/7	Butte ARC	806-	C-	14-	956
KØZXE/Ø	non-club group	421-	B-	3-	942
WA5ZBN/5	IOG,ISP,ZBN	389-	B-	3-	928
WØLSD/Ø	Glenwood Am. Soc.	408-	B-	6-	916
K4ELH/4	Gulf Coast ARC	371-	B-	12-	892
KØDEQ/Ø	Laclede-Pulaski AREC	690-	C-	10-	890
WA3RGR/3*	Lema ARC	364-	B-	3-	878
WØAJA/Ø*	Coon Valley ARC	363-	B-	7-	876
WBØCDC/Ø*	North Suburban Wireless Assoc.	388-	B-	15-	876
W3AVK/3	West Branch ARA	358-	B-	8-	866
K8NAW/8*	USNR Grand Rapids Mich.	354-	B-	7-	858
W8DH/8*	Chippewa ARC	379-	B-	10-	858
VE1XY/1*	Annapolis Valley ARC	346-	B-	8-	842
W3WCQ/3*	Chesapeake ARC	369-	B-	12-	838
W2BMW/2*	Tu Boro ARC	366-	B-	10-	832
WB8GSO/8*	W8HXC WB8s NCT,GSO	331-	B-	3-	812
W8LXE/8	Detroit Metro. RC	302-	B-	3-	754
WA2FBI/2*	Spring Valley RC	294-	B-	3-	743
KØQMR/Ø	non-club group	283-	B-	7-	716
WBØGTV/Ø	Benton County ARC	278-	B-	9-	706
WØZRT/Ø*	Bismarck Area RC	554-	C-	11-	704
KØHNU/2	West Point Ad Hoc Wireless Soc.	274-	B-	4-	698
VE5LMR/5*	Last Mountain RC	268-	B-	6-	686
VE6DE/6*	18th Calgary Scouts	262-	B-	21-	674
WØZLW/Ø	Southpond Radio Catfish	285-	B-	5-	670
VE3MRC/3	Metro ARC	279-	B-	-	658
W7LG/7	non-club group	251-	B-	3-	652
VE7BWI/7	Beaver Valley ARC	222-	B-	12-	644
WN8LKN/8	Motor City RC Novice Group	246-	B-	6-	642
WB2VPY/2*	Chemung Co. AREC Assoc.	213-	B-	15-	626
VE4QD/4	Brandon ARC	260-	B-	8-	620
WØRFU/Ø	Bandhoppers RC	258-	B-	8-	616
WA3KJI/3	non-club group	247-	B-	3-	594
VE1AO/1	Truro ARC	217-	B-	17-	584
WØCVJ/Ø	Tube & Shutter Club	193-	B-	9-	536
WA1LVU/1	Narragansett Bay Wireless Assoc.	215-	B-	3-	530
WBØDMK/Ø	Southwest Minn. ARA	376-	C-	5-	526
W9ESA/9*	Evanston Township HS ARC	200-	B-	5-	500
W2ZJ/2*	Elmira ARA	199-	B-	5-	498
WØRTK/Ø*	Theodore Roosevelt ARC	174-	B-	10-	498
K4JEX/4	Whistler's Mother ARC	198-	B-	3-	496
K8DXF/8	Mason County RC	173-	B-	15-	496
W2QYV/2	Niagara RC	391-	C-	12-	491
VE4GM/4*	non-club group	163-	B-	4-	476
W8SH/8*	MSUARC, VBY/ZAV	221-	B-	2-	442
WN4DAQ/4	Kentuckiana RC	139-	B-	-	428
W5SSV/5*	So. Jefferson Co. ARC	142-	B-	5-	384
WNØGUU/Ø	Cedar Valley ARC	95-	B-	7-	340
WA9ZHQ/9*	Valley VHF Club	102-	B-	7-	304
W6UW/6*	Santa Clara Co. ARA	96-	B-	4-	292
W1SW/1*	Phillips Academy RC	91-	B-	3-	282
WA7UTB/7*	Columbia River AREC	80-	B-	4-	260
W7ZA/7*	Grays Harbor ARC	76-	B-	3-	252
WAØVVM/Ø*	Runestone RC	17-	B-	4-	184
K3EDS/3	Broad Mountain Boys	40-	B-	4-	180
WNØHOI/Ø*	Mid-Mo ARC Novii	13-	B-	5-	176
WA3TBB/3*	Bishop McNamara RC	22-	B-	4-	144
WN1RWR/1*	Bristol RC	61-	B-	4-	122
Commercial Mains					
WB8EAS/8	Ohio Lid Assoc.	338-	B-	4-	676
K4CVO/4*	Citrus ARA	105-	B-	6-	260
WBØIHS/Ø*	Spencer AR Klub	94-	B-	12-	188

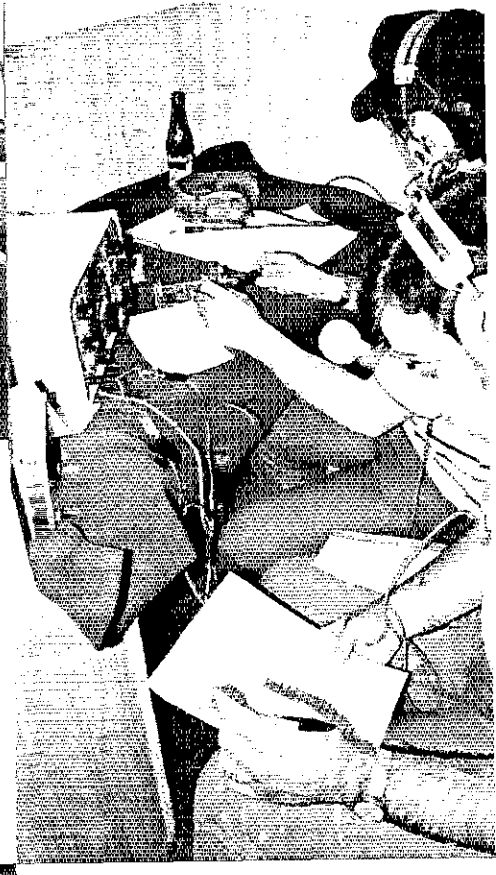
2A - Battery

WA1MES/1*	Pegan Hill AR Soc.	124-	A-	5-	622

2A

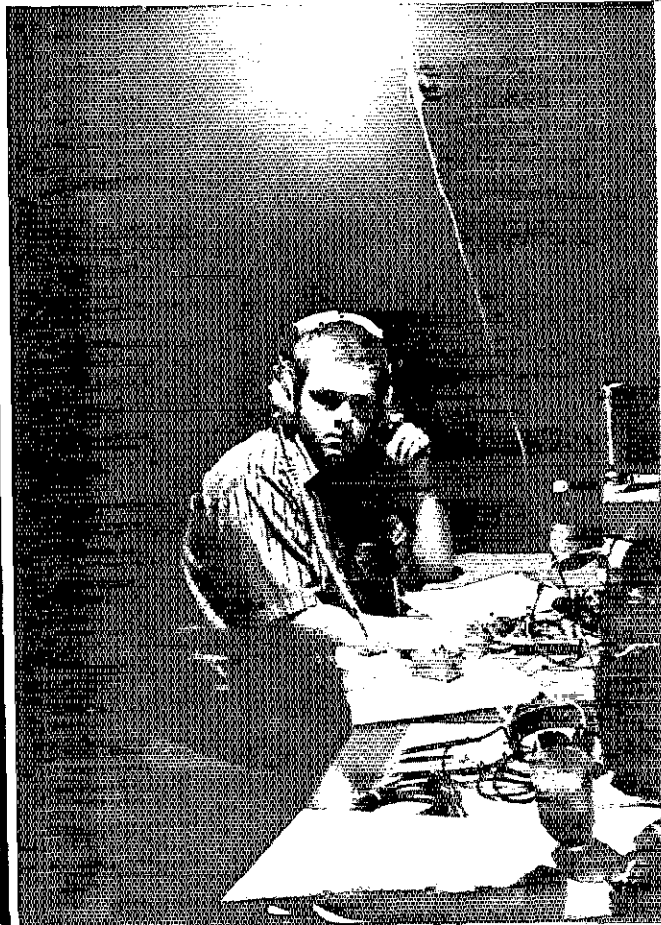
K9IU/9*	Indiana Univ. ARC	3087-	B-	9-	6424
W9YT/9*	Badger AR Soc.	2840-	B-	5-	5930
W6OAT/6	No. Calif. Contest Club	2621-	B-	4-	5517
K6NA/6*	So. Calif. DX Club	2411-	B-	12-	5022
WØLJF/Ø*	Colo. Contest Conspiracy	2164-	B-	8-	4628
WA8FCM/8*	Logan Co. ARC	2042-	B-	8-	4284
W5SBX/5	Texas DX Soc.-Group B	2038-	B-	8-	4276
K6AA/6*	United Radio Am. Club	1913-	B-	20-	4076
WØIW/Ø*	Arapahoe RC	1861-	B-	31-	4072
W4MRF/4	Rotten Radio ARC	1669-	B-	13-	3588
W5SID/5*	Plano AR Klub	1625-	B-	-	3500
W8GK/8	Kanawha RC	1510-	B-	25-	3270
W9YB/9*	Purdue ARC	1461-	B-	15-	3227
W9GW/Ø*	Minn. Wireless Assoc.	1502-	B-	5-	3204
K5PCW/5	Midcities ARC	1429-	B-	15-	3058
WA6VBU/6*	Mike & Key RAC	1369-	B-	8-	3048
W7LC/7	Eastern Mont. College Sparkgap Soc.	1423-	B-	2-	3046
K6DC/6	No. Calif. DX Club	1406-	B-	12-	3012
WA2SRQ/2*	Union Hill Contesters	1468-	B-	4-	2986
WØMXW/Ø*	Rochester ARC	1362-	B-	30-	2974
W4JNB/4	Muscle Shoals ARC	1280-	B-	9-	2810
WØJUI/Ø*	North Iowa ARC	1263-	B-	7-	2776
W4QEE/4*	Mobile ARC	1253-	B-	10-	2756
W4BCV/4	Louisville's Active Radio Operators	1276-	B-	11-	2752
WB9DXW/9*	Hoosier Lakes RC	1265-	B-	15-	2730
W2FXA/2*	Buffalo Area DX Club	1214-	B-	8-	2678
WA2LQZ/2	non-club group	1213-	B-	4-	2676

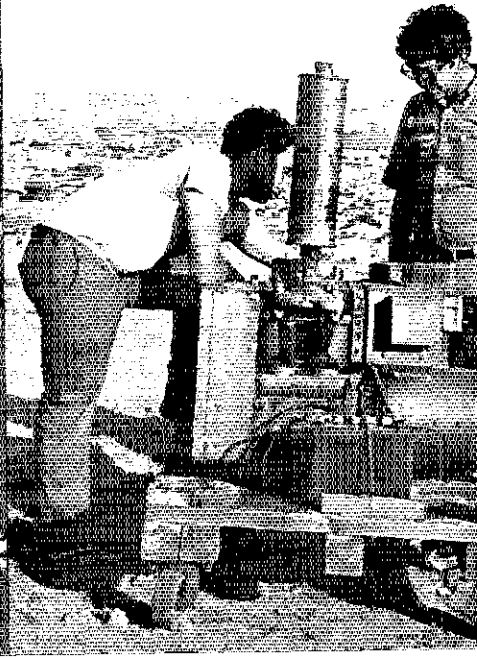
VE1FO/1*	Halifax ARC	1185-	B-16-	2675
W4KVK/4*	Henderson ARC	1229-	B-16-	2658
W9KM/9*	Kokomo Firebird ARC	1124-	B-17-	2648
W8CQK/8	Battelle-Columbus RC	1195-	B- 5-	2640
WB4ZNV/4*	Va. Tech ARA	1190-	B- 9-	2630
VE7NA/7	Nanaimo ARA	1199-	B-20-	2598
WB4BXT/4	Goochland Co. Farm Boys	1185-	B- 5-	2570
W5PDO/5*	Los Alamos ARC	1153-	B-13-	2556
K4IQJ/4	IBM ARC of Boca Raton	1148-	B-15-	2546
WA9UMU/9*	Glen Gates Gang	1139-	B-18-	2528
W2AO/2	Owls of N.Y.	1159-	B- 9-	2518
W8LT/8*	ARC of the Ohio State Univ.	1127-	B-19-	2504
WØEBE/Ø*	Southwest Mo. ARC	1122-	B-30-	2494
WAØCPX/Ø	Signal Hill ARC	1104-	B-15-	2458
WB2NOM/2*	Wireless Institute of the Northeast	1103-	B- 6-	2456
W5UK/5	Greater New Orleans ARC	1100-	B-15-	2400
W4CQ/4	Charlotte ARC	1049-	B- 8-	2398
W4NLX/4	Indian River ARC	1037-	B-15-	2374
KP4ID/KP4	RC de Puerto Rico	1083-	B-19-	2366
W4AB/4*	Broward ARC	1061-	B- ·	2322
W5ABD/5*	Westside ARC	1036-	B-16-	2322
WØWSV/Ø	Cedar Valley ARC	1035-	B-23-	2320
W8VM/8*	Westpark Radiops	1151-	B-20-	2302
W3ALD/3*	Lake Shore ARA	1047-	B- 8-	2294
WBØGBX/Ø*	Minn. Wireless Assoc.	1017-	B- 5-	2284
W5ZP/5	Northwest Ark. ARC	1012-	B-20-	2274
W6MPH/6*	Telco ARC	999-	B-11-	2248
K2DR/2	Holmdel ARC	997-	B-18-	2244
WA3LXK/4*	RF Ark FD Group	1020-	B- 4-	2240
W9NUW/9	Wisc. Valley RA	969-	B-12-	2238
W4ZA/4*	Richmond ARC	964-	B-25-	2228
WBØHSI/Ø	St. Charles ARC	982-	B- 9-	2214
W2LZ/2*	Walton RA	978-	B-10-	2206
K5FIQ/5*	Kurtland AFB ARC	971-	B- 4-	2192
WØGI/Ø	Quantrills Raiders	983-	B-24-	2166
VE5NN/5	Regina ARA	982-	B-20-	2164
W6PIY/6	West Valley ARA	1067-	B- ·	2134
W1HEB/1*	Middlesex ARC	916-	B-20-	2132
VE2ARC/2	Montreal ARC	961-	B-15-	2122
WA3NYU/3	Nights of the Roundtable	873-	B- 7-	2046
W6OS/6	Farinon Elec. AR Team	922-	B- 7-	2044
K2CT/2	Albany ARA	866-	B-15-	2032
W2JT/2	No. Jersey DX Assoc.	902-	B-15-	2004
K4HEX/4	Lynchburg ARC	876-	B-20-	2002
WA1JMO/1	Snedley's Snappers	865-	B-16-	1980
W8MRM/8	Motor City RC	862-	B-20-	1974
W4KCO/4	Tuscaloosa ARC	835-	B-20-	1970
WØPA/Ø	P.H.D.A.R.A.	859-	B-39-	1968
W4ABK/4	Kentuckiana RC	832-	B-30-	1964
W6VPZ/6*	Northrop RC	848-	B-20-	1946
WBØCMZ/Ø	Hammer and Chesty	848-	B-11-	1946
WA9JMY/9	Explorer Post 373	865-	B-16-	1930
WA2PNU/2	Larkfield ARC	830-	B-38-	1910
W5ES/5	El Paso ARC	796-	B-25-	1842
W4AVW/4	Forsyth ARC	766-	B-14-	1832
K5AG/5*	Central La. ARC	764-	B-20-	1828
K8RAY/8	Farmington ARC	789-	B-15-	1828
W3QV/3*	Philmont Mobile RC	760-	B-25-	1825
WØNOZ/Ø*	Huron ARC	783-	B- 6-	1816
W6LHY/6	non-club group	779-	B- 4-	1808
W6VLD/6*	McDonnell Douglas Astronautics RC	776-	B-12-	1802
WA6JVP/6	Weesun ARC	788-	B-15-	1776
K8DAC/8	Saginaw Valley ARA	780-	B-15-	1760
WA3LCY/3	Liars Club	754-	B- 5-	1758
K7SKW/7	Mt. Baker ARC	721-	B-22-	1742
W6LS/6*	Lockheed ARC	743-	B- 8-	1736
WØFIT/Ø*	Albert Lea Spiderweb ARA	740-	B-18-	1730
VE5AA/5	Saskatoon ARC	723-	B-17-	1696
W5RE/5	non-club group	723-	B- 4-	1696
K4FR/4	North Augusta-Belvedere ARC	696-	B-14-	1692
W7VSS/7	Eagle Rock RC	709-	B-12-	1668
K8UTT/8*	Ford AR League	678-	B-17-	1656
W9YCR/9*	Quad City ARC	703-	B-15-	1656
W1KVI/1	Portland Am. Wireless Assn.	726-	B-15-	1652
VE3DV/3	So. Group Champlain Regional Repeater Assn.	675-	B- 8-	1650
W9EBN/9*	Grant County ARC	699-	B-25-	1648
W9HE/9	non-club group	695-	B- 5-	1640
KØPYZ/Ø	Three Rivers ARC	695-	B- 9-	1640
W9PJT/9	Neenah-Menasha ARC	717-	B- ·	1634
VE4HS/4	So. Manitoba ARC	686-	B-18-	1622
W9JLR/9	Flambeau ARC	705-	B- 7-	1610
W9MIC/9	Motorola ARC	624-	B- 6-	1548
WA1LAK/1*	non-club group	643-	B- 4-	1536
W2JUG/2	West Jersey Radio Amateurs	643-	B-14-	1536
WØAZR/Ø*	Austin ARC	614-	B-20-	1528
W7YB/7*	Mont. State Univ. ARC	663-	B- 3-	1526
WA4TFZ/4	Albemarle ARC	661-	B-15-	1522
VE7ARV/7	Vancouver ARC	635-	B-15-	1520
W3OI/3	Lehigh Valley ARC	633-	B-15-	1516
WA1KGS/1	Waltham ARA	652-	B- 6-	1504
W9DUA/9	Sangamon Valley RC	620-	B-12-	1490
WA3SYT/3	Mason-Dixon Pirate RS	555-	B- 6-	1460
W2ZV/2	BNL RC	594-	B-10-	1438
WØGV/Ø*	Bell RC	619-	B- 7-	1438
WØRR/Ø	Heart of America RC	592-	B-16-	1434
WB4TON/4*	Hollywood ARC	612-	B- 2-	1424
WA5BUG/5	Great Plains ARC	1171-	C-11-	1421
K6VIE/6	Explorer Post 2955	585-	B-16-	1420
W1KGZ/1*	non-club group	605-	B- 4-	1410
WB5FIL/5*	Explorer Post 296	580-	B-15-	1410
WB9KCT/9	Hersey ARC	580-	B-12-	1410
WBØBQG/Ø	3M ARC	580-	B-10-	1410
WØSOE/Ø	Wichita ARC	579-	B-24-	1408
VE1AA/1*	Queens Co. ARC	568-	B-16-	1386
W1AQ/1*	Associated Radio Amateurs of Southern New England	593-	B-15-	1386
VE1WN/1	Greenwood ARC	567-	B-11-	1384
W5OK/5*	Electron Benders ARC	558-	B-12-	1366
W3FT/3	Baltimore ARC	556-	B-21-	1362
VE7NT/7*	Comox Valley Wireless Club	578-	B-10-	1356
K8KRG/8	No. Ohio AR Soc.	575-	B-10-	1350
W5ZDN/5*	Central Texas ARC	546-	B-25-	1342
W3DOS/3	Dept. of State ARC	530-	B-20-	1310
WØWRY/Ø*	Niobrara Valley RC	526-	B-14-	1302
WØAA/Ø*	Minn. Wireless Assoc.	523-	B- 6-	1296
WA3RBU/3*	Chestnut Ridge ARC	542-	B-11-	1284
K4GFG/4	Motorola ARC	490-	B-11-	1280
WA5VKM/5	Southwest Research Institute Doublets	509-	B- 5-	1268
VE3CWO/3*	York North ARC	494-	B- 8-	1238
VE7AWI/7	Maple Ridge ARC	483-	B- 8-	1221
WB6QHL/6*	Worldradio Staff ARC	481-	B- 6-	1212
VE2CRG/2	non-club group	468-	B-20-	1186
WA1PHJ/1	Glastonbury ARC	435-	B- 9-	1180
WØNS/Ø	South Platte AR Soc.	473-	B-11-	1146
WB4ZPI/4	Wiregrass ARC	472-	B- 4-	1144
W4HBB/4	ARC of Savannah	881-	C-20-	1131
VE1LC/1	Loyalist City ARC	440-	B-16-	1130
K4HYB/4*	Charles E. Newton ARC	465-	B- 7-	1130
W1EDH/1	Middlesex AR Soc.	464-	B- 8-	1128
WA3IBA/3	HDL RC	455-	B-11-	1110
K5LIB/5	Caprock AR Soc.	422-	B-12-	1094
WØNH/Ø*	Mo. Valley ARC	444-	B-18-	1088
VE3RC/3	Ottawa ARC	426-	B-26-	1052
WA2BNJ/1	Bonzos' Bonanza	424-	B-10-	1048
W2RP/2	Westchester ARA	419-	B- 7-	1038
WBØERV/Ø	No. Colo. ARC	406-	B-10-	1012
WA3NSZ/3*	Randallstown ARC	380-	B- 4-	1010
W9ARA/9	Bloomington ARC	377-	B-14-	1004
WA5WUX/5	Meridian ARC	376-	B- 8-	1002
WA6IDN/6	non-club group	350-	B-14-	1000
VE3CTT/3	Temiskaming ARC	398-	B-10-	996
W9SA/9	North Shore ARC	369-	B-20-	988
K7LIX/7*	So. Ore. ARC	367-	B-11-	984
WB5CYX/5*	North Ark. ARC	714-	C- 9-	964
WA6AEG/6*	Mountain View HS RC	357-	B- 4-	964
WA9WSL/9	Indian Hill ARC	381-	B-15-	962
W9AB/9	Michiana ARC	342-	B-35-	934
WØWCL/Ø*	Mankato Area RC	341-	B- 7-	932
W6MLK/6	High Frequency Mobile Soc.	365-	B- 9-	930
K9RHH/9	Menomonee Falls RAC	335-	B-10-	920
K3HDO/3	Dist. Hgts. RC	357-	B- 9-	914
W8DSO/8	Barker's Bandits	708-	C-10-	908
WB8IDN/2	Euclid HS Alumni Group	348-	B- 7-	896
K4JLA/4	Spartanburg ARC	319-	B- 7-	888
WA9FIH/9	Elmwood Park, IL Civil Defense	316-	B-15-	882
WB2ENJ/2	Trenton Wireless Assn.	340-	B- 4-	880
WB8DEF/8	Brookhaven HS ARC	314-	B- 5-	878
WBØIED/Ø*	non-club group	335-	B- 5-	870
VE3ENF/3	Rideau ARC	305-	B- 9-	860
VE7UT/7	Kamloops ARC	303-	B-14-	856
WA6BMH/6	Poinsettia ARC	301-	B- ·	852
WBØAVW/Ø*	Storm Lake ARC	300-	B- 7-	850
W9CZH/9	Winslow AR Soc.	316-	B- 8-	832
W9MON/9	L.A.M.A.R.S.	290-	B-10-	830
K5JOA/5*	Miami ARC	313-	B- ·	826
W2OYH/2	Morris RC	303-	B-15-	806
W5ND/5	Orange ARC	147-	B- 7-	794
W1DHT/1	Bristol RC	296-	B- 8-	792
WB6MOP/6*	Merced ARC	581-	C- 5-	781
W4FVV/4*	Anderson RC	580-	B-14-	780
W4DV/4*	ARC of Augusta	286-	B-15-	772
WA7LAZ/7*	Hualapia ARC	260-	B- 6-	770
WB8JAD/8	Our Fellas	258-	B- 4-	766
W6IPC/6	non-club group	232-	B- 5-	764
W5DW/5	Collins Radio Splinter Group	252-	B- 9-	754
K2GE/2	Raritan Bay Radio Amateurs	274-	B-15-	748
W8GQN/8	Straits Area RC	220-	B- 6-	740
WB9LSV/9	Fremd ARC	243-	B-10-	736
W2CVT/2*	Poughkeepsie ARC	233-	B- 8-	666
W9FN/9*	Richmond ARA	208-	B-12-	666
W7NBR/7*	Spokane Radio Amateurs	224-	B-10-	648
WB4YUY/4	McLean ARA	222-	B-10-	644
W1BD/1	Central Vermont ARC	218-	B- 7-	636
K3NUM/3*	Pottstown ARA	217-	B- 7-	634
VA3KAR/3*	Kingston ARC	174-	B- 5-	598
K8QIK/8	Lancaster & Fairfield Co. ARC	197-	B- 6-	594
WA2UZL/2	East Meadow HS RC	185-	B- 6-	570
WAØHOU/Ø*	Blue Valley RC	353-	C-16-	553
KØIUC/Ø	non-club group	149-	B- 4-	548



WA6LXN/6 4A ▲
WØOLW/Ø ▶

Left: A study in concentration (maybe he's sleeping) is W4YOK at W4KVK/4 (2A). That bright light is not the sun — this is 40 cw at 3 AM. Right: Does this look familiar? WB6DHW (left) and CP5FZS/W6 try to determine what happened to the reliable (?) power machine. Nice view, yes?





WA5IPE/5*	Wheat Straw ARC	137-	B- 4-	529
WA7SZS/7	Sehome HS ARC	164-	B- 7-	528
WB6OUS/6	Calvary Baptist ARC	137-	B- 6-	524
WB9IJS/9*	South HS ARC	136-	B- 3-	522
KL7AA/KL7*	Anchorage ARC	269-	C-50-	519
WB2WGP/2*	Mid-Co. Net ARC	123-	B- 8-	496
W8LBZ/8	Sandusky Radio Experimental Radio League	292-	C- 6-	492
WB9KDI/9	No. Ill. Am. Wireless Assoc.	260-	C- 8-	460
K7ICY/7	Electronics RC of Beaverton HS	129-	B- 4-	458
WN2DWF/2	Holmdel ARC (Novices)	120-	B- 5-	440
W4OLB/4	Smoky Mtn. ARC	181-	C- 5-	431
W7PXA/7	Panaramaland ARC	114-	B- 4-	428
W1OFK/1	non-club group	110-	B- 4-	420
K9VHF/9*	Hamilton-Southeastern HS ARC	98-	B- 5-	396
WA6COB/6	non-club group	194-	B- 4-	388
VE3FW/3	Lakehead ARC	191-	B- 6-	382
K5WPH/5*	Sun City ARC	88-	B-21-	376
KØJOQ/Ø*	Crete ARC	164-	C- 2-	364
W7PZ/7	Apache Junction ARC	53-	B-10-	356
WB8IOJ/8*	IOJ,LWU,NGO,NTY & Donkeys ARC	30-	B- 4-	310
WB2ABJ/2	Pearl River HS RC	53-	B- 5-	306
Commercial Mains				
KØWAR/Ø	Lamar ARC	694-	B-12-	1438
W1NRG/1	Meriden ARC	562-	B- 2-	1124
WB8LGX/8	Hocking Valley Contesters	404-	B- 4-	808

3A - Battery

W9AZ/9	Kankakee Area Radio Soc.	81-	A-14-	593

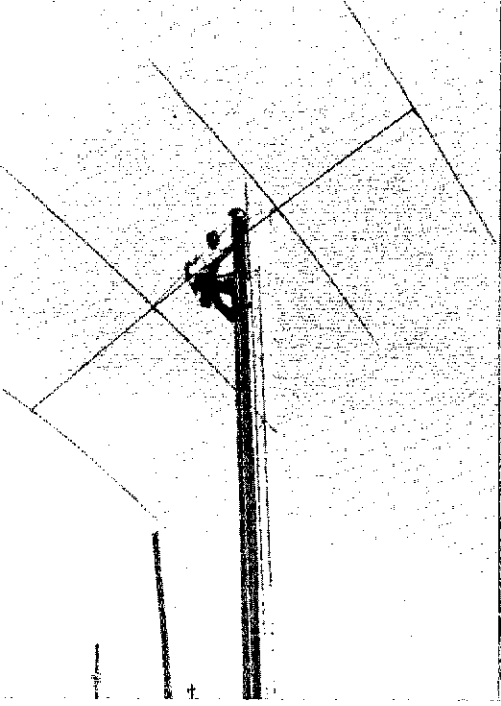
3A

W4FU/8* (+WN8LER)	Ohio Valley ARA	3791-	B-12-	7982
K5RWK/5	Richardson Wireless Klub	3452-	B-27-	7354
W1TX/1* (+WN1PDQ)	Conn. Wireless Assoc.	2623-	B-19-	5696
W5ZR/5 (+WN5JFI)	Texas DX Soc.	2657-	B-17-	5614
W8MB/8	Oak Park ARC	2569-	B-26-	5538
W4SKH/4*	Oak Ridge Radio Operators Club	2551-	B-17-	5502
W5KA/5	Austin ARC	2266-	B-18-	4932
W9FU/9	non-club group	2186-	B-16-	4822
W4RYZ/4	Panama City ARC	2208-	B-15-	4766
W4TRC/4*	Kingsport ARC-Bays Mt. RC	2168-	B-34-	4686
W4IZ/4* (+WN4DAD)	No. Fla. AR Soc.	2042-	B-30-	4484
W7FR/7 (+WN7TNO)	Western Wash. DX Club	2041-	B-24-	4432
W6AB/6 (+WN6WQG)	Satellite ARC	1885-	B-18-	4170
W5LL/5	Tombigbee ARC	1870-	B-15-	4090
W4DW/4 (+WN4WII)	Raleigh AR Soc.	1811-	B-30-	4022
W2NVB/2 (+WN2EOO)	Durland Radio Explorer Post 51	1759-	B-16-	3868
K2GQ/2 (+WN2FJI)	Irvington RAC	1747-	B-20-	3844
WB8KLF/8* (+WN8LOO)	Livonia ARC	1709-	B-33-	3768
W4UC/4 (+WN4GWV)	Five Flags ARA	1727-	B-25-	3754
W9LO/9*	Ozaukee RC	1673-	B-20-	3696
W9FK/9 (+WN9JIA)	West Allis RAC	1613-	B-26-	3576
K4WCC/4	ARC of Ft. Belvoir	1605-	B-18-	3560
W8GFG/3 (+WN3SZX)	SVARFDG-WARA,Part 2	1559-	B-10-	3518
W6IFZ/6 (+WN6VJH)	Richmond ARC	1582-	B-14-	3464
W6OTX/6 (+WN6SSR)	Palo Alto ARA	1483-	B-24-	3366
W4PLB/4* (+WN4DRZ)	Orlando RC	1494-	B-14-	3338
K4AAK/4 (+WN4CXL)	Middle Ga. ARC	1452-	B-30-	3254
W5BW/5 (+WN5HVY)	Miss. Coast ARA	1433-	B-30-	3216
W7IO/7 (+WN7TWI)	Arizona ARC	1404-	B-60-	3178
K2BK/2* (+WN2EQD)	Overlook Mt. ARC	1354-	B-20-	3108
VE3NSR/3	No. Shore RC	1364-	B-21-	3078
WA9EDW/9	Barrington AR Soc.	1386-	B-13-	3072
W9MUC/9 (+WN9MMJ)	McHenry Co. ARC	1311-	B-15-	3022
W8VVL/8	Queen City Emerg. Net	1290-	B-30-	2980
VE3BA/3*	Brantford ARC	1332-	B-10-	2964
W5RK/5*	Tidelands ARC	1273-	B-57-	2896
W9DY/9 (+WN9IQV)	RA Megacycle Soc.	1246-	B-24-	2842
W4ADM/4* (+WN4DIP)				
W8CXS/8 (+WN8OOK)	Hills AR Soc.	1256-	B-20-	2812
WØDLJ/Ø	Independent ARC	1228-	B-12-	2806
K1JMR/1 (+WN1RZN)	Norwood ARC	1397-	B-30-	2794
K8BYI/8*	Southeastern Mich. ARA	1220-	B-25-	2790
W6FD/6	West Coast AR Service	1233-	B- -	2766
W4BFB/4 (+WN4AMU)	Mecklenburg AR Soc.	1207-	B- 9-	2764
W1GB/1	Hamden ARA	1204-	B-15-	2758
K7NWS/7 (+WN7TOY)	BEARS	1148-	B-50-	2696
W3PGA/3* (+WN3TZT)	AERO ARC	1136-	B- 8-	2672
K2INO/2 (+WN2FIS)	Jersey Shore AR Soc.	1152-	B-30-	2654
WØOM/Ø* (+WN9KTB)	Great River ARC	1152-	B-12-	2654
W4PAY/4 (+WN4YHC)	Northern Va. RC	1117-	B-15-	2634
W2PE/2 (+WN2BUL)	RA of WNY	1116-	B-32-	2632
WA9OTH/4 (+WN4YTP)	NCTC ARC	1137-	B-12-	2624
K2IQ/2 (+WN2HIT)	Utica ARC	1118-	B-23-	2586
K1JNQ/1 (+WN1RFE)	Sharon ARA	1066-	B-14-	2532
W3GV/3	RA of Erie	1102-	B-15-	2504
WB5JVA/5	Springhill ARC	1047-	B-12-	2494
KØHMN/Ø (+WNØILR)	Northland United Telecommunications Soc.	1033-	B-14-	2466
WB4NTB/4 (+WN4ENI)	Murray State Univ. ARC	1014-	B-16-	2428
K6LI/6*	North Bay ARA	1012-	B-15-	2424
K9EVC/9*	Radio Amateurs Tech Soc.	1013-	B-14-	2376
W9BFO/9 (+WN9LII)	S.E. Ill. Ham Soc.	1009-	B-18-	2368
W4EXU/4 (+WN4AQS)	Rowan Am. Soc.	999-	B-24-	2348
WØZWY/Ø (+WNØHAU)	Sioux Falls ARC	999-	B-14-	2348
K3TGM/3	Wm. Penn RC	1012-	B- 8-	2324
W9VT/9 (+WN9JSN)	Tri-Town RAC	985-	B-27-	2320
WA2OBU/2 (+WN2GSB)	non-club group	1007-	B- 9-	2314
WØKQU/Ø (+WNØJIQ)	Central Kan. ARC	982-	B-15-	2314
K4KJD/4 (WN4AUX)	Limestone ARC	985-	B-10-	2270
W5LOW/5 (+WN5HUP)	Okla. Central VHF ARC	959-	B-30-	2268
K6CLZ/6	Aerojet RAC	942-	B-20-	2234
K2JD/2	Band Dit-Dahs	944-	B-12-	2188
WA9UHY/9	Wabash Co. ARC	912-	B- 8-	2174
K8YZW/8*	Cherryland ARC	924-	B-15-	2148
W8PBO/8* (+WN8NII)	L'anse Creuse ARC	897-	B-10-	2144
K2BR/2 (+WN2KPT)	Southern Counties ARA	896-	B-21-	2142
VE3PRC/3	Peel ARC	884-	B-21-	2118
WA3RCA/3* (+WN3SEP)	Pa. ARC & Explorer Post 681	884-	B-14-	2118
W6TO/6* (+WN6WFQ)	Fresno ARC	878-	B-14-	2111
K3MTK/3	Suburban ARC	871-	B-25-	2092
WØBRN/Ø	Three Rivers ARC	833-	B-12-	2066
WB4VJO/4	New River Comm. Coll. ARC	824-	B-10-	2048
W3ZH/3	ARINC ARC	837-	B- 9-	2024
W9AA/9*	Ham Festers RC	830-	B-15-	2010
W9QQG/9	Lakeview ARA	851-	B-13-	2002
W5FC/5 (+WN5JBP)	Dallas ARC	845-	B-15-	1990
W3OC/3	Two Rivers ARC of McKeesport	810-	B-25-	1970
K4JVA/4	So. Miami RC	801-	B-15-	1952
W5TSV/5	Pampa ARC	771-	B-14-	1942
WB4KIF/4	Wenoca Twin City ARC	768-	B-12-	1936
WØOLW/Ø*	Viking AR Soc.	783-	B-19-	1916
W9MJL/9	Vermilion Co. ARA	770-	B-25-	1890
W3CSL/3	Monessen ARC	767-	B-24-	1884
W6KA/6 (+WN6BIN)	Pasadena RC	732-	B-12-	1864
W4BS/4 (+WN4CNK)	Delta ARC	724-	B-19-	1848
WA4NEC/4	Bristol ARC	737-	B-16-	1824
WB8MNX/8 (+WN8PAK)	Steel Workers ARA	736-	B-14-	1822
K9GXU/9 (+WN9LTH)	St. Clair ARC	749-	B-21-	1798
W7PXL/7*	Valley RC of Eugene, Ore.	687-	B-10-	1774
K8HPS/8 (+WN8QJR)	GMI RC	712-	B-15-	1774
W1SYE/1 (+WN1QOT)	Newport Co. ARC	710-	B-14-	1770
WB4PLD/4	East Tenn FD Group	734-	B-17-	1768
VE3IBM/3	IBM Canada RC	724-	B- 9-	1748

WA9DKP/9* (+WN9JNM)				
	Huntington Co. AR Soc.	674-	B-15-	1748
W8YDK/8	Milford ARC	722-	B-22-	1744
WB8CSQ/8	Cascades AR Soc.	720-	B-10-	1740
W5PFC/5*	Jackson ARC	714-	B- 8-	1728
K3AW/3	Friendship ARC	713-	B-18-	1726
W6AK/6	Sacramento ARC	712-	B-14-	1724
WB2AUD/2*	North Bergen ARC	830-	B- 5-	1710
W6PMK/6 (+WN6PWT)				
	No. Peninsula Elec. Club	678-	B-12-	1706
W3UU/3*	Harrisburg RAC	693-	B-36-	1686
W6JW/6	Santa Clarita ARC	642-	B-17-	1684
WAØCGV/Ø	McDonnell Douglas ARC	667-	B-16-	1684
W3KWH/3*	Steel City ARC	689-	B-13-	1678
W9REC/9*	Chicago Radio Traffic Assoc.	636-	B-15-	1672
WA3GYE/3 (+WN3STI)				
	Whitehall ARC	656-	B- 9-	1662
VE3SWA/3	South Waterloo	655-	B-13-	1660
WB4ABT/4 (+WN4DLH)				
	So. Peninsula AR Klub	1279-	C-22-	1634
K6BJ/6* (+WN6TKE)				
	Santa Cruz Co. ARC	667-	B-10-	1634
W7DP/7*	Walla Walla Valley RAC	667-	B-10-	1634
W4NPT/4 (+WN4EPT)				
	Navy Norfolk ARC	766-	B- -	1632
W8ICS/8	Indian Hills RC	659-	B-15-	1618
K3ZAC/3	Warminster ARC	633-	B-35-	1616
W4EHW/4* (+WN4WOK)				
	Dade Co. AR Public Service Corps	633-	B-16-	1616
W8DF/8 (+WN8NIE)				
	S. Mich. AR Soc.	658-	B-30-	1616
W8BI/8* (+WN8OOE)				
	Dayton ARA	612-	B-14-	1574
W6HS/6* (+WN6KYF)				
	Crescenta Valley RC	608-	B-20-	1566
VE2IZ/2	West Island RC	620-	B-12-	1540
KH6HIQ/KH6 (+WH6HRY)				
	non-club group	591-	B-14-	1532
W1GQX/1	80 Thru 2 Contest Group	561-	B-10-	1472
W8QLY/8	Mahoning Valley ARA	572-	B-18-	1444
K9HDH/8	Elkhart Red Cross ARC	545-	B-10-	1440
W8VA/8* (+WN8NFZ)				
	Tri-State ARA	534-	B-30-	1418
K1FNA/1*	non-club group	549-	B- 9-	1398
K5VOZ/5	Lawton Fort Sill ARC	520-	B-27-	1390
WA2DNR/2*	Colonie Central HS RC	539-	B- 9-	1378
VE7UI/7*	North & West Vancouver ARC	513-	B- 6-	1376
W8PIF/8 (+WN8OUH)				
	M & M ARC	510-	B-12-	1370
K4MI/4 (+WN4EPU)				
	Brightleaf ARC	484-	B-10-	1368
WA8ICQ/8	Wayne AR Tech Soc.	479-	B- 7-	1368
W8FO/8	Toledo RC	508-	B-10-	1366
WA1DGW/1	Somerset ARC	504-	B-17-	1358
WA3EWJ/3 (+WN3TMC)				
	Montgomery ARC	523-	B-12-	1346
WA7FQD/7*	Emerald AR Soc.	496-	B-14-	1342
WØIS/Ø*	Quad City AR Soc.	515-	B- 6-	1330
VE2CVR/2	Club Radio Am. de La Vallee du Richelieu	485-	B-17-	1320
K6QHQ/6 (+WN6URI)				
	South Bay AR Soc.	471-	B- 9-	1292
W5QGG/5*	Midland ARC	470-	B- 7-	1290
K8TII/8 (+WN8PRW)				
	Henry Co. ARC	443-	B-18-	1286
VE6TG/6	Border Area RC	489-	B-22-	1278
W8MTM/8	Roger Bacon HS RC	482-	B- 6-	1264
WAØSDO/Ø	Central Mo. ARC	457-	B-11-	1264
WA2PUX/2	Kinabzky's Kilowatts	446-	B- 3-	1242
W8ZPF/8	Western Elec. Bell Labs Cres ARC	444-	B- 9-	1238
WA7APE/7	Scottsdale ARC	468-	B-14-	1236
K2OQJ/2 (+WN2KFE)				
	St. Peter's Prep RC	437-	B- 8-	1229
K7AYF/7*	Shyvy ARC	463-	B- 6-	1226
KØGEZ/Ø (+WNØJZH)				
	Longmont ARC	421-	B- 8-	1192
W5DX/5	Texas Southmost ARC	445-	B-11-	1190
WA2MBQ/2*	KORC ARC, KPAA Comm. Club	414-	B-13-	1178
WB2FNK/2 (+WN2FLK)				
	So. Jersey HS Students ARC	411-	B- 6-	1172
VE3NBC/3	North Bay ARC	408-	B-20-	1166
W3ILC/3 (+WN3SJP)				
	Informal Wildwood Drive Ham Group	431-	B- 4-	1162
W8OG/8*	Springfield Ohio ARC	431-	B-18-	1162
W5AC/5*	Memorial Student Center Radio Committee	405-	B-12-	1160
W5JVR/5*	GROUP 6	392-	B- 6-	1134
K8PBO/8*	Mayhams ARC	385-	B- 8-	1120
W8CF/8 (+WN8MPF)				
	Fairborn ARC	384-	B-10-	1118
W9LMP/9 (+WN9MIE)				
	Clinton Co. VHF ARC	353-	B-15-	1106
W3VV/3* (+WN3TGF)				
	McKean Co. ARC	371-	B-11-	1092
WA8CYE/8	Industrial Nucleonics RC	365-	B-10-	1080
WB5FMJ/5	Alma AR Soc.	360-	B- 6-	1070
W6ZB/6	San Leandro ARC	349-	B-12-	1048
WA9NWA/9	Marshfield Area AR Soc.	306-	B- 6-	1012
K6AKC/6	Calif. Chapter of the National Award Hunters Club	355-	B- 6-	1010
K2VSU/2 (+WN2FUH)				
	Mt. Vernon HS Radio Field Club	325-	B-11-	1000
W3SL/3	Delaware ARC	693-	C-10-	993
WØKPK/Ø	Bendix AR Klub	318-	B- -	986
KØKKV/Ø	Lincoln ARC	634-	C-17-	984
K7SXL/7 (+WN7VSV)				
	Olympic College ARC	315-	B- 6-	980
WB4TED/4	Sociedad International de Radio Aficionados	308-	B-15-	966
WA2LCA/2	North Country RC	478-	B- 6-	956
K6NCG/6*	Treasure Island ARC	444-	B- 8-	938
WA8ZHK/8	WRECS	307-	B-11-	914
VE6NH/KL7*	Moose Horn ARC	281-	B- 8-	912
K8UZW/8 (+WN8KQI)				
	Parma RC	280-	B-15-	910
W2AAD/2 (+WN2IAA)				
	Harmonie Hill Radio League	527-	C-20-	877
W7EK/7 (+WN7SBG)				
	Cascade RC	258-	B- 7-	866
K2YBN/2* (+WN2NEQ)				
	Rancocas Valley ARA	274-	B-10-	848
WBØIIV/Ø	Explorer Post 604	241-	B-11-	832
WB2RLO/2	The Fair Lawn ARC	240-	B-11-	830
VE7ES/7*	Totem ARC	254-	B-11-	808
VE7ARM/7*	Richmond ARC	245-	B- 9-	790
W4TJM/4 (+WN4BGS)				
	Polk Co. Civil Defense Am. Communication Soc.	235-	B-10-	770
K2AZC/2	Ogdensburg ARC	209-	B-15-	768
W4HFH/4	Alexandria RC	183-	B-20-	766
W8EIR/8*	Thunder Bay ARC	208-	B- 5-	766
VO2AI/2*	ARC of Western Labrador	204-	B- 9-	758
W1WQM/1	Port City ARC	226-	B- 6-	752
WA6BAI/6*	Tulare Co. ARC	201-	B-11-	752
W7FEL/7*	Clallam Co. ARC	438-	C-10-	738
W2OW/2	Binghamton ARA	418-	C-12-	718
W3HZW/3	Kent Co. ARC	208-	B-10-	716
K1NQG/1 (+WN1QKD)				
	Fidelity ARC	194-	B-20-	688
VE3SCD/3*	Stratford ARC	158-	B-10-	666
K9YCJ/9* (WN9LNI)				
	Gibson Co. ARC	131-	B- 6-	662
KL7EGN/KL7*	Air Force State Mars	154-	B- 7-	658
W2QK/2*	Yonkers ARC	171-	B-10-	642
WA4TGF/4 (+WN4ZRU)				
	Va. Beach ARC	341-	C- 9-	641
K4JMC/4*	Gadsden ARC	164-	B- 4-	628
K2AJV/2	Livingston ARC	138-	B-12-	626
WA9RXI/9	Markham Civil Defense	315-	C- 6-	615
KØAJW/Ø* (+WNØKTV)				
	Minot ARA	112-	B-25-	574
W4EL/4* (+WN4BSN)				
	Triangle ARC	281-	B-10-	562
WBØDDH/Ø (+WNØJTW)				
	Mesaba Wireless Assoc.	102-	B-13-	554
WØCBL/Ø*	Northeast Mo. ARC	235-	B- 8-	520
W9BXR/9*	Mont Co. AREC	72-	B- 7-	444
W2CWW/2	Staten Island ARA	39-	B- -	428
Commercial Mains				
W9CAF/9	Chicago ARC	299-	B- 5-	598
W4IQQ/4*	Greer RAC	117-	C- 8-	117

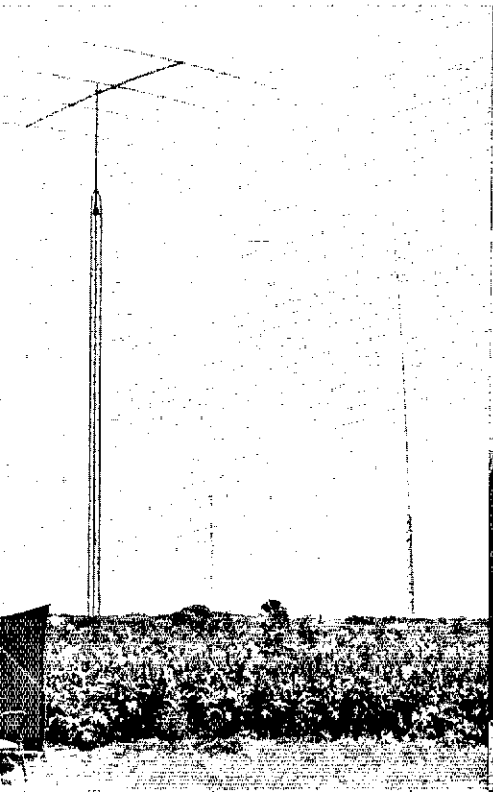
4A

WA6LXN/6 (+WN6TLV)				
	West Valley ARC	3002-	B-22-	6504
W7YE/7*	Arizona Mt. Moguls	2713-	B-20-	5926
W9LM/9*	Northwest ARC	2187-	B-25-	4874
W4CVY/4	Columbus ARC	1997-	B-25-	4549
WØERH/Ø* (+WNØFSL)				
	Johnson Co. RAC	1966-	B-35-	4432
W6ZE/6	Orange Co. ARC	1964-	B-32-	4378
W5SC/5 (+WN5IWB)				
	San Antonio RC	1783-	B-50-	4016
W8MAA/8* (+WN8NVD)				
	Central Mich. ARC	1731-	B-47-	3912
W2FR/2	RAGS Eschewets	1672-	B-19-	3844
W3AI/3 (+WN3RUM)				
	R.F. Hill ARC	1661-	B-60-	3772
K6YA/6* (+WN6UUR)				
	Foothills AR Soc.	1589-	B-21-	3728
K3CR/3 (+WN3TTS)				
	Penn State/Etna RC	1618-	B-15-	3636
K4EG/4* (+WN4ZIN)				
	Alamance ARC	1573-	B-21-	3596
W2SE/2* (+WN2RAE)				
	New Providence ARC	1450-	B-30-	3350
W1NHK/1	Conn. Yankee ARC	1403-	B-11-	3321
W4VTA/4	Confederate Signal Corps	1400-	B-25-	3300
K5SLD/5 (+WN5IQZ)				
	Arlington RC	1421-	B-30-	3292
W7GV/7	Old Pueblo RC	1324-	B-51-	3048



Left: Installing the 20 meter beam at W4HBB/4 (2A). The manhandler of the aluminum is not identified. Right: WA2PWZ putting together the triband beam at K2GQ/2 (3A). A craftsman at work, eh?

Left: After a few years of operation in 2A the Richardson Wireless Club expanded to 3 transmitters this year. Their antennas (l to r) 4 element 20 at 60 feet, 2 element 40 at 65 feet, tribander and 2 meters (far background) and full sized 75 meter ground plane (right foreground). Their first crack at 3A resulted in a 2nd place nationwide finish. Right: The Oscar 6 transmitting antenna at W6FQ/6 (5A). Workers (l to r) are WA6RAY, WA6SMS and WA3FVS. They used 15 watts into these 7 elements to catch 2 QSOs on Oscar. The group switched from 6A to 5A this year and nabbed first spot nationwide.



WB2NRP/2	RS of Greater Brooklyn	1270-	B-16-	3040
W9INX/9	Allen Co. AR Tech Soc.	1317-	B-15-	3034
WA3JZR/3 (+WN3UHH)				
	IBM ARA/Comsat RC	1256-	B-30-	3012
K6MN/6	Santa Barbara ARC	1280-	B-23-	3010
K2YCJ/2	Comm. Club of New Rochelle	1257-	B- 6-	2964
W2SEX/2 (+WN2NIW)				
	ARA of the Towawandas	1255-	B-21-	2960
W5TI/5 (+WN5IDM)				
	Ft. Worth Kilocycle Club	1229-	B-55-	2908
W8FY/8* (+WN8PIE)				
	Van Wert ARC	1181-	B-21-	2812
VA3JJ/3	West Side RC	1162-	B-12-	2774
W1OP/1 (+WN1RFT)				
	Providence RA	1177-	B-20-	2754
K8LUC/8	G.E. Evendale AR Soc.	1106-	B-15-	2712
K9EAM/9* (+WN9LLA)				
	Green Bay Mike&Key Club	1123-	B-23-	2696
WØMG/Ø* (+WNØKRV)				
	NE Iowa RAA	1067-	B- -	2634
WB4WME/4 (+WN4DSA)				
	Big Brown Bean Boys ARC	1088-	B-10-	2626
VE3KCD/3	Kitchener-Waterloo ARC	1076-	B-14-	2602
W6NJ/6 (+WN6UGT)				
	East Whittier RC	1094-	B-15-	2588
WA2LQO/2*	Grumman ARC	1032-	B-26-	2564
W3BN/3	Reading RC	1048-	B-25-	2546
WA8MTX/8	Monroe Co. Radio Comm. Assn.	1065-	B- 7-	2530
W2VDX/2	IBM Owego ARC	1024-	B-12-	2498
W9IKN/9* (+WN9KEH)				
	Elgin AR Soc.	1019-	B-18-	2438
W6TJ/6 (+WN6WKX)				
	Riverside Co. ARA	966-	B-25-	2382
VE3US/3	Sudbury District ARC	947-	B-19-	2344
WB9MOF/9 (+WN9ICE)				
	Moraine Valley Comm. Coll. RC	964-	B-16-	2328
WA6TST/6	Barstow ARC	921-	B- 6-	2292
WA6SFM/6*	Bellflower ARA	927-	B- 7-	2254
WB4TBO/4	Ole Va. Hams ARC	804-	B-27-	2058
WB9FDZ/9* (+WN9IXR)				
	Yellow Thunder ARC	803-	B-50-	2056
W7HNZ/7	Spokane Dial Twisters	801-	B-25-	2052
W7NCW/7 (+WN7SHN)				
	Lower Columbia ARA	743-	B-10-	1936
	Lower Columbia ARA	743-	B-10-	1936
WA2DZE/2	Bergenfield AR Klub	691-	B-10-	1882
W4RKW/4 (+WN4EME)				
	Onslow ARC	699-	B-15-	1848
W4BFM/4* (+WN4ZQE)				
	Decatur ARC	689-	B-20-	1828
W3SGJ/3	Beaver Valley ARA	683-	B-11-	1816
WØBYZ/Ø	Commerce City AR Ops	673-	B- 4-	1801
WB6NVY/6 (+WN6RNR)				
	Redwood HS ARC	666-	B-13-	1782
W2YKQ/2*	Lake Success RC	647-	B- 9-	1744
W4CA/4	Roanoke Valley ARC	626-	B-21-	1652
W2DMM/2*	QRP Chap.1 NYC	598-	B-12-	1646
KØLIR/Ø	St. Louis ARC	592-	B-24-	1634
W5GAD/5	Jefferson ARC	565-	B-10-	1580
WA6GFY/6	LERA ARC (Lockheed)	564-	B-16-	1578
W3CWC/3	Antietam RA	1163-	C-18-	1563
W8ACW/8	Genesee Co. RC	553-	B-25-	1556
W6SF/6	Stockton ARC	572-	B- 7-	1544
WØIA/Ø	Rocky Mt. VHF Soc.	569-	B- 8-	1538
K6CPT/6*	L.A. Co. Disaster Comm. Serv	530-	B-18-	1510
W9CCU/9 (+WN9MLY)				
	Wheaton Comm. Radio Amateurs	1047-	C-15-	1497
K6QEH/6	HFEA ARC	518-	B- 5-	1486
W9PJ/Ø	La Crosse ARC	516-	B- 6-	1482
K6JKC/6	Lassen ARC	506-	B- 8-	1462
VE3HB/3*	Oakville ARC	459-	B-14-	1418
K7CCH/7*	Coos Co. RC	501-	B-10-	1402
W9JP/9	Indianapolis RC	500-	B-17-	1400
W2BX/2*	Cumberland Co. RC	455-	B- 8-	1360
WB4AIN/4 (+WN8NOJ)				
	Rabbit Hash FD Operators	470-	B- 5-	1340
W8CON/8	Mich-A-Con ARC	381-	B- 8-	1212
W2FWG/2	T.A.R.C.O.M.	399-	B-12-	1198
K1ACL/1	So. NH 2 Meter Mobileers	376-	B-13-	1152
W6MUF/6*	non-club group	741-	C- 5-	1141
W9WWI/9*	Clark Co. ARC	333-	B-10-	1116
WØRTI/Ø	Empire RC	345-	B-20-	1090
WB2FVO/2	Thomas A. Edison ARA	344-	B- 8-	1088
WB4GZY/4*	Silver Spring ARC	311-	B-12-	1072
WA1NFM/1	Tri-City ARC	309-	B-15-	1018
W1TYM/1* (+WN1RTR)				
	Malden ARA	289-	B- 7-	978
WØHNV/Ø (+WNØITE)				
	Dakota Feedbacks ARC	233-	B-12-	966
W9AXD/9	Rockford ARA	240-	B- 4-	930
K3DNA/3* (+WN3TRG)				
	Juniata Valley ARC	525-	C-15-	925
K1JFI/1	Roger Williams VHF Soc.	370-	C-10-	820
K8IIA/8	Plymouth ARC	183-	B- 4-	816
VE3CR/3	Bluewater RC	203-	B-10-	806
WØVZG/Ø*	Pilot Knob ARC	327-	C-13-	777
K8ALB/8	Critical Bias RC	324-	B- 6-	648
W3LWW/3	Foothills RC	245-	C-10-	645
WA2CIY/2	Tri-County RC	65-	B- 7-	530
W3UDX/3*	Butler Co. ARA	128-	C- 8-	128

5A - Battery

K7AUO/7	Tek Emp. RAC	276-	A- 7-	1328

5A

W6FQ/6 (+WN6PQY)				
	TRW ARC	*2708-*	*B-40-*	*6081*
K3SSC/3	Delmont RC	2580-	B-25-	5765
W6ULI/6	Fullerton RC	2331-	B-26-	5262
WØNJ/Ø*	Story Co. ARC	1909-	B-22-	4418
K5QHD/5	Garland ARC	1921-	B-32-	4392
K6SYU/6	Anaheim ARA	1888-	B-31-	4376
W4CUE/4 (+WN4APT)				
	Birmingham ARC	1873-	B-87-	4296
W3VD/3	Applied Physics Lab,John Hopkins Univ. RC	1676-	B-15-	3952
K6DKX/6 (+WN6NDN)				
	San Carlos C.D. ARC	1651-	B-14-	3902
K9BPL/9*	Motorola Engineers	1643-	B-16-	3886
WØEQU/Ø*	Aksarben RC	1663-	B-50-	3876
K2AE/2 (+WN2FNH)				
	Schenectady ARA	1481-	B-60-	3612
W6CX/6* (+WN6WVH)				
	Mt. Diablo ARC	1476-	B-15-	3612
WØIF/Ø	Wecomo ARC	1527-	B-19-	3604
W9JXN/9*	Valley Am. Repeater Assn.	1542-	B-10-	3584
W4POX/4	Portsmouth RC	1497-	B-17-	3544
WB8JBM/8 (+WN8OOB)				
	N.Ridgeville,Columbia,Elyria&BayVillage Pond Swimming,Creek Stomping,Mud Sliding Op Drowning HS RC	1453-	B-15-	3456
K1MUJ/1 (+WN1QAW)				
	Eastern Ct. ARA	1295-	B-24-	3140
VE3OW/3*	Windsor ARC	1122-	B-24-	2849
W9PCS/9	York RC	1172-	B-23-	2894
W9HHX/9	Milwaukee School of Engineering ARC	1162-	B- -	2824
W2MMD/2 (+WN2GJH)				
	Gloucester Co. ARC	1077-	B-25-	2654
K4CO/4	No. Kentucky ARC	1251-	B-20-	2552
W8ZHO/8 (+WN8MYZ)				
	Muskegon AReа AR Council	978-	B-47-	2506
W5RBK/5* (+WN5INM)				
	Stillwater ARC	970-	B- 6-	2490
W8ID/8	Seneca RC	992-	B-16-	2484
W6JBT/6*	Citrus Belt ARC	975-	B-20-	2450
K3CSG/3 (+WN3UAF)				
	Abington ARC	879-	B-15-	2258
WA6SKZ/6 (+WN6WMT)				
	La Mirada RC	852-	B-15-	2254
W1HH/1 (+WN1QAA)				
	Chelmsford ARA	846-	B-25-	2242
W8BLV/8 (+WN8LXL)				
	Dial ARC	805-	B-18-	2160
K6GIP/6 (+WN6VIR)				
	Monterey Park ARC	721-	B-20-	1992
K4HTA/4 (+WN4ZOH)				
	Vienna Wireless Soc.	739-	B-17-	1978
W6JTA/6 (+WN6TTH)				
	Estero RC	711-	B-11-	1972
W2DQ/2*	Suffolk Co. RC	1385-	C-20-	1935
W7YN/7* (+WN7UEK)				
	Nevada ARA	690-	B-14-	1930
W8NJH/8 (+WN8OID)				
	Stu Rockafellow AR Soc.	709-	B-10-	1918
W7KYC/7*	Portland ARC	678-	B-10-	1856
W6LIE/6* (+WN6RXI)				
	Kern Co. RC	626-	B-27-	1852
W8VY/8*	Kalamazoo ARC	444-	B-25-	1438
W3ZIC/3	Ft. Venango Mike&Key Club	434-	B- -	1418
W4MOE/4*	Buncombe Co. ARC	456-	B-15-	1412
K2YNT/2 (+WN2PHO)				
	Metuchen "Y" RC	851-	B-26-	1401
K3RAF/3	Lebanon Valley Soc. of RA	381-	B-14-	1312
W6RO/6 (+WN6TKO)				
	Assoc. Radio Amateurs of Long Beach & Douglas Aircraft RC of Long Beach	810-	C-27-	1310
W7NV/7 (+WN7WDJ)				
	Kootenai AR Soc.	366-	B-25-	1282
WA1DYU/1	Whitman ARC	344-	B-20-	1238
W6OT/6* (+WN6WJC)				
	Oakland RC	354-	B-15-	1208
W5MS/5* (+WN5HHT)				
	Corpus Christi ARC	324-	B-12-	1198
WB8NGV/8* (+WN8OSU)				
	Hazel Park ARC	*595-*	*B-100-*	*1190*
WA9LBW/9*	Onalaska & Area ARC	323-	B- 7-	1146
W1MV/1*	Musasoit ARA	292-	B-14-	1134
WB6RXH/6* (+WN6POA)				
	Foothill ARC	288-	B-15-	1126
WA9LJV/9*	Waukegan VHF ARC	293-	B-12-	1086
W5WX/5*	Panhandle ARC	480-	C-20-	1030

6A

WA3PJQ/3	Maryland Mobileers	2441-	B-20-	5582

W4RL/4	Sterling Park ARC	2456-	B-21-	5562
W8TO/8* (+WN8ORQ)	Columbus ARA	2318-	B-28-	5286
W3SK/3 (+WN3SZR)	Penn Wireless Assoc.	2143-	B-40-	4986
K6QEZ/6	Ampex Employees ARC	1931-	B-16-	4512
K7LED/7*	Mike & Key RC	1802-	B-21-	4304
W3PIQ/3	South Hills Brass Pounders & Modulators	1823-	B-30-	4296
W3QT/3	Southern Chester Co. ARC	1506-	B-16-	3612
W6PW/6	San Francisco RC	1419-	B- 6-	3438
W4UOT/4	Middle Tenn. AR Soc.	961-	B-14-	2572
K4SAN/4	Cary ARC	925-	B-16-	2515
K6IS/6	North Hills RC	936-	B-23-	2472
W6SM/6	Turlock ARC	910-	B-20-	2470
WA5ZAA/5	Okla. City AR & Elect.	717-	B-15-	2084
WBØKRA/Ø (+WNØJUL)	Faribault Area ARC	716-	B-18-	2082
KØOKJ/Ø	Kansas City ARC	673-	B-11-	1996
W1GLA/1 (+WN1QDY)	Framingham RC	648-	B- 8-	1896
W8TQE/8	Adrian ARC	560-	B-18-	1775
W7HJF/7* (+WN7TOF)	Santiam RC	540-	B-15-	1730
W6VIO/6* (+WN6TTA)	JPL RC	554-	B-10-	1708
W9DUP/9 (+WN9LHA)	DuPage RC	991-	C-18-	1691
VO1AA/1	SONRA	472-	B-12-	1594
W3AWA/3	Mobile Sixers RC	861-	C-15-	1561
K6EAG/6* (+WN6VZN)	Hayward RC	423-	B-15-	1496
W6CX/6 (+WN6TRX)	Silverado AR Soc.	385-	B- 9-	1420
W6SG/6 (+WN6VWC)	Marin ARC	684-	C-14-	1334
W6KIW/6	Petaluma DX & Experimenters Soc.	559-	B-12-	1116

7A

K2AA/2 (+WN2LHH)	South Jersey RA	3179-	B-35-	7158
W7AIA/7* (+WN7VBA)	Clark Co. ARC	1673-	B-18-	4146
W2DMC/2 (+WN2NEC)	Crystal RC	1503-	B-25-	3706
VO1AT/1*	ARC of Central Newfoundland	1337-	B- 7-	3424
W9YH/9 (+WN9KSU)	Twin City ARC	2423-	C-35-	3173
VE3DC/3	Hamilton ARC	1157-	B-24-	3014
W8VPV/8	Cuyahoga Falls RC	1043-	B-35-	2856
W5DPA/5* (+WN5GZG)	Houston ARC	771-	B-28-	2292
WB2NUW/2	Teaneck P.A.L. RC	746-	B-20-	2242
VO1NT/1*	Nfld. Tel. ARC	655-	B-11-	2110
WØLB/Ø* (+WNØGQL)	Jayhawk AR Soc.	673-	B-35-	2096
WA4YZY/4 (+WN4BIE)	Mountain ARC	581-	B-10-	1962
W1FTS/1	Granite State ARA	591-	B- 8-	1882
W6SD/6 (+WN6OYD)	San Fernando Valley RC	861-	C-15-	1661
K3IEC/3*	Cumberland ARC	450-	B-11-	1600
K3MJW/3	Skyview Radio Soc.	446-	B-15-	1592
VA6NQ/6*	Calgary ARA	776-	C-37-	1581

8A

W9IC/9* (+WN9INQ)	Chicago Suburban RA	3264-	B-64-	7428
K4BFT/4 (+WN4ERL)	Huntsville ARC	2465-	B-40-	5840
W9IZ/9* (+WN9KSK)	Four Lakes ARC	1758-	B-45-	4366
VE3VM/3	Niagara Peninsula ARC	1536-	B-20-	3872
W1BIM/1 (+WN1RMP)	Central Mass. ARA	1234-	B-24-	3318
K6HAI/6	North Shores ARC	1145-	B-23-	3140
WA6BGS/6 (+WN6MXZ)	ARC of El Cajon	1011-	B-46-	2872
W1NEM/1	Hartford Co. ARA	905-	B-15-	2710
VO1AW/1	Avalon Radio Group	732-	B- 8-	2364
W8FT/8*	The Findlay RC	768-	B-20-	2336
K3ERM/3	Frederick ARC	1036-	B-15-	2072
VE3DRT/3	Skywide ARC	607-	B-15-	2064

9A

W4HAW/4 (+WN4EPO)	West Palm Beach ARC	3664-	B-41-	8278
W3IN/3 (+WN3UTA)	Potomac Valley RC	5366-	C-19-	6366
W2LI/2	Tri County RA	2036-	B-28-	5022
VE3NAR/3*	Nortown ARC	1783-	B-31-	3566

10A

W2GSA/2 (+WN2KKT) —	Garden State ARA	1359-	B-35-	3818

13A

W7DK/7 (+WN7UQV)	RC of Tacoma	2586-	B-33-	6672

14A

W1ARR/1	Murphy's Marauders	5255-	B-40-	11,960
VE3WE/3	Scarborough ARC	2434-	B-60-	6328

19A

W6HE/6 (+WN6SAE)	Conejo Valley ARC	3726-	B-38-	9352
W2RJ/2* (+WN2ELF)	Englewood ARA	2571-	B-51-	7147

CLASS B

Grouped in this listing are the scores of portable stations manned by one or two operators. Where two persons participated, the call of the other operator (if known) is shown following that of the amateur whose call was used. Figures following the calls indicate number of contacts, power, and final score. An asterisk following the station callsign indicates set-up operations did not begin until 1800 GMT on Saturday.

Class-B Call-Area Leaders

(Bold Face=Over-all class leaders)

1B	2B
VE3DOP/3	. . . .
WA1BZS/1	. . . .
WA2URS/2	WA2DFI/2
WA3GUL/3	W3IWT/3
K6RIM/4	. . . .
W5YQ/5	WA5ZUP/5
W6ANB/6	WA6CKJ/6
WA7TPV/7	W7GHT/7
W8JSX/8	K8GIV/8
W9LVH/9	W9EI/9
WAØFLD/Ø	. . . .

1B - Battery

K8EEG/Ø	272-A-	916
W4WHK/4	179-A-	687
WA6EUZ/6* + WB6OVV	194-A-	682
W8NDG/8* + W8KRR	172-A-	666
W5JUC/5*	191-A-	623
WA8REN/3* + WA8RQU	141-A-	573
K3ZSK/3* + WA3BGN	125-A-	525
W3TQM/9	122-A-	466
WB4OEI/4*	105-A-	465
KZ5OD/KZ5	135-A-	405
W3CZ/3	88-A-	364
WA5WYO/5 + WA5GWH	88-A-	364
WB5IBQ/5*	67-A-	351
WB6IJV/6	74-A-	322
W6ITH/6* + WA6VBA	56-A-	318
WA7VVS/7*	40-A-	270
WA3RSG/3	53-A-	259
W7LNG/7	14-A-	242
W4WSF/4*	40-A-	220
WB4SYC/4	40-A-	220
WB6PZK/6	23-A-	219
WB5EBA/5 + W5LXG	34-A-	202
WA1PNW/1*	48-B-	196
K4ILI/4 + K4UJS	29-A-	187
W7DRA/7	25-A-	175
WB4OKA/4*	23-A-	169
WB2CMO/2*	19-A-	157
K2KGJ/6*	18-A-	154
WA4WNW/4 + W4OOI	13-A-	139
W1HDQ/1	11-A-	133
K1VUT/1*	15-B-	130
K8QYG/3*	9-A-	127
WB6UZX/6*	9-A-	127
K1PQV/1*	8-B-	116
WA7TXV/7*	1-A-	103

1B

W9LVH/9 + K9FRZ	1372-B-	2844
WA3GUL/3*	1101-B-	2402
WA3OVC/3 + WA3KZQ	1140-B-	2380
K6RIM/4 + K4TTA	1055-B-	2210
WA2URS/2* + WA2BIQ	952-B-	2054
WA9BWY/9 + WA9AUM	1843-C-	1943
K9FAP/9* (2 oprs.)	875-B-	1900
W2AB/2* + W2DW	863-B-	1876
W5YQ/5	787-B-	1674
W6ANB/6* + WB6KMR	755-B-	1610
WB2DZZ/3 + WN2QPY	685-B-	1470
W8JSX/8 + K8KAS	655-B-	1410
WB6MKP/6 + WB6MRS	645-B-	1390
K4HHA/4 + K4BEH	560-B-	1270
WAØFLD/Ø	584-B-	1268
W8HNI/8	551-B-	1252
WA1BZS/1 + WA1CCR	535-B-	1220
WB6CEP/1* + WB6BIG	505-B-	1160
K8TNY/8 + K8UQY	498-B-	1146
WB9HAD/9* + WN9JZZ	518-B-	1136
K6QX/6 + K6QY	498-B-	1096
W5MTL/5 + W5AJA	480-B-	1060
WB4UIH/4 + WB4MWC	408-B-	1016
WA7TPV/7* + WA7RRK	427-B-	1004
WAØKPS/7*	430-B-	960
VE3DOP/3 + VE3FLE	401-B-	952
WAØNVZ/Ø	425-B-	950
K7UWT/7 + K7NCG	680-C-	880
VE2BDM/2* + VE2APF	357-B-	864
K5TCK/5 + WA5EBQ	331-B-	812
WAØVYB/Ø+ WBØDDQ	300-B-	800
WB8AZD/8	385-B-	770
WB2NIE/2	330-B-	760
WA9YQC/9 + WB9BVZ	296-B-	742
WØKKG/Ø*	321-B-	742
WØOOE/Ø	317-B-	734
K4FU/4*	300-B-	700
WØWLO/Ø	330-B-	660
WAØGMX/Ø*	268-B-	636
WA7NWP/7*	233-B-	616
K2EVW/2*	205-B-	610
K2GK/2 + WA2CCG	252-B-	604
W9VOO/9 + W9VAK	227-B-	604
VE5XC/5	213-B-	576
WB4BQE/Ø + WBØAIK	238-B-	576
K4FPF/Ø	231-B-	562
K7IDX/7	220-B-	540
W8HKP/8 (2 oprs.)	218-B-	536
WB9GMV/9	218-B-	536

WB4NAE/4*	209-B-	518
K1EUM/1* + WA1RTC	156-B-	512
WB6EWE/6	201-B-	502
WAØUNB/Ø + WBØFDI	174-B-	498
WA3JGS/3* + K3MNT	382-C-	482
K5LXZ/5	176-B-	452
WØMVF/Ø	163-B-	426
WN6WEI/6 + WN6WER	161-B-	422
VE7AED/7 + VE7GD	128-B-	406
W7GRX/7	151-B-	402
WØBHC/7	134-B-	368
WB9GNC/9	106-B-	312
VE7BMB/7 (2 oprs.)	104-B-	308
WN4BFZ/4* + WN4CPG	52-B-	254
WN2OVE/1	66-B-	232
WA3QWP/3 + WN3TPG	65-B-	230
WN9LWN/9*	32-B-	214
W7DQS/7*	56-B-	212
K9DTB/9	49-B-	198
WBØHHC/Ø	75-C-	175
KL7EWA/KL7	83-B-	166
WN3SZQ/3 + WN3SWP	8-B-	166
W3EAN/3 + W3EBY	80-B-	160
WA3CSP/3*	17-B-	134
W2FSL/2* + W1EHD	11-B-	122
K4QF/4*	10-B-	120
WB5BYK/4*	1-B-	102
WN9KQE/9	23-B-	46

Commercial Mains

WB9CKG/9	544-B-	1088
WA5SIO/5*	362-B-	724
WA3REY/3	104-B-	208
WA1OAM/1	51-B-	102
WN2QHN/2 + WN2KUF	39-B-	78

2B

W7GHT/7 + WA7GOO	765-B-	1780
W9EI/9 + WB9FPK	682-B-	1664
W3IWT/3 + K3BSY	640-B-	1530
WA6CKJ/6 + WA6HDH	569-B-	1388
WA6JVZ/6* + WA6CCM	439-B-	1128
WA6MBP/6 + WN6WBJ	434-B-	1068
K8GIV/8 + K8BQI	401-B-	1052
WA2DFI/2 + WB2ISS	386-B-	1027
K2PLT/2 + W2DNZ	372-B-	944
WA7RKE/7 + WBØFHS	339-B-	928
K3HXS/3 + K3KNL	463-B-	926
WA7NLA/7* + WA7KJC	354-B-	908
KH6HPQ/KH6 + KH6HOU	311-B-	822
WA5ZUP/5 + WA2PRB	689-C-	689
WB9BPB/9 + WB9KBE	210-B-	670
WB8DZR/8 + K3SIL	205-B-	610
WB8KMO/8 + WB8JEJ	187-B-	574
WA8JWP/8 + WB8HVO	158-B-	566
K2LIP/2 + K2PXQ	156-B-	512
WB6ZQZ/6*	141-B-	482
WB5FHD/5* + WB5CDA	99-B-	448
W6PVF/KL7 + KL7HDV	91-B-	432
K6HJU/6 + K6TCN	148-C-	398

Commercial Mains

WN5JBQ/5* + WN5JHE	102-B-	204

Class-C Call-Area Leaders

(Bold Face = Over-all class leaders)

1C

K1FSI/1
W3AA/3
WA4EMA/4
W5OP/5
WA6LVS/6
W8KYA/8
WA9BVL/9
WAØAGM/Ø

2C

W8ODJ/8

Class C

W3AA/3* (9 oprs.)	453-B-	906
W8KYA/8	292-B-	584
WAØAGM/Ø	233-B-	466
WA6LVS/6*	177-B-	354
K6HJJ/6	161-B-	322
K1FSI/1	147-B-	294
W6QHP/6	145-B-	290
WA6PEA/6*	133-B-	266
WA9BVL/9*	131-B-	262
W5OP/5*	79-A-	237
WA6HGH/6	107-B-	214
W6TEE/6	78-B-	156
W6MXO/6*	72-B-	144
WA4EMA/4	68-B-	136
WB6DFO/6	63-B-	126
WB6KZN/6	63-B-	126
WA6UNL/6	62-B-	124
WA9CHY/9* (2 oprs.)	41-B-	82
W6QYS/6	37-B-	74
WB6IAW/6	24-A-	72
WA6IQK/6	18-A-	54
WB6PHQ/6	5-A-	15
WB6TXC/6	6-B-	12
WA6SBY/6	5-B-	10

2C

W8ODJ/8* (10 oprs.)	167-C-	167

Class-D Call-Area Leaders

(Bold Face=Over-all class leaders)

1D

VO2AH
WA1JKZ
W2BHP
K3GJD
K4EJQ
K5UAR
W6MYP
K7RSC
K8CVJ
W9DOB
WØIO

2D

WB2FYS
W3EAX
K4WAB
W8TZZ
WA9JCO

3D

W1AEC

Class D

K3GJD + K3CUW	1015-B-	2030
W9DOB	1635-C-	1635
K7RSC*	659-B-	1318
K5UAR*	510-B-	1020
K4EJQ* (2 oprs.)	463-B-	926
W2BHP*	441-B-	882
WB4ZNX*	377-B-	754
WA2RYC	370-B-	740
WA4BJF*	369-B-	738
K4JLD	325-B-	650
WA2CLC*	319-B-	638
WØIO (WA1JHQ, opr.)	507-C-	507
W3ARK*	249-B-	498
W6MYP	461-C-	461
WB4OSS	449-C-	449
WB4ZQC*	432-C-	432
WA1JKZ	208-B-	416
WB2GPU*	208-B-	416
K3LWR	402-C-	402
WA3SWC	200-B-	400
K8CVJ	200-B-	400
WA7NZT (2 oprs.)	184-B-	368
W6RQZ	180-B-	360
WB9HVJ*	174-B-	348
WB5GFE* (3 oprs.)	162-B-	324
WA1RLU/Ø	162-B-	324
WA2EAJ/6*	157-B-	314
VO2AH*	155-B-	310
WBØIOR*	150-B-	300
WB4FNN*	144-B-	288
VE2BYR	132-B-	264
WB5FML*	118-B-	236
W2GHD	115-B-	230
K3PRP*	114-B-	228
W8HR/8	222-C-	222
WB5HAE*	210-C-	210
KZ5VV*	209-C-	209
VE3AGI	102-B-	204
K7ICW*	99-B-	198
K5LUW/5	189-C-	189
WB6RVQ*	88-B-	176
VE3BFK	87-B-	174
K5MHG/6*	82-B-	164
W1KTU/1*	80-B-	160
W6OUR	73-B-	146
W2IUC*	71-B-	142
WB6DSO	71-B-	142
W5SOD*	70-B-	140
WA7LHZ*	70-B-	140
WA7AQZ/7	64-B-	128
W4NTE*	63-B-	126
WA3TAG*	62-B-	124
W4WVJ* (2 oprs.)	60-B-	120
KL7HER	58-B-	116
WN1QNF (3 oprs.)	58-B-	116
WB4WMA*	58-B-	116
WN3SXU	57-B-	114
WA6DBX	57-B-	114
KØLJH (2 oprs.)	57-B-	114
WA7NXP	54-B-	108
WN1PWY*	51-B-	102
WA2EXP	50-B-	100
WB9BDK*	100-C-	100
WB4WDH	90-C-	90
WØYZZ	45-B-	90
K2JZT*	87-C-	87
K4CAX	37-B-	74
WAØYMS*	37-B-	74
W2UGB/9	73-C-	73
WN8OJH	31-B-	62
WB2SPJ	28-B-	56
WA8WGM	26-B-	52
WB2UFG*	23-B-	46
WA1PAZ*	21-B-	42
WB8NTY*	20-B-	40
W9ZPC*	20-B-	40
WNØGGH	20-B-	40
WN9LSS*	19-B-	38
WN5JWT	18-B-	36
WØHAW/6*	17-B-	34
WN8NXG	16-B-	32
W3DNY	28-C-	28
WA8MCG	14-B-	28
W1HDQ	9-B-	18
WØQAU	17-C-	17
W1OPJ*	16-C-	16
WB2NXF*	15-C-	15
WN9MIF	7-B-	14
W3BB/1*	6-B-	12
W1FEZ	6-B-	12
W1WEE*	6-B-	12
K9DNW*	5-B-	10
WA1PHF (WB2CHO, opr.)	4-B-	8
K7GGD*	4-C-	4
W1SMO* (2 oprs.)	3-C-	3

2D

K4WAB (10 oprs.)	1038-B-	2076
WA9JCO (3 oprs.)	953-B-	1906
WB4QKX + K4HJT	561-B-	1122
W3EAX (3 oprs.)	534-B-	1068
W8TZZ* (6 oprs.)	451-B-	902
WA8PDE + WB8AHA	289-B-	578
WB2FYS* (3 oprs.)	312-C-	312
W4DUG (15 oprs.)	116-B-	232

3D

W1AEC* (8 oprs.)	426-C-	426

Class-E Call-Area Leaders

(Bold Face=Over-all class leaders)

1E

WA8RGJ/VE8
K1BUB
WB2GCD/2
WA3FYZ
W7VNJ
WB9ICF
WØMT/Ø

2E

K4FC
K7CBP

4E

K3IVO
K8EEN

1E - Battery

WAØTFD* (2 oprs.)	105-A-	315
K1BUB*	39-A-	117
WB9ICF*	38-A-	114
WA1FSZ	18-A-	54

1E

WA3FYZ (4 oprs.)	356-B-	712
WØMT/Ø + WAØYPC	348-B-	696
W7VNJ* (8 oprs.)	271-B-	542
WB2GCD/2 (2 oprs.)	101-B-	202
WA8RGJ/VE8	68-C-	68
WNØJYF/Ø (2 oprs.)	12-A-	36

2E

K4FC (19 oprs.)	408-B-	816
K7CBP* (6 oprs.)	130-C-	130

4E

K3IVO (9 oprs.)	750-B-	1500
K8EEN (10 oprs.)	212-B-	424

Check Logs

VE3BRJ, W2KMK, WA3SYT/3, K4JK/4, W4PQA, WB4BES, W5EIJ, K6KWN, WA6GSV, W8BVU, W8GK, W8WVL, WA8MAZ, W9IPT, W9TAL, WA5SXR/HK2.

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY BILL MANN,* WA1FCM

IS THE REPEATER KING?

NO DOUBT ABOUT IT, amateur radio has "discovered" the repeater. Actually, there is nothing new to the idea; what is new is that repeaters have come into widespread use in amateur radio, and are taking the fraternity by storm.

In emergency after emergency, repeaters have shown how valuable they are. Amateurs far and wide are equipping themselves with some kind of a gadget that can "key up" at least one repeater in the vicinity. Listen on any one of a dozen or more common repeater output channels in a heavily populated area (sometimes even not so heavily populated!) and you will occasionally hear operation which bears a striking resemblance to a certain other service – not often, but occasionally. Our Public Service Diary is getting so long that we have had to take steps to change format to get more information in the magazine without taking up too much more space – and a big part of it is via repeaters.

But at the recent Eight Regional ARPSC Conference in Cincinnati, among other things discussed, the emergency role of fm and repeaters was one of the study group subjects, and the all-but-traditional worship of repeaters was noted by its absence. In fact, in this group the word given was that simplex fm operation is preferred in most emergencies to repeater operation.

Incredible? Not at all, if you think about it. If planning is built around the availability of a repeater, all dependence is being placed on that one machine, high up on a mountain-top or a tall building, all but inaccessible in an emergency situation. If it goes off the air, the emergency net is stuck. Its practiced procedure is useless, many of its stations can't hear each other. The mother hen is gone and the little chicks are running around in circles. Some stations designed to operate through repeaters don't even have simplex capability.

How many repeaters have emergency power? If commercial power goes off, does your repeater go off with it? Most do. Even some which do boast an emergency generator require that someone start the generator. How do you get there if the mountain road is choked with snow drifts, or washed out by torrential rain, or the elevator to the 35th floor out of service because of the power failure? Just having emergency power available is only part of the problem. It was pointed out that some repeaters are located adjacent to other facilities with people on duty most of the time. Fine, but this is a pretty ideal situation. If you want to base your emergency planning on repeater availability, better give some consideration to operating it on a battery or bank of batteries kept under constant trickle charge and having capacity to operate the repeater independent of charge for many hours.

But better yet, use repeaters only as a luxury and a supplement, if available, to your basic emergency operating plan. Most emergencies are local in nature, and even those which are not nevertheless involve local communication galore. One thing the popularity of repeaters has done is to cause tens of thousands of amateurs to equip themselves with 2-meter fm equipment, nearly all of it capable of simplex operation. Find yourself a little-used simplex channel and build your local communication around it. A strong station in a good location can be a net control, or act as a manual repeater or relay if necessary. A considerable area can be covered.

Sacrilege? The tone of the above-mentioned meeting was that repeaters have their drawbacks in

* Assistant Communications Manager, ARRL.

Through a combined effort, AREC, RACES and Juniata Valley ARC members installed a new triband beam at the Mifflin Co. Emergency Operating Center at the Pennsylvania Fire School Building in Lewistown, Pa. Shown at one of the operating positions is K3KDK, RO.

The crew that attended the New Jersey Net Picnic on July 28 are pictured here. Standing, left to right: W2ZEP (NJN Mgr.) W2JI, K2EFA, WA2GMH, WA2CCF, WA2FVH, W2RUX, WA2CLB, WA2WLN, WB2AEH, WB2VPR, WA2BAN, WA2SRQ, WA2QNT, WB2FEH, WA2UOO and WA2CXY. Kneeling: WA2PQL, WA2TRK, WA2RYD, WB2RJJ, WB2NOM, WA2NLP, WB2OYV, WA2NKK and WB2FCD.

emergency communicating. Unless your repeater group is dedicated exclusively to AREC or RACES, it is going to contain a lot of untrained operators, many of whom can be more in the way than of help in an emergency situation.

Anyway, the implicit conclusion of this particular study group was that for the day-by-day minor emergency (auto accidents, etc.), repeaters are fine. But for all-out emergency planning simplex is preferred. Use the lower frequencies for coverage of greater distances. Just when you most need it, your repeater may not be there. – *W1NJM.*

OSCAR 6

That Oscar 6 is an exciting and informative venture can hardly be disputed. It is estimated that more than 2,000 amateurs have used the satellite. ARRL has established a "Satellite '1000' Award" based upon the number of contacts, countries and continents worked (see Oscar News, this issue) and over 140 such awards had been issued by mid-September to amateurs in some 30 different countries. Oscar 6 has seen many firsts: slow-scan tv and mobile contacts, new satellite DX records, use of the satellite in major contests, WAS entirely by satellite by 5 amateurs and near completion of WAS by several other participants, and the first reported traffic handling on March 5, 1973 by WAØTAQ and KØDDA. It is the traffic-handling facet which we wish to enlarge upon in this column.

We have a proven "repeater in the sky" which can be used on an established schedule to communicate between two fixed points. Elaborate equipment is not required. Band conditions have little effect. Sounds like a natural for a regular traffic schedule, doesn't it?

Two operators, KØDDA and K1HTV, have established an auxiliary Transcontinental Corps sked on a weekly basis. Lloyd receives a few messages on the Central Area Net and sends them East to Rich via an Oscar pass. The traffic is then routed to the appropriate nets in the Eastern Area. Presently, the two regular TCC stations for that function handle the other CAN to EAN traffic. As more practical experience is gained, more of the traffic will probably be routed by the satellite.

Oscar 6 is proving itself as a reliable means for passing traffic on a regular basis and promises to be an excellent facility for possible emergency communications. If more traffic handlers become involved with satellite communications (and more satellite communicators handle traffic) the facilities can be tapped to a greater extent, training a new "pool of operators" who will be more fully capable of providing emergency communications.– *WA1FCM*

Oops, we goofed. The picture on page 111 of October 1973 *QST* is not composed of New Jersey traffic men, but instead shows the Maryland-Delaware group. The caption should have read: The annual Maryland-Delaware CW Traffic Net - Maryland Emergency Phone Net - Maryland DC Traffic Net Get-together was held July 22. The participants shown are: (first row, l. to r.) W3LDD, W3EAS, WA3SWS, W3LBC, W3EZT, WA3MSW, WA3MJF, WA3IYS, WA3RCI, WA3LQV, WA3QDH; (second row) W3FA, WA3PIG, W3EEB, W3DKX, W3FCI, WA3OEJ, K3QDC, W3ADQ; (third row) WN3UOO, WØYLU/3, K3CKC, K3TNM, WA3QIA, W3FCS, WA3IHW, W3GLI, K3IAG, WA3SCR.

The caption for the NJN picnic appears with the correct picture elsewhere in this month's column. We apologize for the error.

Interested in getting started in traffic handling and network activities? Want to learn more about emergency operation? Need information concerning ARRL-sponsored activities and awards, good amateur operating practices, and ARRL field organization (including leadership and station appointments)? We have just the right booklet: *Operating an Amateur Radio Station*, available free from ARRL. Please send a self-addressed envelope (7" x 10", or larger) with 24 cents postage with your request.

Public Service Diary

■ Because of flooding conditions in the Denver, CO area, the Colorado RACES Net was activated by State RO KØCNV at 0800, May 6. WØOUI, Denver Radio Club station, handled traffic at the Red Cross building using 2-meter fm and liaison with state and Denver RACES. KØCNV and WAØVGX were NCSs and WØCXW handled about 40 health & welfare messages on 80 meters. Many mobiles were active. - (KØCNV, State RO)

● An SOS was heard at about 0020 GMT May 12 from a ship on fire in the North Atlantic. W1FQO, K4FCZ, WB4KYS, WA8LSR maritime mobile-R1 and 8R1W stood by on 20 meters while the FCC in Ft. Lauderdale, FL and the Coast Guard in Jacksonville, FL were notified. The frequency was monitored for two hours. - (K4FCZ)

■ On June 3, in Ogden, UT, WA7RXA ran a phone patch between OA6CW in Peru and a hospital patient in Reno, NV. A mother, not expected to live, wanted to contact her daughter and son-in-law in an isolated mining camp near the Chilean border. WA7RXA provided the necessary communications. - (W7OCX, SCM UT)

■ A call was received from WB5JCB maritime mobile-R2 on a sailing boat in the Caribbean Sea which had been struck by a shrimp boat on June 28. K4FCZ called the FCC and Coast Guard, obtained a position fix and relayed to WB5JCB. The boat was towed to safety. - (K4FCZ)

■ While traveling on I-264 in Norfolk, VA on July 7, WB4GMC saw a truck-car accident. He notified police through WA4DIV and directed traffic until assistance arrived.

On July 28, WB4GMC came upon a collision in Norfolk and reported it to police via K4DOQ, who responded on 6-meter fm. - (WB4GMC)

■ At 2357 GMT August 2, K5YIN heard a call from XE2JN who needed a phone patch to New York City to get a drug needed for a leukemia patient. K5YIN called WB5DCY who conducted the patch and the drug was ordered. - (W5NCB, SCM MS)

■ While listening to the Coast Guard Net on Aug. 6, K3LJP heard XE3D requesting assistance in notifying a Massachusetts man that his son had been killed in a plane crash. Since K3LJP knew the family, he arranged for schedules with XE3D while he was locating the vacationing father. The man was located later in the day and arrangements made. Assistance was provided by W4ZVX. - (K3LJP)

■ On Aug. 8, WA4FPS was monitoring CB channel 9 and heard a call for motorist assistance from a CBer. The CBer was unable to get help because of skip conditions and illegal operators. WA4FPS called on the Tampa Bay (FL) Repeater, and was answered by K4RMU who called police. Police arrived shortly afterward. - (WB4TUP, EC Hillsborough Co.)

■ WB4BIM, mobile on I-4 in Tampa, FL on Aug. 14, came upon an auto accident. He called WA4ZUU on the RACES 2-meter frequency and the accident was reported. Help arrived soon thereafter. - (WB4TUP, EC Hillsborough Co.)

■ On Aug. 19, K4LYY was driving on I-65 north of Birmingham, AL and arrived at the scene of a three-car accident. He stopped, gave assistance, then called WB4AYO on the BARES repeater. WB4AYO called police and K4LYY remained at the scene until their arrival.

During the same afternoon, W4RTI reported a car broken down on Highway 31 through the BARES repeater. WB4AYO called the Homewood (AL) Police and they dispatched a car to the scene. - (K4AOZ)

■ Assisting in the search for a missing person lost Aug. 21, was W5RYD. He handled about 30 messages during the search, including a message to state police, assisted by WA5OHI. The man was found on Aug. 25. - (WA5OHI, EC West-Central NM)

■ The Alexandria (VA) AREC group was activated as a RACES unit, and assisted in the evacuation of 40 people and several pets during flooding in the area on Aug. 27. - (WA4PBG, SEC VA)

■ At 1315 on Aug. 28, a tornado touched down in West Stockbridge, MA, demolishing several buildings and automobiles, killing 4 persons and injuring 35 others. Minutes after the disaster, assistant EC WA1LUX and WA1QGW arrived at Pittsfield c.d. headquarters and alerted EC W1KZS. WA1IQJ was dispatched to the West Stockbridge Fire Station and WA1s KFN MVP were sent to act as liaison and back-up at a demolished truck terminal. Upon request from Red Cross, W1KZS called WA1s HSO PGP to RC headquarters in

Tennessee RM, W4ZJY, left, is shown presenting the Tennessee CW Net Award "Operator of the Year 1972-73" to WB4YCV, during the summer net meeting at Cumberland Mountain State Park.

K7YQM (left) is the Radio Officer for Josephine Co., Oregon. Gene works closely with RACES and AREC members and ED WA7ADW and is also an Assistant Director. Another Oregon leader is WA7SNY (right) who has taken over the reins as EC of Jackson Co.

Pittsfield. Using the K1FFK repeater, W1KZS asked for volunteers. W1KSD and WA1QDO were sent to the truck terminal and began handling traffic for the Red Cross via K1FFK. WA1s KFN MVP provided additional liaison from the fire station. Services furnished were health & welfare traffic, calls for food and supplies, and liaison between c.d. and other groups. AREC activities ceased at 2200. Additional communications were supplied to Red Cross and c.d. the following day. - (W1KZS, EC Berkshire Co.)

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for August Traffic

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	203	947	819	121	2090
WA8MCR	14	677	595	82	1368
K@ONK	119	534	519	12	1184
WA@VAS	125	447	51	396	1019
W6RSY	48	393	312	25	778
W3VR	127	291	264	21	703
W1PEX	277	212	150	27	666
WA@ROK	8	306	300	–	614
WB5CUR	4	294	264	18	580
K3PIE	23	274	236	38	571
W3EML	66	283	175	13	537
WA3PZO	42	245	90	146	523
WN@JFJ	236	236	30	–	502

BPL for 100 or more originations-plus-deliveries

WN@HTF	211	WB4VYU	123	WB@GVR	107
WA3RCI	207	K9HDP	119	WA@AUX	106
WB2ADW	181	WA@MLE	117	WA3SWF	105
WN@HTR	160	K6UYK	115	WN@JIQ	105
WN8MKL	148	WN8MZZ	109	W8SUS	105
WB9FHL	147	WRQCU	109	WA1PHJ	103
WA3EOP	129	WB5FML	109	WA3ATQ	100
K@BIX	127	WA3QLG	108	WA8ETX(June)	426
WB9CAC	126	WB4ZMK	108	WA8ETX(July)	271

More-Than-One Operator Station

WO8HIO 378

BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listings: WN9IHH.

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.

■ While checking for outlets for health & welfare traffic concerning the earthquake in Mexico, WB6RPK was advised by WA6DBT that shortwave station KGEI was accepting messages for spot announcements into the quake zone. A net was quickly organized using WR6ABM and WB6NDJ repeaters manned by K6BLS, WB6GWQ and WA6AVO. Messages were translated into Spanish by Red Cross interpretors who then spoke via repeater into tape recorders at KGEI. WA6s DBT YQL WB6IMX manned equipment at the transmitting site. The operation which took place on Aug. 29, was widely covered by TV, radio and newspaper announcements. - (WB6RPK, SCM East Bay)

■ On Sept. 3, W5TXV reported an accident near Jackson, MS to police. WA5FII activated the WR5ABT autopatch for the call. - (WA5FII, SEC MS)

■ Sept. 5 through 7, WA5WGW, operating as control station at the Baytown, TX EOC assisted in emergency preparations necessitated by Tropical Storm Delia. Over 300 families from Galveston Bay were evacuated because of flooding. Mobile stations passed tidal readings and warnings to residents in effected areas. Operation was continuous for 53 hours on both emergency and primary power. Nine amateurs participated.

During the same period, the Houston EOC, W5PMQ, coordinated communications among several coastal cities. Eight amateurs were active from the EOC and 19 amateurs as mobile or fixed. WA5OPK operated from a forecasting station, supplying valuable information. - (WA5ABA, EC Harris Co.)

W5BQN monitored the progress of Delia as NCS for the Gulf Coast Hurricane Net. A prime objective of the net was to separate official weather bureau information from speculation; storm position, direction and intensity were given. - (WA5YXS, SEC STex)

■ *April-May Special Events.* On April 14, 13 members of the Glens Falls Area (NY) AREC provided communications for a canoe and kayak race between Rock City Falls and Balston Spa, NY. - (K2AYQ, EC) Fifteen members of the Interstate Repeater Society (WR1ABQ) participated in the May 19 Walk-A-Thon in Derry, NH. (W1PVF/1)

■ *August.* Members of the Saint Charles Co. AREC and Saint Charles ARC were responsible for communication between racing officials, crash rescue boats, and the boat pits at the National Hydroplane races held at Lake Saint Louis, MO on Aug. 11-12. Continuous communication was maintained on 2-meter fm for a total of 21 hours over the race period. - (K@VVH, SCM) WR9AAB in Marathon Co. WI has been used by amateurs on rustler patrol for the sheriff's department. Each night three or four mobiles patroled various

Public Service Honor Roll August 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*
WA3RCI	10	10	12	12	12	5	3		5	69
WA3QLG	10	10	12	12	12		3		5	64
WA3QOZ	10	10	12	12	12	3			5	64
WB4SVH	10	10	12	12	12	3			5	64
KØBIX	10	10	12	12	12		3		5	64
WA3SWF	10	10	12	12	12	7				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
WB5FEY	10	10	12	12	12				5	61
W7OCX	10	10	12	12	12				5	61
KØBAD/4	10	10	12	12	12				5	61
WB5AMN	8	10		6	12	19			5	60
WAØVYB	10	10		12	12	10			5	59
WB2CHY	10	10	12	12	12					56
WA2CNE/2	10	10	12	12	12					56
WB2OYV	10	10	12	12	12					56
WA2TRK	10	10	12	12	12					56
WA9QVT/4	10	10	12	12	12					56
WBØHBN	10	10	12	12	12					56
WBØHOX		10		12	12	17			5	56
WA1PGY	10	10	9	12	12					53
WB2AEH	10	10	12	9	12					53
K3KAJ	10	7	12	12	12					53
WB4FDT	10	10	12	9	12					53
WA1LIR	10	5	12	12	12	1				52
WA1PHJ	10	10	12		12		3		5	52
WB4VYU	10	10		12	12	5	3			52
W4WXZ	10	10	12	3	12	4		1		52
WA6TVA	10	10	3	12	12				5	52
WBØGVR	10	10	12		12		3		5	52
WAØMLE	10	10	12		12		3		5	52
W4OGG	10	10	12	12				7		51
K3OCB	10	10	12	12	6					50
WA3QDH	10	10	9	9	12					50
K6UYK	10	10	12	9	6		3			50
KØJTW		10		12	12	16				50
W2MTA	10	10	12		12				5	49
WB4AJL	10	10	12		12				5	49
W6OAW		10		12	12	15				49
K7OUF	10	10	12		12				5	49
K8MLO	10	10		12	12				5	49
WA9EED	10	10	12		12				5	49
WB9KVN	10	10	12		12				5	49
KØMRI	10	10	12		12				5	49
WØOYH	10	10	12		12				5	49
W3FCS	7	10		12	12	7				48
WA4CBE	10	10	12	3	12	1				48
K3OIO	10	10	12	12	3					47
WA6DEI	10	10	12	3	12					47
W8GLC	10	8	12		12				5	47
WB8MJH	10	10	3	12	12					47
WAØROK	10	10	12		12			3		47
WB4ZMK	10	4	12		12			3	5	46
WA8UPI	4	10		12	12	3			5	46
WAØTFC	6	10	12	12	6					46
WBØCZR	10	10	12		12	1				45

WB2FWW/8	44	WB8NCD	39	WA3MQP	34	
WA2ICU/4	44	WB9FOT	39	WA3QIA/VE2	34	
WB2NOM	44	WBØHCK	39	W3YA	34	
WA2SHT	44	WØHI	39	W6RFF	34	
K2VGD	44	WAØSIG/6	39	W6YBV	34	
WA3SKP	44	WA3EOP	38	W7BQ	34	
WB4BAA	44	WB4ZQF	38	WB8ALU	34	
K5YTA	44	WA5YEA	38	WB8KKI	34	
W6INH	44	W7IEU	38	WB8KXV	34	
WB9CAC	44	WA3ATQ	37	W9EL	34	
WBØHSZ	44	WA3PZO	37	W9FWH	34	
K1YMH	43	K4FCZ	37	W9QLW	34	
WA1NLD	42	WB5FMA	37	WAØFMD	34	
WA3PXA	42	WB5FML	37	WA2UOO	32	
WA5VBM	42	WB6AKR	37	WA4BXT	32	
W6AUC	41	K9HDP	37	WB4OXT	32	
W6DEF	41	K3EZB	36	WB4SKJ	32	
WA1PHF*	39	WB4EKJ	36	WB5DBK	32	
K1SXF	39	WA8NOQ*	36	WA7MEL	32	
W2FR	39	K7IFG	35	W8JD	32	
WB2LZN	39	W7WAH/5	35	WB8JGW	32	
W2RUF	39	WB8KZD	35	WØOF	32	
W3LOS	39	WBØCCB	35	WAØYVT	32	
W3NEM	39	WA1MXV	34	WN1RFD	31	
WB4RUA	39	W2FIR/5	34	K4KNP	31	
K4UNW	39	WB2VEJ	34	WA5ZBN	31	
W5RB	39	K3CB	34	WA3RKH	30	
WA7QAR	39			K4BSS/4	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.

sections of the county and reporting any suspicious activity spotted to the sheriff's office. Between Aug. 11-18 nine amateurs logged 135 man-hours with 2369 miles of patrol - (K9JPS, EC) Six amateurs set up a booth at the Brooklyn (CT) Fair and originated numerous messages for the attending public. - (WA1HYN, EC)

■ *September.* While Civil Air Patrol members picked up donations for the Jerry Lewis Tel-a-thon held Sept. 3, members of the Tampa Bay (FL) Repeater Association provided communications for the CAP members. - (WB4TUP, EC) The Ottawa (ON) ARC and the Ottawa Valley Radio Club supported the University of Ottawa student's fund-raising drive for cystic fibrosis research on Sept. 7-8. They provided 2-meter fm base and mobile operators to assist in the drive. - (VE3DV, SCM)

■ Thirty-five SECs filed monthly reports for Aug., representing 11,425 AREC members. Let's see now, that's only one more report than a year ago and some 800 less members. Hope the new SEC Monthly Report *cards* will boost figures in months ahead. Sections reporting: Alta, BC, Colo, Conn, EBay, ENY, EMass, Ill, Iowa, Kans, Mar, Mich, Miss, Mo, Mont, Nebr, Nev, NFla, NTex, Ohio, Okla, Org, Oreg, SV, SDgo, Sask, SFla, STex, Utah, Va, Wash, WVa, WMass, WNY, WPa.

Traffic Talk

■ When starting a cw net, most net control stations send a CQ or two, the net abbreviation a time or two followed by the NCS's call, then QND (meaning "The net is directed."), QNZ ("Zero beat your signal with mine.") and QNI ("Net stations report in."). There are many variations, but the information imparted is usually the same.

The voice equivalent (for use when "opening" a phone net) might be: "Calling the Ontario Sideband Net, calling the Ontario Sideband Net. This is VE3QIK. The net is directed; zero beat your signal with mine. Stations report in, go ahead." But how often do we hear such a simple introduction?

Instead, we often hear a general rundown of when the net meets, the frequency used and the purpose of the net. The NCS gives his name and location. Stations are told that no one "breaking" the net will be recognized unless they hold emergency or priority or time-valued (whatever that is) traffic. And in some cases, stations are asked to move off frequency if they do not want to join the net. It may take two or three minutes of ramblings before any stations are given the opportunity to report in!

What does all this accomplish? The regular net stations (who are certainly the majority of the stations listening at the beginning of the net) know how and why the net operates. The person on or near the frequency will move when he learns that a net is nearby (if he doesn't, chances are he won't when asked, either!) or join the net when he hears others reporting in. The "casual" operator will likely listen to the net operation before joining and chances are he will not be on frequency at the start of the net anyway.

Take a good listen to your net's "opening statements." Does it really serve a useful purpose or does it detract from an otherwise snappy net session?

■ *Procedural points.* When the NCS sends two stations off net frequency to pass traffic, who calls first? To avoid having both stations call at the same time, standard practice is to have the station who will be receiving the traffic call the sending station. The logic is that since the receiving station will have to do more listening, he should pick the frequency which sounds the clearest to him or, to quote W2MTA in a recent New York State Net Bulletin, "Him who has to copy it should have the option of what QRM he wants to copy it through."

When sent off frequency, choose the nearest frequency to that directed by NCS, but be sure to avoid causing interference to anyone on or near the frequency; move up or down slightly.

■ *National Traffic System.* The appropriate way to list traffic when reporting into an NTS net varies with the different levels of NTS (i.e. local, section, region, area or national nets). In local and section nets, traffic should be listed by town or city if it is destined *within* that local area or section and simply "THRU" if destined outside. On region nets, INCLUDING DAYTIME REGION NETS, list traffic by section (if the section is within that region) or as "THRU" going outside the region. Area nets should only see traffic listed by region, area or foreign country. At the national level (the Continental Traffic Net) traffic is to be listed *by region* or foreign country.

Net control stations: Please (tactfully) correct stations who list traffic incorrectly.

■ *Monthly reports.* Representation on EAN was down a bit in August and Mgr. K2KIR sez "Reps have got to quit getting sick and going to hospitals — our percent representation is suffering as a result. (No sense of priorities . . .)" Hi. Daytime TEN started Sept. 1 at 1900Z GMT on 7263 kHz. Retired TWN Mgr., K7NHL, submits his first report as newly appointed PAN Mgr. Traffic from the Boy Scout Jamboree stations and from fairs raised CTN's traffic count to the highest in its five months of operation. Start of school has necessitated several changes in the D1RN duty roster. Some college stations are increasing the activity on D3RN. WA9EED is still striving for 100% representation for 9RN. New TEN certificates have been issued to WAØs TAQ VBG by WØHI.

August Reports

Net	*Sessions*	*Traffic*	*Avg.*	*Rate*	*%Rep.*
EAN	31	1451	46.8	1.076	93.5
CAN	31	965	31.1	.800	99.5
PAN	31	923	29.8	.849	98.8
CTN	31	660	21.3	.279	72.5
1RN	62	494	8.0	.358	97.4
D1RN	31	141	4.6	.263	68.2
2RN	62	449	7.2	.608	98.7
3RN	62	530	8.6	.500	97.3
D3RN	31	231	7.5	.395	96.8
4RN	54	412	7.6	.307	82.7
RN5	62	636	10.3	.331	92.5
RN6	62	643	10.4	.654	100.0
RN7	62	243	3.9	.285	58.5
8RN	48	346	7.2	.382	67.4
D8RN	26	78	3.0	.228	51.6
9RN	62	494	8.0	.516	90.7
TEN	62	602	9.7	.489	81.1
ECN	62	184	3.0	.280	92.5
TWN	57	263	4.6	.154	65.8
TCC Eastern	113[1]	532			
TCC Central	78[1]	465			
TCC Pacific	108[1]	625			
Sections[2]	2971	11710			
Summary	*3900*	*23077*			
Record	*3146*	*31117*	*16.4*	*1.440*	

[1] TCC functions not counted as net sessions.

[2] Section and local nets reporting (90): APSN (AB), MTN (MB), APN (Mar.), CM GBN ODN OPN OQN (ON), WQ-V/UHF (PQ), AENB AEND AENM (AL), ATEN HARC (AZ), OZK (AR), IEN NCN NEN SCN (CA), CCN SSN (CO), CN CPN NVHFTN (CT), DTN (DE), FAST FMTN FPTN GN QFN QFTN TPTN VEN (FL), GASSBN GSN (GA), IMN (ID, MT), ILN (IL), TLCN (IA), KWN QKS QKS-SS (KS), KNTN KSN KTN KYN MKPN (KY), LTN (LA), SGN (ME), MDCTN (MD-DC), WMN (MA), MJN MSPN PAW (MN), MTN (MS), JC2AN MOAREC MOSSB WEN (MO), MTN (MT), NJN NJSN (NJ), NLI NYS (NY), CN NCSSBN THEN (NC, SC), COAREC-10 COAREC-2 OSSBN (OH), OLZ OPEN OPON SSZ (OK), BSN OSN (OR), EPA KSSN PTTN WPA (PA), TNN (TN), TEX TEX-SS TTN (TX), BUN UCN (UT), VN VRN VSBN (VA), NSN WSN (WA), BEN (WI).

Transcontinental Corps

W3EML has issued TCC-E certificates to W1NJ M W2FR K3MVO (that's 11 in a row to them that Bill has issued), W4UQ (making 10 in a row) and K8KMQ (9 in a row). WA2CXY WAØYDJ/4 VE3SB are new TCC-E members. Successful TCC-C functions include 2 Oscar-6 skeds.

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	123	91.1	1590	532
Central	95	82.1	982	465
Pacific	124	87.1	1326	625
Summary	*342*	*84.3*	*3898*	*1622*

The TCC roster (Aug.): Eastern Area (W3EML, Dir.) - W1s BJG EJI NJM QYY, W2s FR GKZ, WA2s CNE CXY ICU/4 UWA, W3EML, K3s CB, MVO, WA3OGM, W4s SQQ UQ ZM, K4s FAC KNP, WB4s OMG SGV, W8s PMJ VDA/4, K8KMQ, WA8PIM, WAØYDJ/4, VE3SB. Central Area (KØAEM, Dir.) - W4OGG, K4BSS/4, WB4YCV, W5s GHP MI QU SBM TNT, WB5FDP, W9CXY, K9HDP, WA9EED, WØs HI LCX ZHN, KØDDA. Pacific Area (K5MAT, Dir.) - W5RE, K5MAT, W6s BGF EOT IPW ISC MLF RSY VNQ VZT, WA6DEI, WB6s AKR VKV, W7s BQ EM GHT KZ, K7s NHL QFG, WØLQ, KØOTH, WBØAXW.

Independent Net Reports (August)

Net	*Sessions*	*Traffic*	*Check-ins*
20 Meter SSB	23	1119	369
40 Meter SBN	22	1730	205
North American Traffic	27	311	453
Clearing House	27	384	485
Hit & Bounce	31	677	260
Hit & Bounce Slow	16	114	127
IMRA	50	743	1786
7290 Traffic	46	576	1793
75 Meter ISSB	31	325	1234
Ohio Valley Teenage	31	155	238

QST

Hamfest Calendar

Minnesota – The winter Piconet-Handi-Ham Hamfest is December 1 at the Eagles Club in Faribault. Registration is at 9 AM. A dinner follows the program.

New York – The 64th Annual Dinner-Meeting of the Radio Club of America is Friday, November 16 at the Plaza Hotel, New York City. Sen. Barry Goldwater, K7UGA is guest speaker. QCWA and AFCEA members are also invited. Tickets are $15. Write to Jack Poppele, 145 Main Ave., Clifton NJ 07014.

Ohio – The Massillon ARC Auction and Flea Market is December 7. Details from MARC, Box 8711, Canton OH 44720.

Pennsylvania – The Eastern Pennsylvania Section get-together is November 3, at the Country Kitchen, Rt. 30, Paoli, Penn., at 6PM. Details from W3HK.

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.

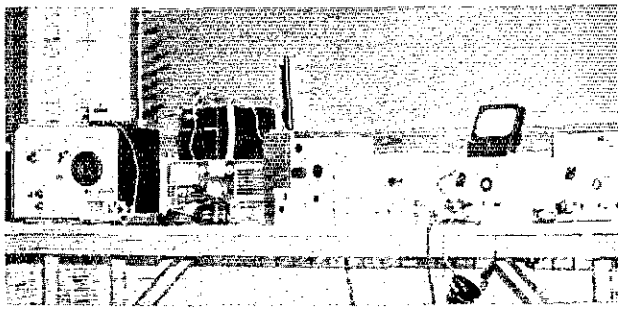
July 18-21 – NATIONAL, New York, N.Y.

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.

Strays

A Homebrew Solid-State Field Day

To most radio amateurs, the annual ARRL Field Day is merely a chance for them to take their home station gear into the field for operation under simulated emergency conditions. However, some clubs take the exercise a bit further and build special gear for the event. The collection of gear shown in the photo is that which was used by TERAC, K7AUO, in mounting a five band effort in the QRP-Battery class in the 1973 FD. Included in the photo are superhet transceivers for 80, 40 and 20 meter cw, a multiband sideband transceiver, modified "Mountaineer" type direct conversion stations for 40 and 15 cw and a 2-meter fm system, complete with a 10 watt "brick." The reader should not be fooled by the commercial appearance of some units. For example, the tubes in the SBE-33 have been replaced with a broadband solid-state linear power chain. Those participating in the construction efforts include W7ADV, W7BKN, W7UDM, K7UVK, W7VOK and W7ZOI.



Here is another triple A repeater call, this one for the first call area. The fellows from the Malden Mass. ARC presented the trustee, Mel Dunbrack, W1BHD, with a new call "sign". From the left, standing, WA1HPS, K1VTE, W1BHD, WA1QLC and K1VWL.

Mrs. Lois Vines may have established a "first" when she recently defended her Ph.D thesis via an amateur radio link between WA3FXJ at Georgetown University in Washington, D.C. and HK5AIT in Cali, Columbia. It is normal procedure for the student's mentor and two readers to participate in the oral defense; however, Mrs. Vines' mentor is on a sabbatical in Columbia and will not return to the U.S. until the Fall semester. As a result, of a suggestion by Rev. Dineen, acting dean, Mrs. Vines was able to complete the requirements for her degree through the use of amateur radio.

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.

Happenings of the Month

- League Asks Code Test Credit
- ARRL Election Results
- RACES Comments Filed by League
- More Time for CB Filing

ARRL ELECTION RESULTS

Last month's editorial speculated that many of the posts open in League elections this autumn would go uncontested. And so it proved to be: in six of the eight divisions, there was only one candidate for director and, in one of these, only one for vice director as well. Accordingly, the Executive Committee on September 29 declared the following people reelected without membership balloting:

Noel B. Eaton, VE3CJ, director, Canadian Division

A. George Spencer, VE2MS, vice director, Canadian Division

Larry J. Shima, WØPAN, director, Dakota Division

Max Arnold, W4WHN, director, Delta Division

Larry E. Price, W4DQD, director, Southeastern Division

In the Great Lakes Division, **Richard A. Egbert, W8ETU,** of Reynoldsburg, Ohio, (who became director on September 8, 1973, upon the death of Alban A. Michel, W8WC) was also reelected, as the only candidate. Dick has been vice director since January 1, 1972, and was an assistant director in 1971. From 1968 to 1972 he served as SCM of the Ohio section, and in the four years prior, had been CD radio officer and ARRL emergency coordinator for Franklin County. W8ETU has been secretary of the Order of Boiled Owls, Columbus Chapter since 1965, holds appointment as ORS and OBS, and is a member of QCWA, Ohio Single Sideband Net, Buckeye Net, Central Ohio AREC, the A-1 Operator Club and is a Life Member, ARRL. Dick is an engineering manager at Rockwell International, developing guided missiles.

The lone nominee for director in the Midwest Division (where incumbent Ralph V. Anderson, KØNL, was not a candidate) was **Paul Grauer, WØFIR/WAØLLC,** of Wilson, Kansas. Paul owns and operates the Wilson Telephone Company, is a director of the Wilson State Bank and of the Farmers State Bank of Lucas, and was mayor of his city for three terms. He is rounding out a term as vice director of the division; serves as president of the Jayhawk Chapter, Telephone Pioneers of Kansas; and was Kansas Amateur of the Year in 1967. WØFIR is active in a number of traffic nets and holds appointments as EC, OPS, and OBS. First licensed as 9FIR in 1928, Paul is a Life Member of ARRL.

There are contests for two directorships and seven vice director offices. Ballots are being sent the second week in October to Full Members of record September 20, including licensed Family Members. Since our non-profit organization mailing permit is used, delivery dates are not uniform; however, Full Members of the Atlantic, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions who have not received ballots by November 1 should get in touch with Hq., enclosing if possible the mailing label from a recent *QST*. Ballots must reach us by noon November 20, and the results will be announced by bulletin from W1AW on late afternoon and evening schedules.

ARRL REPLIES IN RACES INQUIRY

In June this department (page 77) reported an FCC inquiry into the Radio Amateur Civil Emergency Service (RACES), Docket 19723. Below we print the text of the League response, formulated under guidelines adopted at the July meeting of the ARRL Board of Directors and utilizing input from the ad hoc committee on emergency communications, SCMs and SECs.

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

In the Matter of	)
Inquiry into the Provisions	) Docket 19723
of Subpart F, Radio Amateur	) RM-968, 1116
Civil Emergency Service	) 1478
(RACES), in Part 97.	) 2032

RESPONSE TO NOTICE OF INQUIRY

The American Radio Relay League, Incorporated, respectfully submits the following comments concerning the Radio Amateur Civil Emergency Service (RACES) in response to the Notice of Inquiry released April 20, 1973 (FCC 73-40).

1. One of the basic purposes and objectives of the Amateur Radio Service, as stated in Section 97.1 of the Commission's Rules, is "providing emergency communications." The fulfillment of that objective long before any rules existed was one of the reasons the League was organized 60 years ago. The very first sentence of the Rules and Regulations of the League's Communications Department is, in pertinent part, as follows:

1. The League maintains a Communications Department to effectuate the following purposes and objectives; the organization of members for practical communications *with particular attention to emergency preparedness and communications service in the public interest;* .. . . (Emphasis supplied)

For almost 40 years, at least one member of the League's staff has devoted much of his time to the planning and coordination of emergency preparedness and communications on a national scale.

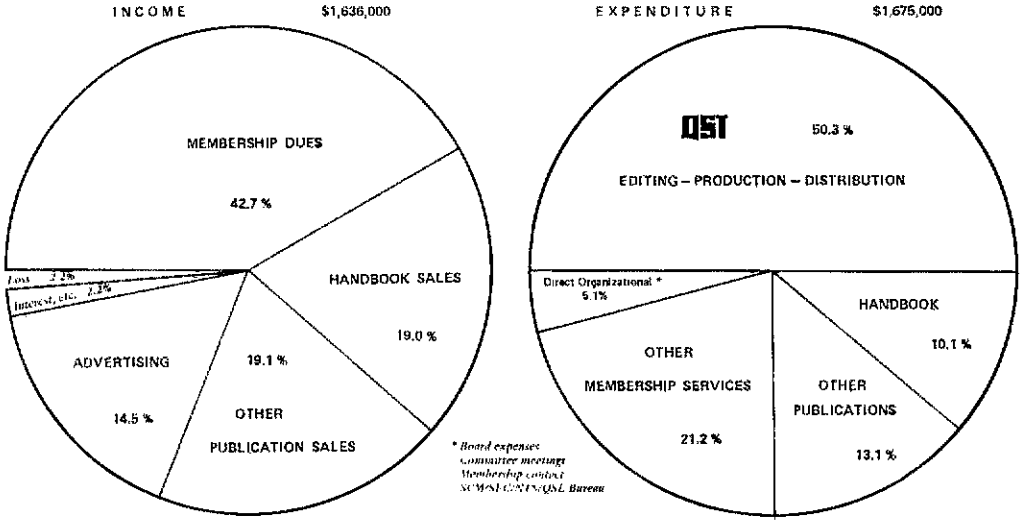
2. RACES is but one of several groups of amateurs devoted to emergency communications. Others include the League's Amateur Radio Emergency Corps (AREC), established in 1935, and the National Traffic System (NTS), established in 1949. Both were incorporated into the League's Amateur Radio Public Service Corps (ARPSC) in 1963. In recognition of the ever-increasing importance of the role of the Amateur Radio Service in emergency communications, the League's Board of Directors, at its annual meeting in January 1973, authorized the formation of an Emergency Communications Advisory Committee. The Notice of Inquiry to which these comments are directed was issued prior to the selection and appointment of the members of that committee. Upon the issuance of the Notice, the League's President appointed a temporary committee to assist in formulating this response. The views expressed herein reflect, to a considerable extent, those of the temporary committee and the League's Communications Department, including the latter's communications from the League's Section Communications Managers and Section Emergency Coordinators.

3. A brief review of the history and background of RACES will assist in understanding the views expressed herein. With the entry of the United States into World War II, all amateur transmissions within the country ceased. The need for a more effective radio communication capability within the population centers of the United States in the event of attack by the enemy soon was recognized, and the War Emergency Radio Service (WERS) was established, with operation restricted to the 112-116 MHz amateur band. The Service was directed and administered by the Office of Civil Defense, and was terminated at the end of the war. The need for a somewhat similar service administered by the government was recognized in 1951, and led to establishment of RACES in 1952. As the threat of enemy attack diminished over the years, the Civil Defense establishment, including RACES, gradually shifted much of its attention and activities to disaster preparedness. Subpart F of the amateur rules of the Commission is devoted to RACES. Section 97.161(a) is as follows:

> (a) The Radio Amateur Civil Emergency Service provides for amateur radio operation for civil defense purposes only, during periods of local, regional or national civil emergencies, including any emergency which may necessitate invoking of the President's War Emergency Powers under the provisions of Section 606 of the Communications Act of 1934, as amended.

Two of the definitions in Section 97.163 are as follows:

> (a)*Radio Amateur Civil Emergency Service.* A radiocommunication service carried on by licensed amateur radio stations while operating on specifically designated segments of the regularly allocated amateur frequency bands under the direction of authorized local, regional or federal civil defense officials pursuant to an approved civil defense communications plan.
>
> (c) *Civil Defense Communications.* Communications or signals essential to the conduct of civil defense activities of duly authorized civil defense organizations, including communications directly concerning safety of life, preservation of property, maintenance of law and order, alleviation of human suffering and need and dissemination of warnings of enemy



These "pie charts" summarize the League's financial picture for the 1972 calendar year. A detailed operating statement is available to League members who send in a business-sized s.a.s.e.

The Cleveland Society for the Blind was host to a statewide convention earlier this year; they also sponsored a booth at which the Apricot Net explained amateur radio as an avocation for the sightless. Manning the booth: Eunice Bernon, K8ONA; Anita C. Bien, W8TAY; Joseph E. Veliconia, WB8HZJ; (standing) Werner K. Sauber, W8KC.

> attack to the civilian population in case of actual or impending armed attack or in any disaster or other incident endangering the public welfare. Such communications may also include transmissions necessary to establishment and maintenance of radio system and communications essential to the training of civil defense personnel.

Amateur stations authorized to engage in RACES operations are limited to relatively narrow portions of the amateur bands below 225 MHz (Section 97.193).

4. Disasters of major scope have occurred almost annually in the United States in the 21 years since RACES was established. The role of RACES has varied with each. In some instances, the contributions of RACES were most significant; in others, AREC was the backbone of emergency communications. In some, RACES and AREC operated almost separately; in others, the two were integrated into a single combined activity for most practical purposes. The differences in the relative importance of the two groups resulted, in large measure, from the leadership. One of the reasons RACES was not more effective in some disasters was the failure of the local civil defense officials to fully understand the characteristics and capabilities of the Amateur Radio Service. Another reason is the lack of a clear-cut answer to the question of whether RACES is an amateur service for civil defense communications or a civil defense service utilizing amateur facilities.

5. The first question of the Commission is:

> "I. Is RACES an effective means of providing needed communication services during periods of local, regional, or national emergencies?"

This question cannot be answered either "yes" or "no." In some areas of the United States, RACES is highly and skillfully organized, with excellent capabilities for service during periods of local and, to a somewhat limited extent, regional emergencies. In other areas, RACES is nonexistent. Because each RACES organization is established and administered by local civil defense officials, RACES does not and probably cannot provide other than local and limited regional service. To provide a national service, RACES must be tied into some other amateur organization such as NTS. A far more comprehensive study is necessary for the formulation of specific suggestions as to how RACES might be expanded throughout the nation and made a far more effective service. But one answer is clear. RACES should not be abandoned.

6. Next the Commission asks:

> "II. Is the present licensing system for RACES stations appropriate? Should stations authorized to be operated in RACES be assigned distinctive call signs which could only be used for RACES activities?"

The response to the first of these questions is limited by the scope of Question IV relating to "frequencies, emissions, [and] operators." As so limited, the response is that the present licensing system can stand some improvement. Some on the temporary advisory committee and others submitting comments to the Communications Department have suggested (1) that only licensed amateur operators be permitted to operate in RACES[1]—and (2) that station licenses be issued directly to the local or area civil defense director, the communications officer, or the radio officer, even though not a licensed amateur operator, similar to the issuance of station licenses for military recreation stations. (Section 97.37).

7. With respect to special call signs, Section 97.213 now provides for the assignment of "tactical or secret call signs by the Commission or by competent civil defense authority" and for their use if properly registered with the civil defense radio officer and, except in time of "actual or threatened conditions which appear to jeopardize the defense or security of the United States," if properly registered with the Commission. With the shift in the role of civil defense over the years, with less emphasis on enemy threats and attacks and more emphasis on natural and man caused disasters, the need for tactical and secret call signs has greatly diminished. Recognition of emergency operations and identification of stations participating in RACES is most desirable, particularly if the self-policing practices of amateurs are to be effective in minimizing unintentional interference from non-participating stations. Inasmuch as most RACES communications are in voice, a simple means of identifying a station as engaged in RACES operations is desirable. One suggestion is to merely identify as "RACES W1AW." No knowledge of the significance of special and seldom used prefixes or suffixes would be required.

8. The next question is:

> "III. What abuses, if any, of the Rules by RACES stations are commonplace? What are possible solutions to ending these abuses?"

Complaints have been received from time to time over the years that some agencies have abused the provision of the rules that RACES stations and nets may engage in drills by conducting entirely

1 Any person holding any operator license issued by the Commission, amateur or commercial, may be authorized by the local Civil Defense officer to operate a RACES station. (Section 97.203(c)). Any amateur station owned by a person holding an Extra, Advanced, General or Conditional Class amateur operator license may be authorized by the Commission to participate as a RACES station. (Section 97.179)

unrelated operations. One example is communication between members of a city department concerning routine city business completely unrelated to civil defense or disaster preparedness. However, the number and nature of such complaints cannot be termed "commonplace" or widespread. Any such abuses can be terminated promptly by enforcement of the existing rules.

9. The next question is far more comprehensive and cannot be adequately answered in the brief time provided.

> "IV. Should additional or different privileges, e.g., frequencies, emissions, operators, be authorized for RACES stations? What are the most needed additional privileges? What are the consequences, to both RACES and the Amateur Radio Service in general, if RACES privileges are expanded? What are the consequences if RACES privileges are not expanded?"

At the outset, it must be remembered that the Commission issues two separate and distinct licenses to almost every radio amateur. One is the operator license, with privileges commensurate with the class. The other is the station license. The privileges run with the operator license and not with the station license. This distinction must be remembered when considering privileges.

10. The recent development and widespread use of repeaters in the 146-148 MHz band and, to a lesser extent, in the 220-225 and 420-450 MHz bands, has opened up new and highly efficient local and limited area communication capabilities for and by amateurs. Although RACES operations in the 144-148 MHz band are restricted by Section 97.193(a) to 145.17-145.71 and 146.79-147.33 MHz, suggestions have been received (1) that repeaters for RACES be shifted to the 146-148 MHz band to conform to Section 97.61(c), and (2) that repeaters assigned to or operated under RACES during emergencies be made available for normal amateur use at other times, thereby providing practical experience with the coverage, operational characteristics, and equipment reliability of the repeater as well as providing a substantial number of portable, mobile (including hand held units), and fixed stations with requisite frequency capability.

11. With respect to operating "privileges" by various classes of amateur operators, many have suggested that Technician Class operators be permitted to hold station authorizations in RACES. In support, the argument has been made that the experience and discipline obtained by Technicians from the operation of and through repeaters above 146 MHz have provided a highly skilled corps of operators and a vast pool of excellent equipment fully capable of handling emergency communications and traffic on frequencies not otherwise available to Technicians. Although the League is not prepared at this time to make a firm recommendation, these suggestions are referenced for the Commission's consideration.

12. The necessity for additional frequency space for RACES and the justification for retention of all of the space now assigned to RACES has not been considered to any significant extent because of the lack of time and the vagueness of the Commission's questions. Except for a reassignment of frequencies in the 144-148 MHz band as noted above, no suggestions or recommendations are submitted at this time.

13. The Commission's final question is:

> "V. What additional safeguards, if any are required to insure that non-essential RACES radiocommunication is not conducted to the detriment of non-RACES amateur radiocommunications?"

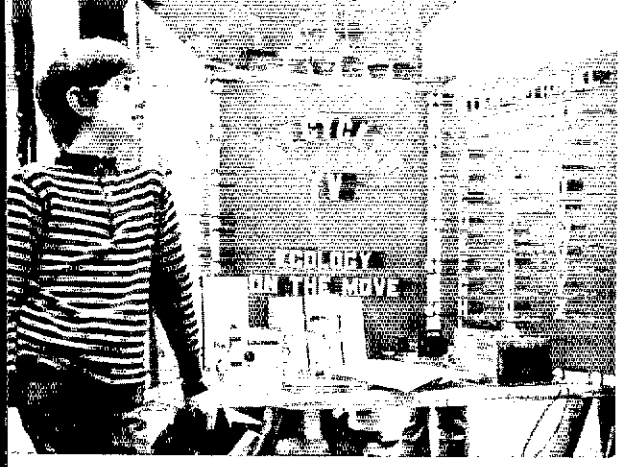
The answers to Question III are equally applicable to this question. Based upon the information now available, abuses are not so widespread or "commonplace" as to require, at least at this time, any action other than more rigid enforcement of existing rules promptly upon receipt by the Commission of well founded and adequately documented complaints.

14. Even though each of the Commission's questions has been answered, some additional comments are pertinent.

15. The voluntary nature of amateur radio reserves to each amateur the extent and manner in which he will engage in emergency preparedness and operations. RACES is preferred by some, and AREC is attractive to others. Tens of thousands actively participate in one or more of the hundreds of nets. In times of disaster, each organization has a role to fulfill. One of the weaknesses of RACES is that, with few exceptions, the civil defense authorities have little understanding of the strengths and capabilities of amateur radio, with the result that many amateurs turn to AREC, NTS or some other group. If the Commission desires to strengthen RACES, it may be desirable to limit participation in all operations to licensed amateur operators. One of the attributes of RACES is that it is tied into other disaster organizations. The Commission can encourage amateurs to engage in emergency preparedness, but it cannot order them to do so and cannot dictate the extent and manner in which they participate. From a practical standpoint, the major role of the Commission in times of disaster is to clear frequencies for emergency traffic and to relax the restrictions on the nature of the messages.

16. The RACES rules are outdated. Many have expressed the view that basic, not merely cosmetic, revisions are desirable. Unfortunately, the scope of the questions in the Notice of Inquiry are so limited and the time for comment was so brief that the League is unable at this time to submit more specific proposals. It is anticipated that the newly established Emergency Communications Advisory Committee will develop specific recommendations and proposals once it becomes fully operational.

Harold L. "Prof" Sheets, WØDM, SCM of North Dakota, was awarded the "Ham of the Year" plaque at the Peace Garden Hamfest by its cochairman, Dr. Mel McKnight, WAØSTB.



Timmy Lightfoot, WN5JCZ, won a regional first prize in a Science Fair with his ten watt crystal-controlled transmitter built from old TV parts; he was a student at Rocky Mount Junior High School, Plain Dealing, Louisiana.

The League shall continue to review disaster plans and problems with various bureaus and divisions of the Commission on an informal basis as it has done over the years.

Respectfully submitted,
THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
By Robert M. Booth, Jr.
Its General Counsel

August 31, 1973

LEAGUE ASKS CODE CREDIT

ARRL has filed a request for rulemaking which would give amateur applicants a second try at the code test without payment of another $9 fee. The text follows:

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

In the Matter of

Amendment of Section 1.1115(c), Rules and Regulations (Amateur radio examination fees)	)))	RM-

To: The Commission

PETITION FOR RULE AMENDMENT

The American Radio Relay League, Incorporated, respectfully requests the Commission to amend Section 1.1115(c) of its Rules by adding the following as subsection (c) (10):

> (10) Applications for the first reexamination for an amateur radio operator license provided such applications are filed not more than six months after failure to pass the required code test.

In support whereof, the following is respectfully submitted:

1. Every applicant for an amateur radio operator license is required to pass a code test. Examinations for the Amateur Extra, Advanced and General Classes are conducted by a Commission employee or representative. (Section 97.33(a)). Before beginning the examination, the applicant must pay the prescribed fee, which now is $9.00. (Section 1.1115(a)). If the applicant passes the code examination, he then is permitted to take the written examination; failure terminates the examination. (Section 97.31(a)). If he fails the code examination, no portion of the fee is refunded or credited for future reexamination. Further, reexamination is not permitted within 30 days. (Section 97.33).

2. One who has not taken a code test, particularly outside Commission field offices, has no understanding of the unsatisfactory conditions and surroundings that usually exist and the tensions of almost every applicant. The receiving test is administered with the applicant frequently seated on an uncomfortable armchair desk – often not adaptable for left-handed persons – and by reproducing through a loud speaker code characters and groups prerecorded on a tape or other device. All too often, the combination of poor acoustics, an uncomfortable chair and desk, a room crowded with other applicants taking the same test at the same time, and the natural nervousness and sweaty hands, produce a very high percentage of failures. The examiner merely says, "You failed, sorry, try again after 30 days." Based upon reports from numerous amateurs, a high percentage of those who failed the first time are successful the second time.

3. The authority under which the Commission establishes and collects fees, Title V of the Independent Offices Appropriations Act of 1952 (31 U.S.C. 483(a)), requires that fees shall be:

> Fair and equitable taking into consideration direct and indirect cost to the Government, value to the recipient, public policy, or interest served, and any other pertinent facts . . .

The payment of $9.00 – the present fee – for the privilege of trying to copy code for only five minutes, followed by grading which takes only a minute or so, is indeed a high price to pay, particularly when the applicant usually has incurred other and most substantial direct and indirect costs for travel and loss of pay while away from work. If the applicant is a student – a very high percentage of new amateurs are still in school – $9.00 often is substantial. The payment of two fees for only ten minutes of examination – if the applicant fails the code test a second time – far exceeds the test established by Congress which is quoted above.

4. Section 1.1115(c) may be amended as proposed by a simple order without the necessity of rule making as the change, insofar as the public is concerned, is procedural rather than substantive.

Wherefore, the premises considered, it is respectfully requested that the Commission issue promptly a simple order amending Section 1.1115(c) of its Rules as proposed above.

Respectfully submitted,
AMERICAN RADIO RELAY LEAGUE
INCORPORATED
By Robert M. Booth, Jr.
Its General Counsel

September 5, 1973

MORE TIME FOR CB FILING

Last month we ran the text of ARRL's appeal for a five-month extension of time for filing comments in Docket 19759, FCC's proposal, based on an Electronics Industries Association (EIA' request, to create a new Class E citizens radio service in the 224-225 MHz portion of our amateur band. The request for delay, which incidentally drew the support of the United States Citizens Radio Council, Inc., was denied by the acting chief, Safety and Special Radio Services Bureau. ARRL appealed to the full Commission, but we were turned down again. (The text of our appeal follows this item.) The Land Mobile Section of EIA was also turned down on a request for a 30-day extension.

Finally, however, the acting chief, Safety and Special Radio Services Bureau, on his own motion, extended the time for comment in Docket 19759 *to October 19 and for reply comment to* November 23, 1973, respectively. The order said, in part,

". . . We believe that a 30 day extension has become appropriate for the convenience of the parties who may wish to file comments. We note in this regard the inordinate delay in the release of the Order denying the EIA petition for an extension of time. *Further, we note in regard to reply* comments that renovation of the Commission's public reference room potentially may create some difficulties for interested parties desiring to obtain and study the comments filed in this Docket. . ."

The League's filing in opposition to Docket 19759 runs some fifty pages; among other things, it requests oral argument before the Commission *en banc.* While the deadline for filing one's own reactions has passed, *there is still time to answer* arguments put forth by others through the filing of "reply comments." Inquiries from Congressmen into the matter may, of course, be sent over to the Commission at any time.

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, RMs 1633, 1656, 1747, 1761, 1793, 1841.)

To: The Commissioners

APPEAL FROM ADVERSE RULING ON REQUEST FOR EXTENSION OF TIME

The American Radio Relay League, Incorporated, respectfully requests the Commissioners to review and set aside the Order of the Acting Chief, Safety and Special Radio Services Bureau, released September 12, 1973 (Mimeo 06545), denying the League's request for an extension of time to file comments and replies in response to the Notice of Inquiry and Notice of Proposed Rule Making, released June 12, 1973 (FCC 73-600).

In support whereof, the following is respectfully submitted:

1. The proposal to reallocate a portion of the 220-225 MegaHertz band, which is assigned by treaty to Radiolocation on a primary basis and to the Amateur Radio Service on a secondary basis, is a far more complex proposal than it would appear to the casual observer. The proposal not only involves derogation of a treaty to which the United States, Canada and Mexico are parties, but also involves the threat of destructive interference to Radiolocation services of the United States Government in various areas of the country including the White Sands Missile Range. The Office of Telecommunication Policy has endorsed the proposal only if a *disciplined* service could be established, i.e., one which would guarantee protection of Radiolocation from interference. (Notice, para. 4). To prevent interference, both to Radiolocation operations in the United States and to Radiolocation and Amateur operations in Canada and Mexico, the Notice proposes to establish prohibited areas in Florida and New Mexico and within 20 miles of the Canadian and Mexican boundaries.

2. The threshold question confronting the Commission is "How can a disciplined Citizens Radio Service be devised?" Even though the purpose of this proceeding is not to find solutions to the many serious problems of the Class D (27 MHz) Citizens Radio Service, a thorough understanding of the Class D service is a prerequisite to devising a *disciplined* Class E Service for the 220-225 MHz band. Thus, the problems of and lessons learned from the Class D service must be understood and applied to the proposal to create a new service in the 220-225 MHz band.

3. The League's request for an extension of time was based *solely upon the magnitude of the* task of developing and preparing the "specific comments and substantiating data" requested by the Notice (para. 10) and its sincere desire to be of assistance to the Commission. The studies conducted by the League to date indicate that there may be a way to expand the present Citizens Radio

Here Timmy, WN5JCZ (right rear) is joined by three of his classmates in a course conducted by *Dwight M. Brown, Jr., W5WE* (to whom tnx for the pix!): Junior Harris (left foreground); Chuck Carraway, WN5JEK; Ricky Compton (left rear).

Service without having such a high level of *discipline* as required to prevent interference to Radiolocation or other essential services and without derogation of treaty obligations and yet avoid a recurrence of the problems of the present Class D 27 MHz service.

4. The League's request for a five-month extension of time to submit comments and replies[1] was based solely upon the desire to provide constructive assistance to the Commission. The matters requiring in-depth study are simply too many and too complicated to be started and completed by the League's volunteer committees and groups and by its professional staff and consultants within the 3 months provided by the Notice. Further, the Amateurs of the United States, and also of Canada and Mexico, have a most important stake in the outcome of this proceeding. Particularly since the adoption of the VHF repeater rules a year ago (in Docket No. 18803), Amateur interest and use of the 220-225 MHz band have grown at a phenomenal rate. The Commission must have as complete information as possible before it can make required public interest determination as to how the best use can be made of the shared 220-225 MHz band.

5. The extremely brief period for developing and presenting "specific comments and substantiating data" has proven to be entirely unreasonable. The refusal to grant at least some extension of time is *unprecedented* in rule making proceedings[2]. In fact, the League's request was so reasonable, in light of the importance and complexity of the subject matter, that its denial under delegated authority by the Acting Chief of the Safety and Special Radio Services Bureau was arbitrary and capricious and, unless set aside, may bring about a denial of the due process guaranteed by the Administrative Procedure Act.

Wherefore, the premises considered, the Commissioners are respectfully requested to reconsider and set aside the Order of the Acting Chief, Safety and Special Radio Services Bureau, and to grant additional time to submit comments in response to the Notice in this proceeding.

Respectfully submitted,
AMERICAN RADIO RELAY LEAGUE,
By Robert M. Booth, Jr. *Its General Counsel*

September 17, 1973

[1] The Petition For Extension of Time filed by the League on August 21, 1973, requested, on page 1, an extension of five months for the submission of both comments and replies. Through an oversight, the date for replies shown on the last page was erroneously given as May 22, 1974, rather than March 22, 1974. The Order denying the petition noted only the May date.

[2] Counsel for the League does not know a single rule making proceeding during the last ten years in which at least one extension of time has not been granted upon request by an interested party. The haste displayed in this proceeding is unprecedented and already has been construed by many as a "ramrodding" of the proposal by its proponents.

ALBAN A. MICHEL, W8WC/W8SMQ

We regret to report the death, on September 8, of Alban A. Michel, W8WC/W8SMQ, director from the Great Lakes Division since January 1, 1968. Al held his first amateur operator license in 1916, his first station license – 8WC – in 1922. More recently, he has been variously the president, vice president and a director of the Greater Cincinnati Amateur Radio Association; president of the Ohio Valley Amateur Radio Club; chairman of the Cincinnati-Dayton Chapter, QCWA; radio officer, Hamilton County Civil Defense; and a member of AREC, OOTC and RSGB. W8WC was honored as Amateur of the Year at the 1971 Dayton Hamvention, and is a member of the Cincinnati Amateur Hall of Fame. Al will be deeply missed both at the Board meetings and among his fellow Great Lakes Division amateurs.

DONALD H. MIX, WITS

Another key fell silent – that of Donald H. Mix, the "Sleepless wonder of ITS," on September 19. The radio pioneers among us remember Don as the operator of WNP "Wireless North Pole" aboard the schooner *Bowdoin* when Admiral Donald B. MacMillan took her to the Arctic in 1923. Don was a member of the League technical staff from 1932 to 1969 when he retired as assistant technical editor of *QST* (but doing additional work for the League since then as an editorial consultant). In the postwar years alone, Don was author of some two dozen *QST* articles of his own, including our favorite, "Ivory Tower Confessions," in July 1959, and has edited countless other manuscripts for the magazine. An avid amateur all along, Don had the knack of listening at the right time – from the twenties, when his lists of "Calls heard" were always impressive, to the sixties, when staff members gave him a plaque commemorating his thousandth Asian QSO. Don was 71 years old, and lived in Bristol, Connecticut.

C. R. RUNYON, JR, W2AG

A third early amateur to die recently (on September 19) was C. R. Runyon, Jr., W2AG, 80, of New York. A long time friend and associate of Major Howard Armstrong, OM Runyon built the fm station which was used to demonstrate the new mode to a meeting of the Institute of Radio Engineers (now Institute of Electrical and Electronic Engineers) in 1934. He was founder and president of Radio and Engineering Laboratories and a founding member of the Radio Club of America. With his passing there remains only one of the original Life Members of the League (class of 1919): our cofounder and first secretary, Clarence Tuska, ex 1WD. The members of this class put in the money which was used to start reorganizing the League after World War I – an exercise in faith, if ever there was one!

PROVISIONAL LICENSES IN CANADA CLARIFIED

Applicants for amateur operator certificates in Canada whose residences are "remote from an examination centre" are permitted to obtain a Provisional Amateur Operator's certificate by declaration; within a year, the holder of such a certificate is expected to visit a DOC office and sit for the regular examination. At League request DOC has clarified the phrase, "remote from an examination centre," as an area "more than one day's travel from the nearest examination centre, excluding travel by aircraft."

VIRGINIA FORBIDS HEADSETS, TOO

In September, page 78, we mentioned a new Florida law prohibiting the wearing of headsets by operators of motor vehicles. We learn, thanks to WB4OXD of the Norfolk, Virginia, police department, that a similar rule became effective in his state on June 1, 1973. It reads,

"Section 46.1-202.1 State Code: It is unlawful to operate a vehicle while wearing headphones. Part A. It shall be unlawful for any person to operate a motor vehicle on the highways of this commonwealth while using ear phones on or in the ears. Any person violating this section shall be guilty of a misdemeanor. Part B. For the purpose of this section, "earphones" shall mean any device worn on or in the ears which converts electrical *energy to sound waves or which impairs or hinders* the person's ability to hear, but shall not include any prosthetic device which aids the hard of hearing, nor does it include the driver of any police vehicle or any fire vehicle used exclusively for fire fighting, any ambulance, or rescue, or life saving vehicle used for the principal purpose of emergency relief.

The purpose of the law seems to be to stop the use of headphones connected to entertainment devices because they tend to shut out the sound of sirens on emergency vehicles. If readers have details on similar laws in other states, please drop us a line.

RULEMAKING REQUESTS & A DENIAL

A petition has been filed by Gerald A. Cohen, WA1CYT, asking that FCC change its procedural rules so that, if FCC fails to act on an amateur license application within 60 days, the fee therefor would be refunded. The file number is RM-2229.

Max Grossman, WA7LZL, has asked for a change in Section 97.95(b)(2) of the amateur rules so that, when U.S. amateurs are on (or over) the high seas (outside the territorial waters of any country), they may use all of the amateur frequencies between 3.5 and 148 MHz. At present, amateurs on the high seas in the Western Hemisphere may operate between 7.0 and 148 MHz; elsewhere, only on 7.0-7.1, 14.0-14.35, 21.0-21.45 and 28.0-29.7 MHz. This request is RM-2243.

The Chief Engineer of FCC, on delegated authority, has denied a request for rulemaking, RM-1857, which sought regulations governing "electromagnetic smog." The petition had been submitted by Gabriel F. Gargiulo, WA1GFJ in September 1971.

EXECUTIVE COMMITTEE MINUTES

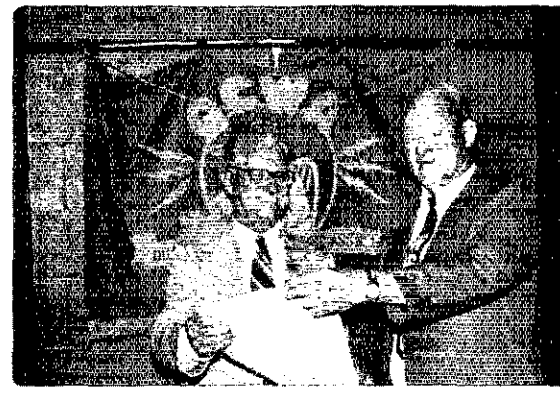
Minutes of
EXECUTIVE COMMITTEE MEETING

No. 347 Sept. 29, 1973

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at Dunfey's, Hyannis, Mass., at 9:05 a.m. September 29, 1973. Present: President Harry J. Dannals, W2TUK, in the Chair; First Vice President Charles G. Compton, WØBUO; Directors Noel B. Eaton, VE3CJ, John R. Griggs, W6KW, and Robert B. Thurston, W7PGY; and General Manager John Huntoon, W1RW. Also present were General Counsel Robert M. Booth, Jr., W3PS, Asst. General Manager R. L. Baldwin, W1RU. Directors Robert York Chapman, W1QV, Charles M. Cotterell, WØSIN, Harry A. McConaghy, W3SW, Larry E. Price, W4DQD, Larry J. Shima, WØPAN, and Stan Zak, K2SJO; and Vice Director John C. Sullivan, W1HHR.

On motion of Mr. Thurston, unanimously VOTED to grant affiliation to the following societies:

American University Amateur Radio Club, Washington, D.C.; Boise County Radio Amateur Club, Idaho City, Idaho; Central States VHF Society, Inc., Incorporated in Colorado; Columbia Amateur Radio Association, Columbia, Md; Huntington VHF FM Association, Inc., Oyster Bay, N.Y.; Mid-Cities Amateur Radio Club, Arlington, Texas; Mid-South DX Association, Memphis, Tenn.; Plano Amateur Radio Klub, Plano, Texas; Sand Creek Jr. High School Radio Club, Albany, N.Y.; Sehome High Amateur Radio Club, Bellingham, Wash.; The Society For The Preservation Of Amateur Radio In Kodiak(SPARK), Kodiak, Alaska.



James P. Barth, W5KCO, has received a commendation signed by the National President of QCWA, Senator Barry Goldwater, K7UGA, for his work in establishing the antique wireless display at the Aerospace Museum, Balboa Park, California. Making the award is Gerald A. Estep, W6JAO.

During the above action, there was discussion of the status of the Central States VHF Society, and a recognition that it may not precisely fit the rules as a "local" group; the President was directed to request the Membership Affairs Committee to *explore appropriate changes in the rules to ensure* adequate ARRL liaison with such outstanding groups.

On motion of Mr. Compton, unanimously VOTED to approve the holding of a Georgia State Convention in Atlanta on June 8-9, 1974, and a Florida State Convention in Orlando on June 15-16, 1974.

On motion of Mr. Griggs, Life Membership was unanimously GRANTED to the following applicants:

Robert G. Affel, W4TOW; James P. Alexander, K2ASI; Edward C. Anderson, Jr., W8DUW; Lynn C. Anderson; Robert N. Anderson, K4OSW; Allen

F. Antoniac; W. P. Armstrong, WØNC; Juan Aliaga Arque, EA3PI; Charles J. Ashworth, Jr., W1BIS; Garry L. Atkins, WB9ANT; Earl Aulman, WA7-NWV; Leroy R. Auxier, WAØDNV; Bruce N. Ballew, WB4AYN; Robert A. Barden, WA2RJZ; Patrick M. Barkey, WA8YVR; Raymond B. Bass, W7YKN; F. W. Bassermann, VE2BQF; John E. Becker, K9WEH; William J. Benton, Jr., WB5CMX; W. Taylor Benton, W4FPI; Paul E. Bittner, WØAIH; Kenneth W. Blair, WAØSEV; Charles W. Bostian, W4KEP; Lloyd W. Brubaker, WA6KZV; Ralph E. Bugg, K8HSQ; Karl W. Bullock, WA5TMC; Fred D. Campbell; William E. Campbell, Jr., K5SBR; W. H. Cantrell, WA5YPI; William P. Carpenter, W1SO; Joseph M. Cassano, K3FMA; Albert T. Chapulis; Raymond D. Charland, WA1IKJ; David W. Clements, WB4WAB/KL7; Leonard R. Cochran, WA5-ZUL; Robert W. Coker, WA5ZNZ; Charles Cone, Jr., W4GKF; Allen B. Corderman, WB2IWQ; Thomas A. Cordich, WB6LPN/WA6LSW; Charles C. Creekmore, WB6RVJ; Carl A. Croce, K3DLS; George W. Daly, W3QDQ; M. Daviau, VE2DDV; William W. Douglas, KZ5WDN; Ralph L. Duvall, Jr., W3GL; Thomas H. Earnest, W5UFO; Billy R. East, WA5ATF; Richard A. Egbert, W8ETU; Russell F. Ellis, W4SID; Robert Farnum, WB5FVN; Werner A. Fehlauer, WB2BRB; Don P. Ferrante, WA8EDQ; Doug M. Fleenor, WA6VMN; Robert N. Fournier, WA4UTP; Warren R. Fugate, WA3SRM; Philip S. Gale, WA2PBG; Vincent P. Gambino, WB4QJO; Dwight Gann, K5MQA; Stephen G. Gaspar, WA2QZD; Hobart L. Geer, W3SN; Michael Gershman, WB2CIT; Linus J. Glatzel, WAØITR; Joseph W. Goldston, K4TBE; Ivor M. Grant, WN6FHQ; Norman D. Grant, WA1JYY; R. William Gray, W2FWK; Donald E. Greene, WN7VZV; Bernard D. Greeson, K9CUC/WA1KHN; Thomas L. Gregory, WB4OXD; Billy C. Hall, WB6CQR; Jean S. Hall, WA8OXL; Thomas Hammack, Jr., W4WLF; Gerald Parks Handley, II, WA5DBY; James Hanson, WA4FVC; James D. Hardy, K4-HAV; Robert A. Hart, WA7HRA; Ian T. Haynes, VE2ATU; Jay M. Hecker, WB4HDZ; Beth M. Heesacker, WA7EUQ; Ernest M. Helton, W8MVN; John W. Herb, W4CDU; James Herteen, WAØNAA; Glenn E. Hickey, W5VYO; Theodore W. Hitchcock, W1UUZ; Leslie D. Hittner, KØBAD; W. C. Hobbs, VE7AWH; John R. Hopkin, Jr., WB4BND; Delmar E. Hostetler, WA8UPI; Marvin C. Hoyt, WA9ENC; James E. Howells, WA7SVU; Robert L. Humbel, WB9KPX; Larry P. Humlicek, WA5PAF; George M. Hunt, W4NUT; David K. Hutchison, WAØJKT/RJH; Guy Huse, W2CEV/W1BBG; Ray Hugh Husher, K5LXZ; B. F. Jeavons, WA6GEF; Arnold A. Jeffery, WB2DZT; Dale L. Johnson, WA9TTH; Elroy W. Kauffman, K4EJG; Norman A. Keck, Jr., W9YYG; Terry F. Keim, VE8OK; Henry A. Kiessling, WA9FAA; Rowe Kinney, W8GHL; Richard E. Klein, K2STT; Scott I. Kostenbauder, W3WLF/W2AWX; John Kowalik, K2OPT/Ø; Adolph H. Kryger, WA9QJH; Elmer T. Kusluch, K4IZT; Edgar De Sousa Ladeira, WA2OKN; Lowell Larsen, KØTCG; Robert C. Lawson, K6MQG; Jeffery L. Leites, K3OHU; Robert G. Lepelletier, Jr., WB4KCM; Robert S. Levy, WØNTC; Arnold A. Lewin, WA7BIA; Robert O. Linder, KØMKI; Clyde Littlefield, WA7PQE; Gerald N. Loewe, WAØ-ZWD/DL; Frank R. Lombard, WØDUL; James W. Lorah, K3IIJ/WB4KOB; Benjamin L. Lowe, K4VOW/WA5UVM; Russell B. Lundsgaard; Hugh Macdonald, G3SZN; William H. MacGahan, W2-ABE; John March, W9KFQ/W2SNF; James A. Maxwell, W6CUF; Lawrence F. McDonald, WB2SCJ; Ronald H. McLean, WB2AUS/WB2CFP; John J. McNassor, Jr., W1GVT; James McQuagge, Jr., K4LIX; Gay E. Milius, Jr., W4NJF; Frank D. Miller, K9HMB; Terry L. Million, WAØYSK; Chad Z. Moore, K8AAZ; Donald E. Moore, K1QPN; Donald B. Morris, W8JM; James H. Morris, W4-VUO; William C. Mueller, W5VSD; James T. Munn, Jr., K9VFA; John W. Nall, WB4LOQ; Mark B. Nelson, WB8LQW; William R. Nelson, WA7SJN; Fowler B. Norris, K3THF; Kenneth A. Norvell, W5LVW; James N. O'Boyle, Jr., WA1MXO; Francis T. O'Connor, W3VNA; Tod Olson, WØIYP; Jerry L. Owen, WB4TTL; William D. Paige, K6GNZ; Jimmy R. Pendley, WB6RMG; Fred Pfeiffer, WA9-PWN; Yorke P. Phillips, K1BXE; David L. Pollard, WA7OVH; Herbert Posner, WA7KGT; Gene Powers, WB6CXF; Earl C. Quinnell, WAØELW; Clarence R. Rhein, K4HXC; Robert A. Rhodes, K6LTL; Harold Richards, WA6BJO; John D. Richards, KL7GHX; N. Swank Roberts, WA5GNT; Wayne B. Roberts, K4GQS; John H. Roch, WA1-MNV; Ren P. Roderick, WA7QFR; Derald E. Rogers, W3UYN; William J. Roper, WA5TYB; James A. Rounds, K9DDA; Charles R. Sadowski, WA2QOF/G5AWS; Wayne F. Salhany, WB4VZW; Jack R. Sargeant, WA4UOH; Gilbert T. Sargent, W4SQQ; Ray Sarver, WA4EPQ; Robert C. Schmidt, W6HOC; Fred B. Schnittker, WØLOQ; George W. Schreech, W4DFA; K. Michael Schwendeman, KØJTA; Thomas Sebaugh, K5AN; Nelson M. Seese, W4BHD; J. Allen Selvidge, WØOMG; Kramer C. Shank, Jr., W4YSJ; John R. Sheller, WA8ZDF; H. C. Sherrod, Jr., K5OSQ/WB4IIP; Howard E. Short, WA7QGR; Ronald J. Sibbitt, VE3CKU; Aurelio S. Silveira, WA1BJY; William L. Smith, K4RJ; John R. Souvestre, WA5NYY; John E. Stanis, W6TKI/W7TKI; Dave Strain, WA3AHK; Maxwell D. Streaker, WA4MSU; Donald W. Stribling, KH6HSW; Anthony J. Suruda, WB2JXE; Don Sutherland, VE6VK; Charles E. Swift, WA3LLZ; Jerry M. Swords, WA5VNE; James M. Szot, WB2VVZ; Hisanao Takeda, JA7GUN; Perry T. Taylor, W2GOA; Scott T. Taylor, WA3EKT; Donald S. Teague, Jr., W6AKI; Cyrus P. Thompson, WB8EFB; Loren E. Thompson, Jr., WØLRN; Rolph D. Tobin, WAØZRL; Gary Price Todd, WA4IPB;

As part of Field Day publicity on Long Island, NY, these amateurs were interviewed for several broadcast radio stations (left to right): WB2BAU, WB2CRY, ARRL President W2TUK, WB2CHY, K2DGI, WB2TSB (standing). *(Photo by WA2CXG)*

James W. Tonkin, WB2VXT; Frank J. Tressa, W2TVN; Ronald H. Troudt, K7TGD; Ulo Vilms, K4OV; Marvin T. Volz, W8KPI; Stephen J. Vose, WA4LLI; William D. Wadsworth, VE7ZM; Larry P. Waggoner, WAØQPM; Craig Lee Wasson, WA6COG; Thomas W. Webb, W4YOK; Douglas L. Westenhaver, WN4YHP; Arthur S. Westneat, Jr., W1AM; Eric A. Williams, WA1HON; John H. Wilson, WA8CKB; John L. Wilson, K3NPV; Norman L. Wingard; John C. Winter, Jr., WB4OAB; Franklin E. Withrow, III, WBØBBE; Terence H. Wolfley, WB8PLQ; Robert H. Wright, W1RMH; Joe L. Yankovich, L. F. Heithecker, W5EJ; David T. Zweier, K3JSX/W3AVJ.

On motion of Mr. Eaton, unanimously VOTED *to respond in favor of IARU Proposal 134*, concerning establishing a 5-Band WAC certificate. On further motion of Mr. Eaton, unanimously VOTED to respond opposed to IARU Proposal 135, concerning vhf band subdivision for satellite work, as the proposal does not adequately recognize current established activity.

The Committee next proceeded to examine nominations in the director elections, with careful attention to the application of the eligibility rules concerning membership and freedom from commercial connections. The Committee made findings and ordered actions as detailed below, all by unanimous actions.

CANADIAN DIVISION

For Director: Noel B. Eaton, VE3CJ, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Director from the Canadian Division for the 1974-1975 term without membership balloting.

For Vice Director: A. George Spencer, VE2MS, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Vice Director from the Canadian Division for the 1974-1975 term without membership balloting.

DAKOTA DIVISION

For Director: Larry J. Shima, WØPAN, was lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Director from the Dakota Division for the 1974-1975 term without membership balloting.

For Vice Director: Edward C. Gray, WAØCPX, and Thomas M. Kulas, WAØIAW, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

DELTA DIVISION

For Director: Max Arnold, W4WHN, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Director from the Delta Division for the 1974-1975 term without membership balloting.

For Vice Director: Franklin Cassen, W4WBK, was found lawfully nominated and eligible; however, the Committee was in receipt of a letter from Mr. Cassen *withdrawing his name as a candidate*, because of a move outside the division. Walker J. Coffey, W5NCB, and John H. Sanders, WB4ANX, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

GREAT LAKES DIVISION

For Director: Richard A. Egbert, W8ETU, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly elected as Director from the Great Lakes Division for the 1974-1975 term without membership balloting.

For Vice Director: William E. Clausen, W8IMI, and *Henry F. Zimmerman, K4FU, were found lawfully* nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

MIDWEST DIVISION

For Director: Paul Grauer, WØFIR, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly elected as Director from the Midwest Division for the 1974-1975 term without membership balloting.

For Vice Director: L. C. Miller, WAØKUH, and Richard W. Pitner, WØFZO, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

PACIFIC DIVISION

For Director: Jean Gmelin, W6ZRJ, and Lee R. Wical, KH6BZF, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: Howard P. Shuch, WA6UAM, was found lawfully nominated but ineligible because of lack of the required membership continuity. Albert F. Gaetano, W6VZT, and Gary A. Stilwell, W6NJU, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

SOUTHEASTERN DIVISION

For Director: Larry E. Price, W4DQD, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Director from the Southeastern Division for the 1974-1975 term without membership balloting.

For Vice Director: Evelyn D. Gauzens, W4WYR, James C. Roux, K4THA, and Theodore R. Wayne, WB4CBP, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

ATLANTIC DIVISION

For Director: George W. Hippisley, Jr., K2KIR, and Harry A. McConaghy, W3SW, were found lawfully nominated and eligible. The Committee was in receipt of written complaints from Mr. Hippisley and several other Atlantic Division members concerning the propriety of a solicitation of votes contained in a recent divisional newsletter to *members from Director McConaghy*. The Committee questioned Mr. McConaghy concerning the matter. The Committee then excused Mr. McConaghy and invited Mr. Hippisley to make an oral presentation of his position. Mr. Hippisley requested disqualification of Mr. McConaghy as a director of the League and a ruling that he was not an eligible candidate for the office of director of the Atlantic Division, based on the alleged improper use of bulletins for vote solicitation. The Committee then thanked and excused Mr. Hippis-

(Continued on page 93)

Amateur Radio Regulation

Commissioner Wiley Encourages Greater ARRL/FCC Liaison

THANK YOU for giving me an opportunity to attend this convention and get better acquainted with the League, its members and their problems. Let me say at the outset that, while I have been invited to appear before a large number of broadcast groups, this is my first opportunity to talk to amateur radio operators and I welcome it.

That fact highlights the first point I would like to make during these remarks: Amateur radio operators and FCC Commissioners should have more opportunities such as this to get together and share views. As you know, your day to day regulatory problems are customarily handled by FCC staff personnel. As a result, those of us who are not amateur radio operators may be relatively unfamiliar with who you are and what you do. Not surprisingly then, your individual position on various issues may not be as well known to the Commission as you would prefer.

I am pleased that the situation may now be changing. The recent appearance by the League before the Commission was the first opportunity for most, if not all, of the Commissioners to get first hand knowledge about what concerns you and your fellow radio operators. I congratulate the League on that presentation and encourage you to continue to work for a closer relationship between yourselves and the Commission so that we come to know more about your views on matters which concern us all.

Nevertheless, while the Commission, as a body, has not had many opportunities to consider amateur radio matters, I am personally aware of a number of issues which concern you as a result of my individual reading and research.

I know, for example, that the tower height limitation proposed in Docket No. 19555, the proceeding to implement the Environmental Policy Act, is a matter of legitimate concern to all of you. Your comments in the proceeding, pointing out that the proposed limitations may go beyond the intended scope of the EPA, deserve careful consideration.

I am also aware of your disagreement with the Commission's resolution of Docket No. 19245, the so-called Eye Bank proceeding, and your views with regard to Docket No. 19162, dealing with voice privileges on the amateur bands. While I realize that neither of these proceedings may be completely satisfactory to the ARRL, I think you will agree that it was wise to permit the expansion of voice privileges in the amateur bands and that our action was, in general, quite favorable to the ARRL petition. I think you will also agree that permitting amateur operators to handle third party traffic was a much needed Commission action, even though you would have preferred that we not add the proviso prohibiting "regular business communications."

Repeaters

Another proceeding which I know gives you great concern is Docket No. 18803, Repeater station operators, in particular, are troubled by the requirement that a "control operator" must be present at all times. Because of their concern, as well as my own position on overregulation, I intend to ask the staff if that proceeding deserves another look. Although it is premature to antici-

FCC Commissioner Richard E. Wiley addressed amateurs attending the Roanoke Division Convention in mid-September, with a message which deserves careful attention by all of us.

— *Photo by W9QKE*

pate it at this time, I intend to explore with the staff the possibility of reconsidering our actions in Docket 18803 to make certain that we are not imposing restrictions for no good reason.

Although the repeater rules, the Eye Bank matter and the environmental docket all concern you, the mail I receive leads me to conclude that the Class E proceeding (Docket No. 19759) is, perhaps, the single most important amateur radio matter now before the Commission. From as far away as Havasu Lake, California and Mesa, Arizona, and as close as Arlington, Virginia, letters seem to arrive by the truckload regarding the proposal to reallocate the 224-225 MHz band to a new Class E Citizens Band Service. Since that proceeding is presently pending before the Commission it would, of course, be inappropriate for me to comment on its merits. Nevertheless, I can say this: unless you speak up, your arguments about self-policing, incentive licensing and the need for VHF frequencies for the amateur radio community may not be heard.

Overregulation?

As I review the major concerns of the ARRL and recite the docketed matters either acted on or pending before the Commission, I suspect that there is yet another major issue which concerns you because of its cumulative effect: I suspect that what bothers you the most is the possibility of overregulation.

If I am correct in that assumption, I believe I know why: the ARRL is justifiably proud of its record of self-policing its membership. Understandably, you would prefer to rely on self-regulation, or at least less regulation, rather than more regulation.

As some of you may know, I have more than a passing interest in the subjects of overregulation. At the request of the Chairman, it has been my responsibility as Re-regulation Commissioner to supervise a Task Force designed to eliminate outmoded regulations and ease unnecessarily burdensome rule requirements in the broadcast services.

Since we began our program, we have issued a number of Commission Orders which deleted certain rules that no longer served any public interest purpose, simplified other rules which were unnecessarily complex, and eased record-keeping requirements. The underlying purpose of our re-regulation program has been to update our rules to reflect the technological changes which have taken place in broadcast communications. Our philosophy has been that neither the public interest nor the licensee is served by outmoded rules and more regulation than necessary.

It is important to emphasize that individual letters from a growing number of small-market broadcasters provided the necessary impetus to begin our re-regulation program. In fact, the success of our efforts has been largely dependent on the hundreds of small-market broadcasters who have kept us informed about their problems.

It is my firm conviction that re-regulation need not be limited only to broadcast communications. There may be reason to believe that overregulation may also exist in non-broadcast services such as amateur radio; perhaps, for example, in Docket 18803 or elsewhere in Part 97 of the Commission's Rules. The lesson to be learned is simple: broadcasters have spoken out on the subject government regulation and informed the Commission of their problems; in turn the Commission has investigated and re-regulated where public interest so dictates.

ARRL Resolution

That lesson may be important to the League. On January 18, 1973, you adopted a resolution to more actively confer with government officials about what you believe to be "progressively restrictive" regulation. In a recent amateur radio publication a contrast was drawn between the re-regulation efforts in broadcasting and the added rule restrictions in the amateur radio field.

Clearly, the time is now for the ARRL to demonstrate the need for re-regulation and to point out, specifically, where the Commission's Rules are unnecessarily restrictive. I can assure you that I am personally committed to doing all that I can to eliminate excessive regulation in any communications service where it is shown to serve no public interest. And I believe that the majority of the Commission, with a proper showing, will support that view. But the initial burden rests with you to inform the Commission where we are overregulating and making the amateur radio operator's regulatory life unnecessarily burdensome.

Ladies and gentlemen, this is the message I would like to leave with you this afternoon: both the agency and the League must begin to communicate with each other as well as themselves. The more I learn about amateur radio the more I appreciate the very worthwhile contribution you have made to improved radio communications during times of natural and personal disaster. Your membership, I know, is composed of highly competent radio operators who provide an important world-wide communications resource. The various volunteer groups within the League, such as the Official Observer Corps and the Intruder Watch, are a credit to radio communications. Licensed radio amateurs have been a great source of supply for skilled and trained electronics operators during national emergencies. I congratulate you on your past successes and look forward to learning more about your organization. With your help in keeping the Commission better informed about your legitimate regulatory problems I am confident that we can work together to improve the conditions under which you operate as well as the world-wide public service you provide. QST

Changes of Address

Please advise us direct of any change of address. As our address labels are prepared in advance, please allow six weeks notice. When notifying, please give old as well as new address and Zip codes. Your promptness will help you, the postal service and us. Thanks.

Correspondence From Members-

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

GREAT SWR MYTH?

● Scene: just outside the building where the East Brunswick Amateur Radio Club meets. The stars danced noiselessly and the wind blew gently across my cautiously pouting lips, as I listened to W2DU (Walt Maxwell, author of the excellent *QST* series on the mysteries of VSWR) attempt to answer my seemingly simple question, "Walt, how can I best solve the problem of my absurdly high SWR of 4:1?" Walt smiled patiently, and tried to put a round truth into a square cranium.

Only now, after reading his first two articles (received August 20, thanks to EDP technology and the treacle-infested machinery of the banana boats which must have delivered my copies - April, May and June together), do I realize why his answer could not be more precise. First of all, Walt wanted to know why I thought that a high SWR was really significant. He claimed that *he* had one nearly as high – and coming from an antenna expert, that was hard to swallow! All I can say is, "Thanks Walt, and sorry that you had to go to the trouble of putting the answer to my question in words that will now be shared with a large segment of the amateur fraternity. Now we will no longer be able to whine about an SWR of 3:1 (or so) and be able to get away with it without the slightest suggestion of embarrassment."

During the short time that I was a member of the club, Walt displayed great courtesy in answering even the most stupid question (see above). I am extremely pleased that *QST* has been able to secure his (obviously gratuitous) services in helping once and for all to expose the *Great SWR Myth* – *Edward R. Brace, G5AYR/W3ETQ, Aylesbury, Bucks., England*

FD FUMBLE

● I enjoyed participating in this year's annual Field Day activities with K8EMY/8 (the Southeast Amateur Radio Club). I'm sure that we didn't score high in the contest but we all had fun as always communing with nature and testing our emergency preparedness. One problem, though, presented itself that, it seems to me, violates the spirit and objectives of Field Day and amateur radio. No one was willing to accept or pass a message or participation or messages from visitors to our FD site to demonstrate our usefulness as radio amateurs. Field Day is usually well advertised and is our opportunity to show those who come out how we can be of service to them.

For most of the day I had a New Hampshire message in front of me. We worked New Hampshire several times and also many WIs. After exchanging section and signal reports we would ask the station to take a message for his area. Invariably we got the reply "Sorry OM, we are too busy working Field Day to handle traffic." Several stations, in reply to our query, asked if it was a priority message – when told it was routine traffic we got a "Sorry OM, no time."

I'm sure that FD '73 was very successful and that many of the FD stations will be the proud and deserving recipients of awards for their participation and hard work. But, based on my experience, many FD stations missed the boat with regard to FD objectives as FD would be an exercise in futility if, in demonstrating emergency preparedness in communication, you are unable to pass a message.

Bev Harding (age 12) is a Cadette Girl Scout of the Cleveland Area Council who helped K8EMY/8 that weekend with logging and refreshments to learn a little about ham radio (the club recently donated an unneeded squad tent to the Council and suggested that a few of the Scouts might enjoy sharing our field day). In conclusion, her message to "grandma" is undelivered – perhaps one of you WI boys can forward it for us. – *Ray Heimberger, W8VRZ/8, Shaker Heights, OH*

THE LICENSE MANUAL

● I would like to congratulate you on the wonderful way you have set up the latest (69th edition) *License Manual*. It's the most explicit manual I've ever gotten. I buy several manuals every year and give them to prospective hams. Your examples and references to the U.S. Regulations (The Communications Act) are great. I talk it up every chance I get on the air. A copy of this latest manual is a *must* for every ham. One can see that a lot of time and effort went into compiling it.

Joseph F. Falabella, W3HWL, Washington, DC

[EDITOR'S NOTE: The new 70th edition of the *License Manual*, available shortly, will hopefully be even better, with the new study questions integrated into the text, and with questions grouped according to subject.]

VEHEMENT PROTEST!

● I direct your attention to the opening editorial article in "The World Above 50 Mc." in June 1973 *QST*, "Just as is the case on the hf bands, relatively few amateurs desire cw for the majority of their operating."

I must protest vehemently the unsupported, untrue and obviously self serving statement.

The above may be true of the vhf frequencies in spite of the fact that most of the significant vhf work is done on cw, but it is simply not true on the hf bands, as the League is well aware.

Hence, I can not countenance how such a statement could be published unchallenged in *QST*.

I would point out further that one can not identify the author of the above libel. Did K8REG write the editorial, or is it an amplification of his views written by Mr. Smith? If K8REG wrote it, that line should have been deleted, or at least challenged by Mr. Smith at the conclusion of the article.

If Mr. Smith wrote the article, I recommend you request his resignation.

Irresponsible statements such as this can only harm the League and the low frequency privileges we enjoy. It disturbs me that a novice operator who has not yet formed his operating habits could read that article and decide that there is little reason to become proficient at code beyond

passing his General license exam. Yet with the readership *QST* enjoys this will happen at least among a few. — *R.C. Locher Jr., W9KNI, Deerfield, IL*

[EDITOR'S NOTE: The problem is perhaps mostly one of semantics — what one person considers "relatively few" may be an entirely different concept to someone else. Surveys have shown that a decreasing proportion of amateurs use cw for the majority of their operating, and it is perhaps on the order of 30% or less at the present time.]

ARRL PRESENTATION

● Thank you, ARRL, for your outstanding performance in your "Presentation of the American Radio Relay League to the Federal Communications Commission, July 9, 1973" - as reported on page 50 of *QST* for September, 1973.

You have not only expressed my own opinion of what amateur radio is — and should be. I am certain you have expressed the opinion of the majority of radio amateurs the world over.

I hope this presentation may have wide publicity, so that radio amateurs everywhere may rededicate themselves to the task of keeping amateur radio the very wonderful and useful hobby it has always been — and must continue to be in the future. — *Frank R. Warden, WIAGB, Adamsville, RI*

Reading Wayne Green's editorials concerning his thoughts about the ARRL, seems to me that he is a bit off base when he calls the ARRL "silent" (as in August 1973 issue on page 2). I have yet to hear anything about a presentation before FCC by W2NSD/1.

Maybe the ARRL hasn't made enough noise to satisfy everyone, or all that it possibly can. But September's transcript of the presentation gives me the impression someone is really trying to open the FCC's eyes to the error of its ways. The last few paragraphs especially do an excellent job of stating the fate of ham radio due to the new amount of present and proposed regulation changes . . . — *Sol B. Marcus, WB9IHC, Park Forest, IL*

MAKING IT STICK

● I thought I knew all about the art of soldering until I read "How to Solder" in August 1973 *QST* by VK3AOH, which told about getting solder to stick to aluminum. Immediately after reading the article I tried this method and I was surprised at the results; even my friend WB8FDI was quite amazed at the results and how easy it was to do! — *Karl T. Schwab, WB8DSG, Warren, MI*

EYE-CATCHING

● I find the front-cover illustration of September *QST* very interesting, though perhaps not for the reason that might be most appealing to the editor!

What catches my eye is the piece of test equipment in the background. It appears to be energized by a Millen dipper and could be an r-f impedance bridge, or, perhaps, a Q meter. In either event, I'd be interested.

If you've published a description of this, would you please tell me where to find it, for obviously it escaped my attention. — *G. Robt. Mezger, W2BLL, Boonton, NJ*

[EDITOR'S NOTE: The device is the Macromatcher, designed by Jerry Hall, K1PLP, and described in *QST* for January, 1972, and in the '72 and '73 *Radio Amateur's Handbooks*. In fact, look carefully at the January, 1972, *QST* cover picture!]

Happenings

(Continued from page 89)

ley. After extended discussion, during which General Counsel Booth was requested to comment upon the questions presented, the Committee unanimously agreed there was no basis for any disqualification procedure in the Articles or By-Laws and thus declared both Messrs. Hippisley and McConaghy eligible, with their names listed on ballots to be sent to Full Members of the Division. However, the Committee expressed concern over the question of vote solicitation in director news bulletins to members and directed that the matter be brought to the attention of the Board of Directors at its 1974 annual meeting for any necessary action.

For Vice Director: Jesse Bieberman, W3KT, Layfield L. Lamb, W3BWZ, Harold C. Smith, WA2KND, and George S. Van Dyke, Jr., W3HK, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

On motion of Mr. Compton, unanimously VOTED that Noel B. Eaton, David H. Houghton and Stan Zak, with F. E. Handy an alternate, are appointed a Committee of Tellers to count ballots in the current director elections.

The Committee was in recess for luncheon from 12:30 to 1:00 p.m.

Director Price reported that the ARRL Foundation certificate of incorporation was filed on September 24, and that papers were in process to the Internal Revenue Service seeking qualification as a tax-exempt corporation. On motion of Mr. Compton, unanimously VOTED to authorize up to $800 additional expenses of the Management & Finance Committee.

The Committee recessed at 2:20 p.m., reconvening at 10:15 p.m.

The Committee reviewed and confirmed its action in the matter of the Atlantic Division director election.

The Committee extensively reviewed draft comments of the League in Docket 19759, the matter of CB on 220 MHz.

(During the course of its meeting the Committee discussed, without formal action, progress of the Amateur Satellite Service Committee, amateur participation in the U.S. Bicentennial, individualized score lapel pins for DXCC members, an amateur radio symposium at the IEEE convention next March, and a complaint from K6BX on rejection of several Ham-Ads.)

There being no further business, the Committee adjourned, at 11:50 p.m.

Respectfully submitted,
JOHN HUNTOON, W1RW
Secretary

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

AMATEUR RADIO IN YUGOSLAVIA

The following summary of information on amateur radio in Yugoslavia is furnished courtesy of the *Savez Radio-amatera Jugoslavije* and recent *ARRL*/IARU Headquarters visitor YU3EY.

Licensing

There are four classes of license available. The fourth class entitles the holder to operate his own or a club station on any of the vhf/uhf bands with a power input of 100 watts. An examination on radio theory and regulations, plus a code test of 5 words per minute, are administered to each applicant.

The third class permits one to operate a club station *only* on the 3.5 and 7 MHz bands at 100 watts input. The required code speed is 12 wpm.

In order to obtain a second class license, an amateur in Yugoslavia must first confirm 25 countries with his third class license from a club station. The code requirement is 16 wpm. A second class license permits the holder to operate his own or a club station on all bands with up to 500 watts (raised this fall from 150 watts).

The first class license is the most difficult to obtain. The applicant must first confirm 100 countries with a lower class of license and must pass a code test at 20 wpm along with a stiffer test in theory and regulations. First class licensees are permitted to run 1000 watts (up from 500 watts).

Call Signs

The prefix for Yugoslavia is YU, though YT and 4N have been used in the recent past for special purposes. The numeral indicates the republic in which the station is located, as follows: YU1, Serbia; YU2, Croatia; YU3, Slovenia; YU4, Bosnia-Herzegovina; YU5, Macedonia; YU6, Montenegro; YU7, Visitor's license; YUØ, Special stations.

All call signs with two-letter suffixes are private stations, as are calls with three-letter suffixes whose first letter is N-Z. Three-letter suffixes beginning with A-M indicate club stations. Some special club stations, and vhf-only clubs, are assigned calls outside this sequence.

Organization

The national amateur radio society in Yugoslavia is *Savez Radio-amatera Jugoslavije (SRJ)*, Bulevar revolucije 44/II, P.O. Box 48, 11001 Beograd. YU1AU is President, and YU1AY serves as Secretary. *SRJ* boasts a membership of 52,000, 1,945 of whom are licensed to operate their own stations. Membership in the society through a local club is necessary to hold a license.

The monthly magazine *Radioamater*, printed in Croatian, is the official publication of the *SRJ*.

DENMARK ANNOUNCES LICENSES FOR TEMPORARY VISITORS

According to *Experimenterende Danske Radioamatorer*, IARU member-society in Denmark, the Danish General Directorate of Posts and Telegraphs will now accept an application for a temporary amateur license from any amateur visiting, or planning to visit, that country. A special application form obtainable from the General Directorate must be filled out and forwarded to the home administration of one's home country (FCC and DOC, in the case of the U.S. and Canada). The administration then certifies that the applicant holds an amateur license and forwards the application to the Danish authorities. Alternatively, a certified copy of the license is deemed sufficient evidence. Application must be made at least one month in advance. A fee of D.kr.50.00, payable only after the license is received and the licensee arrives in Denmark, is required.

This temporary license is valid for a maximum of three months. For longer periods, an application for a permanent Danish license must be submitted.

The address of the General Directorate of Posts and Telegraphs is 1st Technical Office, 17 Farvergade, 1st Floor, DK-1007 Kobenhavn K, Denmark. Application forms may also be obtained from *ARRL*/IARU Headquarters.

VERONA MARKS 25TH ANNIVERSARY

To celebrate its 25th anniversary, the *Vereniging voor Experimenteel Radio Onderzoek in de Nederlandse Antillen*, IARU member-society in the Netherlands Antilles, announces that December 1973 will be PJ Activity Month. VERONA members will be permitted to use the special PJ1 prefix during the month. Special QSL cards will be sent to confirm all contacts.

DX OPERATING NOTES

Reciprocal Operating

United States reciprocal operating agreements exist only with: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Brazil, Canada, Chile,

Four continents and ten countries are represented in this photo taken during the Radio Amateur Weekend at ITU Headquarters organized by the International Amateur Radio Club, 4U1ITU, during June. From left are V. Timofeev (U.S.S.R.), IARC president OK1WI, K4ZA/K6ZA, A. Timofeeva (U.S.S.R.), IARC treasurer R. Brossa (Switzerland), OK1ASF, HB9NO, ITU Secretary-General M. Mili, HB9AUK, F6ADI, P. Bronzini (Italy), CCIR Director HB9AJI/WØDW, IARC secretary HB9ANW/G3OQF, R. Fontaine (France), ex-VK9WB, and ex-XU2RT.

Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Fiji, Finland, France,* Germany, Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Jamaica, Kuwait, Luxembourg, *Monaco, Netherlands,** *New Zealand*, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Sweden, Switzerland, Trinidad and *Tobago, United Kingdom,** Uruguay, and Venezuela. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write *ARRL* headquarters for details.

Canada has reciprocity with: Belgium, Brazil, Denmark, Dominica, Dominican Republic, Ecuador, France, Germany, Guatemala, Israel, Luxembourg, Mexico, Netherlands, Nicaragua, Norway, *Panama, Peru, Portugal, Senegal, Sweden*, Switzerland, U.S., Uruguay, Venezuela, and Commonwealth countries.

Third-Party Restrictions

Messages and other communications — and then only if not important enough to justify use of the regular international communications facilities — may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries.** Argentina, Barbados (only U.S. stations /8P), Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, *Greenland (XP calls only)*, Guatemala, Guyana, Haiti, Honduras, Israel, Jordan, Liberia, Mexico, Nicaragua, Panama, Paraguay, *Peru, Trinidad & Tobago, Uruguay* and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR JY LU OA PT PY TG TI VE VO W or K/8P XE XP YN YS YV ZP 4X 4Z 8R and 9Y4. Canadian hams may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, Dominican Republic, El Salvador, Honduras, Israel, Mexico, Peru, Trinidad & Tobago, U.S., and Venezuela. Permissible prefixes are: CE CP HI HR K OA TI W XE YS YV 4X 4Z and 9Y4.

DX Restrictions

Amateur licensees are warned that international communications are limited by the following *notifications of foreign countries made to the ITU* under the provisions in Article 41 of the Geneva (1959) Conference.

The Director General of the Posts and Telegraphs Department of Vietnam has notified the ITU that there is no objection to communications between amateur stations in other countries and XV5AC. However, communication with other amateur stations in Vietnam (XV or 3W8) is forbidden. Canadian amateurs may not communicate with Cyprus (except ZC4 and special 5B4 stations), Gabon, Iraq, Pakistan, Turkey, Khmer Republic (except XU1AA), Vietnam, Libya, and Yemen. Prefixes to be avoided by Canadians include AP TA TR8 XU XV YI 3W8 4W 5A. QST

* Agreement includes overseas entities.

** By special agreements, third-party traffic is *also permissible with amateurs in Australia and the* Federal Republic of Germany for traffic regarding amateur satellites, with 4U1ITU, and with personnel of Project Hope in Jamaica.

Exciter *(Continued from page 50)*

The 7377 amplifier operates in Class AB1, with the combination resistor and 4.5-volt battery-bias shown. The idling plate current is approximately 25 mA, and increases to 90 mA with drive. Screen voltage is maintained at 180 by means of the IN3014 Zener diode.

Performance

Perfection in equipment design is seldom achieved, but after reviewing several uhf heterodyne circuits in various journals, this one looks good and the performance surpasses our expectations. The output was measured as 10 watts with a commercially made rf-output meter.

The unit has been tested (on the air) at this station for approximately two years. It has given an excellent account of itself. It is a "natural" for driving a higher-power amplifier. QST

160-Meter Contest *(Continued from page 59)*

The calls of all disqualified participants will be listed in the *QST* report of the contest.

Any participant on the borderline of disqualification but not actually disqualified will 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. QST

November, 1923

. . . Transatlantic tests are announced for late December. But at the Second National Convention in Chicago, Leon Deloy, French 8AB, portends earlier success with his comment, "We are undertaking a big effort to bridge the Atlantic very soon." At the convention, sponsored by the Chicago Radio Traffic Assn. (still going strong in 1973), Hiram Percy Maxim calls for a "World Amateur Radio Relay League."

. . . Former *QST* editor Clarence Tuska (also still going strong in 1973) is manufacturing receivers, and the lead article describes his and Robert Miner's "Superdyne." A tuned-plate circuit is absolutely necessary for good performance, and its major disadvantage – unwanted oscillation – is remedied by *negative* feedback to the grid circuit.

. . . *Wireless North Pole* continues its spectacular performance furnishing news to the outside world of the MacMillan Arctic expedition. (A sad 1973 note: radio operator Don Mix, W1TS, just joined Silent Keys).

. . . Canadian amateurs are coming on strong, and completed an impromptu transcon relay in an hour and ten minutes. This outperformed an organized U.S. effort the same month – though admittedly the latter was a daytime effort.

. . . In disasters, hams have been especially helpful to railroads, and so the American Railway Assn. and ARRL are working together to set up a communications emergency plan.

November, 1948

. . . Kenneth B. Warner, W1EH, is a Silent Key, after nearly thirty years as secretary and general manager of ARRL. Black-bordered editorial pages chronicle his history and contributions. "If it was Maxim who conceived our League, it was Warner who breathed into it life and energy and vitality, whose balanced judgement and clear vision ensured its growth and success."

. . . "Mike" Villard, W6QYT, gives sideband another forward push with his simple transmitter design – phase shift, of course. "On the Air with Single Sideband" reports the mode is spreading rapidly; we may have as many as a couple dozen stations by now!

. . . Technical Editor W1DF analyzes the new "quad" antenna in various configurations, while Assistants W1DX and VE3BLZ tell us how to design car-mounted antennas for 80 meters, to take advantage of the new mobile regs. KH6IJ rounds out the radiator field by describing a 20-meter beam in "plumber's delight" style, while WØSJK helps us measure the best match with a "twin lamp" SWR indicator for coax.

. . . W1HDQ shows an easy way to get on 50/144 Mc., one feature being use of third harmonics of 8 Mc. crystals so that only two tubes are required.

. . . W1JEL and W1CTW attempt to keep up fm interest by speech clipping and filtering in an adapter unit – but real fm growth is destined to await more vhf developments. – *W1RW*

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.

WØ – Reggie Hoare, WØQYP, P.O. Box 115, Mitchellville, IA 50169.

KØ,WAØ,WBØ,WNØ – Dr. Phillip D. Rowley, KØZFL, 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, K75OD, 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 Quebec, H3R 2E3.

VE3 – R. H. Buckley, VE3OW, 20 Almont Road, Downsview, ON.

VE4 – D. L. McVittie, VE4QX, 647 Academy Road, Winnipeg R3N 0E8, MB.

VE5 – A. Lloyd Jones, VE5IL, 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 – Frank Van Der Zande, VE8OO, P.O. Box 72, Fort Smith, NWT X0E 0P0.

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*.

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* W3WRE

Powder Puff Derby

THERE ARE all sorts of contests that have become traditional activities each year. For the sports buff there are the many Bowl games, and the World Series, while the Indy 500 appeals to the drivers. Those of us who are interested in flying have looked forward to the annual All-Woman Transcontinental Air Race each summer when women pilots from all occupations attempt to make a perfect cross country flight at the best ground speed possible.

Popularly nicknamed the "Powder Puff Derby," this air race has the distinction of being the longest and largest race of continuous duration of all speed races for light airplanes. Over 2000 women have flown more than three and a half million miles in the past 26 years of the history of this race, and the routes have covered some 140 cities. While the race has been sponsored by many clubs and other organizations, amateur radio has provided the vital service of acting as the communications link in setting up a coast-to-coast network at race time. The 1973 race marked the 20th anniversary of amateur radio's official connection with AWTAR. Viola Grossman, W2JZX, served as chairman of the radio service, setting up a network of stations from the takeoff city, through the designated stopover towns across the country, to the terminal point. Vi was followed by WIUKR, Eunice Gordon and Thelma Zimmerman, W9JYO, who held the office with W9BKJ. Then in 1958, Carolyn Currens, W3GTC, became chairman of the radio network, a postion she has held for the past 15 years.

*YL Editor, *QST*. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

It's not an easy job to plan the communications set up. The route requires a station manned by operators experienced in traffic work to handle the dozens of messages from contestants and officials. Over the years the YLs and OMs who have worked during the race have been highly commended for their operating ability, and the fast and efficient service given. Those gals who have worked at the stop over points remember take-off, and ETA times, and overnight arrangements messages from each of the contestants, and often a sudden flurry of traffic for some badly needed part. They will remember long hours of operation from morning to night, when only two or three YLs were running a stopover station with no relief, the excitement of everyone at the terminal city, and the equally exciting moment of take off. A new look in the story came in 1973 when, for the first time, amateurs from the Novice ranks joined the net to assist in making it one of the most successful from the communications standpoint.

Each year there is an increase in the number of participants and each plane is manned by a pilot and co-pilot. According to the regulations there are stopover cities along the route, for the race is always a daylight flight only. Each of these points requires communications, and that means year-round planning for W3GTC and her committee. They must plan on at least ten cities across the country where it will be necessary to handle traffic during the race. Each of the people in those cities must locate operators to assist them, and each year

Amateur radio resulted in a wedding with a full complement of licensees as attendants. L-r: Rodrigo, CX1JDW/W5; Ruth, WB5DKE the bride; Bill, WA5MZU, the groom; Steve WB5CTS; Richard WA5DWR. *(Photo WN5DZQ)*

Edie Pyle, WN4EUE, and WA4BZS secretary of Wilderness Road Amateur Radio Club. Edie is the first YL in Lincoln County, Kentucky to qualify for an amateur radio license. *(W4CID photo)*

the YLs and OMs have provided that important link that has become synonymous with amateur radio.

The story of the Powder Puff Derby is names. It's Betty Gillies, W6QPI, who was a contestant for four years, and served as chairman of AWTAR for five consecutive terms. It's workers like W2JZX, KØEPE, WA6USU, W6BDE, W6FEA, and the tireless help they received from their many operators. It's BAYLARC, PI-YL, NYCYLRL, WAYLARC, and it's W3GT planning for the next one to take off from Lancaster, California in July 1974.

1974 YLRL Officers

YLRL membership elected the following as officers for 1974:

President, Eila Russell, WA8EBS. Licensed in 1963; 1973 YLRL Vice-president, member of ARRL, Buckeye Belles, Chix-on-Six, Ohio SSB, Buckeye Ragchewers and Apricot Nets. The OM is W8BII.

Vice-president, Chris Haycock, WA2YBA. Licensed 1966; member of NYC YLRL, YLISSB, Tangle Net, Westchester Repeater Assn., ARRL. Chris has served as Second DC of YLRL, and is WAC YL Custodian.

Secretary Myrtle Cunningham, WA6ISY. Licensed in 1959, Myrtle was Secretary of YLRL in 1973. A member of ARRL, YLRC-LA The OM is W6PIF/W7CUK.

Receiving Treasurer, Marion Bees, W8UAP. Licensed in 1954, a member of TASY and ARRL. The OM is W6WNK.

Disbursing Treasurer Madeline Greenberg, W2EEO. Licensed in 1950; former 2nd DC of YLRL, Madeline is a member of ARRL, and has served continuously as treasurer of the club.

District Chairmen: 1st, Open; 2nd District, Barbara Neiman, WA2RDV; 3rd District, Penn-Jersey YL Club (rotated in membership); 4th District, Nancy Hickman, WB4NTW; 5th District, Frances Smith, WA5MPM; 6th District, Violet Barrett, W6CBA; 7th District, Joyce Gobel, K7RRS; 8th District, Rosemary Davidson, WA8VXF; 9th District, Carol Bourne, WA9NEJ; Ø District, Glenda Latcher, WAØTNI; KH6 District, Betty Marsh, KL7FJW; KH6 District, Ardella Johnson, KH6TI; KL7 District, Betty Marsh, KL7FJW; VE District, Ebba Kristjansson, VE5DZ.

"YL News and Views" extends congratulations to the women who will guide the club in the coming year.

YLRL 34th Anniversary

Thirty four years ago YLRL was organized to form a club for women amateur radio operators only. From a beginning of a dozen women in this country, the club has grown to a membership of almost a thousand that represents all 50 of the United States as well as some 30 countries and all continents.

The official publication, *YL Harmonies*, is published bi-monthly containing official YLRL sponsored contest rules and results, certificate regulations, and net listings as well as news of the membership.

Club sponsored contests include those for YL participants only: YLAP, Howdy Days, and the new DX YL to Stateside YL contest. The annual YL-OM contest is open to all amateur radio operators who wish to take part in it.

YLRL membership is open to all women amateur radio operators with a current license. Application forms, and detailed information sheets are available from the membership chairmen. In the western United States, Beth Taylor, W7NJS, 14637 S.E. Fairoaks Avenue, Milwaukee, Oregon, 97222. In Eastern United States, Marge Campbell, K4RNS, 65 North Arbor Drive, Ormond Beach,

WA6ISY, Myrtle Cunningham, 1974 secretary-elect for YLRL. In addition to her YLRL duties Myrtle was recently honored by AFCEA when she was selected to receive their Honor Award. Myrtle has worked on many of this country's space research projects such as Minuteman, Surveyor, Phoenix, SERT II, Condor, as well as the Intelsat IV as a part of her work at Hughes Aircraft.

WA8VXE, Rosemary Davidson, 1974 DC of the YLRL 8th District.

Rosemary Davidson, WA8VXE

That nothing can stop a YL in search of a hard-to-get certificate was proved again when Rosemary was in the middle of rolling out pie crust and heard a gal from Utah on the air. She got the contact with fringe benefits of flour and bits of dough all over the rig. Cleanup activity was easy since she had WAS-YL in the bag.

Rosemary passed both General and Advanced tests on the same day in 1967 after the OM had tried for years to get her interested. Since then her activity on the air has resulted in DXCC, CQ-DX WAC-YL, WAS-YL, DX-YL certificates, and she holds the ARRL Code Proficiency certificate with a 25 wpm sticker.

A member of ARRL, YLRL, TASYL, TOT, YLISSB, the Southern Michigan Amateur Radio Society, she also holds official Phone Station and Emergency Coordinator ARRL Appointments.

Rosemary says that she operates by "whim," leading to a different type of activity each week depending on the phase of radio that interests her most at the time. But she says, "There are so many different things to do that it is always exciting with ever new horizons." Two things never deflected by whim are her pleasure in operating the YLRL contests, and regular participation in the QSO Parties as they occur.

Next year WA8VXE will add one more activity to her list when she assumes the duties as District Chairman of the 8th YLRL District. QST

Florida, 32074. The International Membership Correspondent is Gretna Longware, WA2WHE, P. O. Box 426, Elizabethtown, NY 12932.

YL CW Net

YLN is a slow speed net that meets each Thursday at 1400 GMT on 7123 kHz. This net, formed to assist Novices to increase their code proficiency building towards upgrading the class of license, is not just a ragchewing net, but handles a great deal of formal traffic. Being a "traffic hound" is not a requirement for net participation, rather it is one of the many ways to teach accuracy of copy as well as acquaint the beginner with the public service aspect of amateur radio. All YLs, no matter what class license, are cordially invited to check into the net either to build code speed, help with the traffic that is on the net, or to meet the newcomers to amateur radio.

YL SSTV

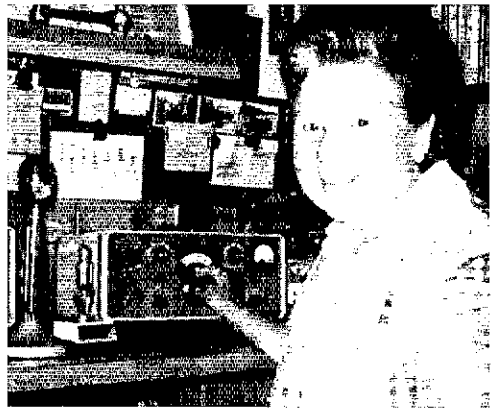
By the time WA2LKC, W5TXK, K6OPX, and W4LAX complete their description of equipment transimission they have used words that most of us never heard, even though we have been in radio for a long time. We will soon, for the number of YLs who are enjoying only 4 YL names and calls are in the *Call Book* magazine listing, there are quite a few other gals who share the OM's interest and his equipment under his call. Up to this time YL SSTV activity is limited to this country only, for no DX gals have been listed in the SSTV group.

TASYL Officers

TASYL, Michigan's state wide YL club announces the following elected officers of the organization.

President, Marion Van Til, WA8OCD; Vice president, Rosemary Davidson, WA8VXE; Secretary, Beverly Stoner, K8ZJU; Treasurer, Nona Schneider, WA8CXF; Editor, Roberta Lemon, WA8ARJ; Publisher, Ruth Wardell, WA8YPY.

The Automobile State YL net meets each Thursday at 1400 GMT on 3,895 MHz. With WA8ARJ as net control.



Eila D. Russell, WA8EBS, 1974 President-elect for YLRL, Inc.

CONDUCTED BY BILL SMITH,* W5TVB

Transpacific VHF Duct Propagation

IN THE EARLY 1940s, World War II radars "saw" targets at distances up to 1700 miles. Military aircraft, with the aid of nothing better than the ubiquitous SCR-522, logged instances of vhf reception over then unbelievable distances. Even ship-borne vhf radio seemed to have magical qualities now and then. But "heard" reports count for little, unless complete documentation is possible, and in the stress of the great war, there was no time for such niceties. There were some common denominators, however. Paths where vhf signals appeared to have traversed extreme distances were practically all in the lower latitudes, mostly within 20 degrees of the equator, north or south, and over water all or most of the way.

It remained for vhf enthusiasts of the postwar era to demonstrate conclusively that communication is possible on frequencies above about 100 MHz or so, over distances beyond a few hundred miles. Rapid strides in the development of low-noise receivers, in more efficient means for generating appreciable transmitter power, and particularly in more effective antenna systems, helped to extend vhf horizons, and by the early 1950s, the 144-MHz DX record had been moved out to 1400 miles. But it was not until 1957 that anything like the real potential of the vhf range for occasional long-distance communication was realized. Condensed from various editions of the *QST* column, here are essentials of one of the great ham radio stories of all time, with *QST* references, so that you can read the full story yourself:

July 8, 1957 – W6NLZ and KH6UK work on 144 MHz, after *nine months* of nightly attempts. Contact maintained from 2037 to at least 0050 PST, July 9. Distance 2540 miles.[1]

Aug. 18, 1957 – Second 144-MHz QSO, 2050 to 2114 PST.[2]

June 22, 1959 – Same stations communicate on 222 MHz, after only five nightly schedules, 2130 to 2220 PST.[3]

July 20, 1960 – W6NLZ hears KH6UK on 432 MHz, 2020 through 0240 PST, July 21. Brief period of reception the night of July 21, 2007 through 2220 PST. Two-way attempt failed both nights, due to receiver trouble at KH6UK, discovered later.[4]

[1] *QST*, September, 1957, p. 62.
[2] *QST*, October, 1957, p. 93.
[3] *QST*, August, 1959, p. 68.
[4] *QST*, September, 1969, p. 78.

*Send reports and correspondence to Bill Smith, W5TVB, ARRL, 225 Main St., Newington, CT 06111.

Early 1960s – Government-sponsored research (how do you suppose they happened to get into it??) on the California-Hawaii path, and between the Brazilian coastal bulge and Ascension Island, established the nature of tropospheric ducts in these areas. Duct propagation was found to be possible even below 50 MHz, under ideal conditions for duct formation and maintainance.

What might have happened in the years between 1960 and 1973, had there been enthusiasts like W6NLZ and KH6UK on the job in the right places at the right times? We may never know, but in late July, 1973, fortunate circumstances combined to produce another landmark in the history of the world above 50 MHz. So much happened between July 26 and the first few days of August that only hints of the whole exciting story can be given here.

July 26 – W6KZJ, San Jose, and KH6BZF, Kanoehe, Oahu, heard each other very weakly on 432 MHz, beginning at 2010 PST. This was on a nightly 222- and 432-MHz schedule, kept for some weeks previously with no positive results. Nothing was heard on 222 Mhz. Though marginal, this success is unique in transpacific experience on these frequencies, in that W6FZJ is at low elevation, 27 miles inland, behind mountains that rise to about 3000 feet directly between him and the Pacific.

Next, a bit of narrative from K6DYD, Point Loma, a bluff overlooking the Pacific, in San Diego:

> On Saturday, July 28, about 1305 PST, I received a call from WA9OZF/6, who was mobile near Vista, north of San Diego. Wayne was hearing a repeater on 146.76, carrying conversations of KH6 stations! Having no 146.16-MHz transmit capability, he asked me to see if I could key up the mystery repeater. My quick check showed that there was, indeed, a strong repeater signal on 146.76, on a beam heading right for Hawaii.
>
> My one-second shot on 146.16 brought a full-quieting response from the repeater. I asked if anyone was hearing me, and signed "K6DYD, San Diego." Dead silence on the repeater frequency! Another try brought a response from KH6AFS, mobile, who expressed doubt as to my authenticity! After I explained briefly what was happening, many other stations jumped on the tropospheric bandwagon. In the ensuing hours, hundreds of contacts were made between California and Hawaii, mostly through the KH6EQN repeater. This 30-watt machine is at 8000 feet elevation, on the slopes of Mauna Loa, near the center of the Island of Hawaii.
>
> In the meantime, WA9OZF/6 was on his way up to his remote site near Vista, now with a mobile

rig that did have .16 capability, and he managed several contacts through KH6EQN.

At 1637 PST I worked KH6FOO, a 15-watt mobile, direct on 146.52 MHz. He had driven up Mauna Loa toward the repeater site, until he was able to get into the transpacific duct. KH6AFS, the first station to reply to my call, was also worked simplex, as he followed the example of KH6FOO. I continued to work through the repeater, until it faded out near midnight, local time. I never heard it again, but stations in the Santa Barbara area continued to work into it for another two days.

Equipment at K6DYD consists of a Motorola 60-watt transmitter, driving a homebuilt kilowatt amplifier using an Eimac 8877. The antenna has eight 10-element Swan-type Yagis, vertically polarized.

As the opening moved up the California Coast, it became obvious that stations at some elevation, with a clear view out over the Pacific, were doing the best work, and a scramble for such choice spots got underway. Much of what follows is from a beautifully detailed report by K6YNB, who drove his famous camper mobile[5] 200 miles to Point Sal, a 1000- foot bluff near Santa Maria, with help from WB6s ASR, RAL, and RIV. There they found KH6EQN to be as strong as 10 microvolts, and full-quieting almost the entire time they stayed at Point Sal. K6YNB/6 worked over 100 stations through KH6EQN, and direct, from Sunday night through Monday. Dr. Overback had worked 25 stations through KH6EQN before departing for Point Sal.

In Santa Barbara, WB6QBB moved his 250-watt final to the site of W6HUT, on a mesa some 350 feet above the city. With operating help from W6TYP, K6TAZ and WB6MSC, this station worked into Hawaii consistently Sunday afternoon and evening.

During the evening of July 30, WA6EIR of Lompoc, with the aid of WA4APG and WB6QLY, set up Joe's 2-meter kilowatt on a hilltop overlooking the Pacific, at Vandenburg Air Force Base, about 15 Miles south of K6YNB/6. They had good signals from KH6EQN, until closing down around 0130 Tuesday, the 30th. Both stations found the Hawaiian signals stronger from these coastal bluff sites than at their homes, which are farther inland, but still with a clear view over the Pacific.

K6YNB noted that the KH6EQN repeater and the high altitude mobiles in Hawaii put in consistently strong signals, including periods when tests with KH6BZF and KH6GRU, both low-elevation stations on Oahu, were yielding marginal results, at best, on 144, 220 and 432 MHz. He concludes that transpacific tests on vhf and uhf bands would stand better chance of success if the stations at the Hawaiian end were in high-elevation sites. Some elevation at the eastern end should help, too, to more than 1000 feet or so might be harmful at the California end. This is in line with the results of the Navy survey alluded to earlier, which showed the duct to be commonly around 1000 feet above sea level at the east end, and quite high (usually 4000 to 7000 feet) over Hawaii. In this instance, well-equipped remote-base stations high in the California mountains fared poorly, except for WA6SIN, situated 2000 feet above sea level, in Ventura County.

[5] Overbeck, "The Cabover Kilowatt," *QST*, August, 1971, cover and p. 48.

Mel Wilson, W2BOC, lectured the annual convention of the Worldwide TV-FM DX Association this past August in Dunkirk, N.Y. The association is a membership of avid TV and FM DXers well aquainted with *E*, tropo and meteor scatter propagation and is a growing hobby that includes many amateurs. *(Photo via WA9RAQ)*

It should be pointed out that not all contacts made during this extended opening fit this pattern perfectly, at either end of the circuit. Operating only about 200 feet from the ocean front in Hilo, KH6HLP worked K6QEH in Fullerton (operated by W6KJD and K6JYP) with S9-plus signals on 145-MHz cw, beginning at 1935 PST, July 29. They worked on ssb, with K6QEH S9 on this mode, as well, soon after the cw contact. The KH6HLP tape record of this work was played again and again at the Central States VHF Conference in Bloomington, Minn., Aug. 17 - 19.

KH6HLP threw together a station hurriedly when he heard California stations coming through the KH6EQN repeater. Paul, a long-time vhf enthusiast as W6ZOP, was operating from a water heater room at the top of a Hilo ocean-front hotel, and room temperature was 90 degrees at the floor, and 130 degrees at the ceiling. He had only a Communicator IV for cw, and he keyed it with the push-to-talk switch on the microphone for his cw QSOs with K6QEH and K6KSY, who lives on the Palos Verdes Peninsula, not far from the site made famous by the late W6NLZ. K6QEH was so strong at first that he was heard clearly with a 19-inch wire plugged into the converter at KH6HLP! The antenna normally used was a 20-element horizontal Yagi – but Paul had no coaxial relay, and so was making the changeover by hand for each transmission!

K6KSY was first worked at 1950 PST, when signals from California were in a weak period. Reports of 559 were exchanged on cw. A second contact with K6KSY was made at 2205 PST, and a third one at 0011 PST, the 30th, by which time K6KSY was back up to 9-plus, on ssb, with

KH6HLP remaining on "push-to-key" cw.

KH6HLP heard W6WKO, located near the Los Angeles International Airport, around 1950 PST. Perhaps the most interesting single report of the whole bash is KH6HLP's reception of W6KQG in Sebastopol, north of San Francisco, for about 15 minutes, beginning at 2345 PST, the 29th. This is by far the most northerly reports ever received on the Hawaii-California circuit.

The Sebastopol location of W6KQG is confirmed by WA6PYN vhf PAM of the San Francisco ARRL Section. Mike reports that W6KQG enlisted the aid of WA6STS and K6ZWB, who supplied the fm exciter to drive the kilowatt amplifier at W6KQG, and they worked several Hawaiian and Southern California stations through the KH6EQN repeater. The path was open on 50 MHz as well, and W6KQG worked KH6IJ on that band, as did K6UQH in Saratoga, both around noon PST, the 29th. These and other 50-MHz reports, below, indicate troposhperic propagation on that band as well – good news WAS seekers on 50 MHz.

The KH6EQI 50-MHz beacon was widely heard Sunday morning, and WB6IMV placed a call to Bert Ingalls, KH6GRU, who was on the air from his EWA Beach location in a matter of minutes thereafter, working K6BPC, WA6JRA and K6QEH, and possible others not reported.

The 2540-mile 2-meter DX record of KH6UK and W6NLZ was broken, after standing unchallenged since 1957. Though nearly all the contacts were made by fm stations with those at the Hawaiian end being at high elevations, either through driving up the slopes of Mauna Loa or working through the Mauna Loa repeater, K6QEH and WA6JRA worked KH6GRU on 144-MHz cw. The distances are reported by K6JYO to be 2585 and 2591 miles, respectively. Unless someone has a claim for a greater distance, WA6JRA and KH6GRU are the new holders of the 2-meter record, 2591 miles.

The question inevitably arises as to why 13 years lapsed between the last transpacific work of W6NLZ and KH6UK and this record-breaking weekend. That they worked five times in three different years, on three different bands, in three different months, says that this path must have been open fairly often in the 13 year interval since anyone utilized it.

If anyone has weather records for the dates listed at the start of this summary, we'd be glad to see them. We do have good information on the 1973 conditions, thanks to Carl L. Smith, WØBWJ, ARRL vice-president, and long-time Western Airlines pilot on the San Francisco (SFO) to Honolulu (HNL) route. Airways weather-maps supplied by WØBWJ for the period July 26 through Aug. 1 show a series of tropical storms on a line from central Mexico to just south of Hawaii, near latitude 19 north.

The first of the series, names "Doreen," was shown at about 17 *degrees* north and 145 *degrees* west, or about 800 miles southeast of Hawaii, at 1800 GMT, July 26. Eventually, Doreen passed about 400 miles south of Hawaii and Johnson Island, After July 29. The circulation pattern around this storm must have had a major influence on upper-air conditions near Hawaii, for several days. On the 26th, the second storm "Emily," was at about the same latitude, near 120 *degrees* west, and a third, "Florence" was just moving into the eastern edge of the map, near the coast Mexico. Emily subsided into a mere tropical disturbance, of no major concern to air travel on Carl's route far to the north. Florence picked up some steam as she moved west, and on the Aug. 1 map, a fourth storm, "Glenda" moved into view from off Mexico.

The undersigned is no expert on tropical storms, but knows from years of observation that hurricanes have major effects on Eastern Seaboard weather, and on propagation on the vhf bands, even while still very far southeast of any major land area. It seems only logical to assume that the Doreen-Emily-Florence-Glenda series had more than a little to do with the great doing of July 26 through Aug. 1.

Pilot Smith took off from HNL at 0830 Hawaiian time (1830 GMT) July 28, for SFO. Reaching cruising altitude of 37,000 feet in about 30 minutes, Carl reported this to HNL on 131.95 MHz. Much to his surprize, SFO also acknowledged the call. He has heard SFO in Hawaiian airspace before, but this time all communication for the entire trip, with both ends, was maintained on 131.95 MHz. Most startling of all, SFO had to ask HNL to stand by, at times, to clear traffic with aircraft coming in to San Francisco! WØBWJ is accustomed to some pretty good 131.95-MHz DX, after years of flying this route, but this is the first instance in his long experience, where there was interference between the two *ground stations*.

So the period of "the great opening" must have been more than a little unusual, to say the least.

We now know what *can* happen, and we have practically continuous means of checking conditions, in the fm repeaters constantly in use at both ends of the circuit. To know every time it happens; to develop, perhaps, the ability to predict when it is *going* to happen; and to learn how conditions vary from one opening to the next, could demonstrate the unique worth of amateur radio experimentation, once again. Meanwhile, let's keep our ears open, and our pencils and tape recorders ready!

In closing this already over-long report, we offer thanks to the many operators and observers who answered the WIAW bulletin appeal for details of this phenomenal opening. Though only a fraction of the letters are even mentioned here, they all helped to put this latest vhf adventure into at least some degree of perspective. Nice work! – *W1HDQ*

OVS and Operating News

50-MHz reporting this month reflects the departure from the summer *E* season. WB2LAI/4, Chesapeake, Virginia, found comments in this column by W1HDQ regarding the 10-to-6 meter *E* relationship interesting, but Bill uses 11-meter CB for his tipoffs. On Aug. 5 there was widespread double hop and Bill worked KØVXM, South Dakota, and W7ZKL, Utah, for two new states.

Over 100 persons attended the Central State VHF Society's annual conference held this past August in Minneapolis. Top row, left to right: W7VDZ (left) tells WB4BND that perhaps next summer Hoppy will finally work Wyoming on 50 MHz. W9JDJ (left) and K9HMB appear amused during a technical session. Middle row: K2RIW discusses a new principle of Yagi design as WØRLI (background) exhibits interest. 2-meter moonbouncers W8KPY, W6PO, WA2WOM and W2AZL in an echoless meeting. Bottom row W2UK (foreground) was winner of the Society's 1973 W6NLZ Memorial Award. W4FJ watched as K5PJR put a 132 converter through its moment-of-truth on the noise figure meter. *(W5TVB photos)*

Idaho and Montana were heard but not worked. August 7 produced a coastal tropo opening and WB2LAI/4 worked W3TBG, Delaware, for another new state, number 41. Perseid meteors made possible scatter contacts with stations in Illinois. In the evening of the 12th, two stations in New Mexico were worked. They were the only stations heard, and there are no other skip reports on file for this date. Bill's final *E* opening of August was on the 18th to Tennessee and Alabama. WB2LAI/4 and WA3SKT/4 desire scatter schedules, and can be found on 50.11 Saturday and Sunday mornings between 0700 and 1100 Eastern time.

Going back to July, K5ZMS/5, San Antonio, found *E* quite productive, with the band open 22 days! Stations throughout The U. S. were worked, plus TG9SO and XE1GE. The first week of August was also lively. Ray had contacts from New England to the Pacific Northwest.

K7QFW, Washington, says six meters wasn't

open too often in the early part of the season, but when it was, the signal levels were good. His latest report covered June, with stations throughout the U. S. being worked.

From near Kansas City, WAØVJF, who seems to miss little that's doing in the midwest on 50 MHz, believes the band may have been open on multihop *E* to Venezuela July 29. YVs were present on 10 meters, and on six he heard indicators of multihop *E* such as Texas and Mexico City at the same time, and teletype on 49.985 MHz from the direction of South America. The Teletype signal disappeared at approximately the same time as the YVs did on 28 MHz. Based on this, Jon feels six was open to at least Venezuela between 1840 and 1910 GMT.

Anyone have ideas on this? Some detective work by Jon reveals that a station signing PZ5CW, Surinam, South America, was bootlegging the call. This was confirmed by the real PZ5CW, who says he has never worked six meters. Aside from this bootlegger, summer '73 has been unusually free of the clowns who get their kicks from illegal operation. Perhaps some of our old "friends" are maturing.

Continuing with the *12-page* report from Jon we find six meter openings August 1, 5-6, and 10, with multihop across the U. S. very pronounced on the 5th. The following day 8P6EN, Barbados, worked all New England states except Maine, and also New York, New Jersey, Pennsylvania, Michigan, Ohio and Indiana during an intense opening. WAØVJF settled for New England and W7 contacts.

Elsewhere, WA1DFL, Mass., was elated August 6 when he finally worked KØVXM at Yankton, S. D., But for other than August 5-6, found *E* conditions in August rather poor. WB6NKO, Carmichael, says he worked *E* nine days in August with the best openings on the 5th and 9th. WB6NKO was issued 50 MHz WAS certificate number 118 this summer past. K7ZCB, near Portland, reports August 5th good, working stations from South Dakota to New Jersey. Dave says several Portland area stations managed contacts into New England around 2240 GMT. K7ICW, Las Vegas, reports August percieds openings on seven days, including multihop on the 4th, 5th, 14th and 25th. The August 25 opening found KP4DQN squeaking into Las Vegas, while Texas stations were working Puerto Rico with apparent ease. The August 4-5 openings were likewise reported by K7GSE, Seattle who worked 2s on the 4th.

W1HDQ calls Aug. 5 one of his better days for *Es* in many years of vhf DX chasing. The band opened to Florida at 0805 EST, almost simultaneously with the appearance of Florida stations on 10 – a good sign. In the first 90 minutes stations in the single-hop range were heard all the way from Florida to Michigan; often several different areas simultaneously. The 10-meter band was jumping all day, but 6 went quiet in the afternoon, reopening about 1800 EST. Again almost everything within 1200 miles was heard, and there was double hop mixed in, the latter flashing from one section of the country to another rapidly. Ed worked W7FN, Washington; W7ZKL, Utah; W5SOT and W5SVJ, Los Alamos, New Mexico; K7ICW, Las Vegas, Nev.; WA7ESI, Idaho; and heard stations in Colorado and Oregon.

Another good session came Aug. 10, when W6ABN and WA6JRA were worked, in the midst of 4s, 8s, 9s, 10s. The final Es opening (or was it just a stray?) came the night of Sept. 5. Aurora the night of Sept. 9 enlivened the closing hours of the September VHF Party. This was hardly a surprise in view of S9 bursts of solar noise having been observed the morning of Sept. 7.

8P6EN says that the 1973 sporadic-E season, while not up to last year, was good for 270 contacts in this country and Canada, including three new states and VE3. On Aug. 5 alone, Allan worked 60 stations. Recently he has been attempting to work VP2LAW, St. Lucia, on 6. John is only about 100 miles to the north, but is on the "wrong side" of a high mountain for work to Barbados. VP2LAW has a low-power a-m and cw rig, crystal-controlled on 50.4 or 50.103 MHz, transmit and receive. He got on too late for the summer *E* season, but is an avid vhf enthusiast, and will keep trying. John, a 10-meter regular, puts a strong signal into most of this country on that band. He will gladly work anyone interested in discussing the 6-meter band. 8P6EN may have worked his last 50-MHz DX from Barbados, as he is returning to Austrialia around the end of 1973.

144-MHz meteor jockeys generally were disappointed by the late July and August meteor showers, but we have evidence of a number of contacts. Here, by our usual method, is who worked whom.

W1AAI, Mass.: W5TDP, Ark., W5RCI, Miss., WB4MJY, S.C.

W1FZA, N.H.: KØWLU, S. D., K5BXG, W5WAX, Okla. Now has 24 states.

WA1FFO, Conn.: WB4MJY, S.C., KØMQS, Iowa, W4ISS, Ga., W5RCI, Miss.; FP8AA. Now at 32 states.

K5BXG, Okla.: WA2GSX, N.Y., W7RQT, Utah, VE2YU, WØLER, Minn., K1ABR, R.I., W1FJH, Mass., W1FZA, N.H., Now 41 states.

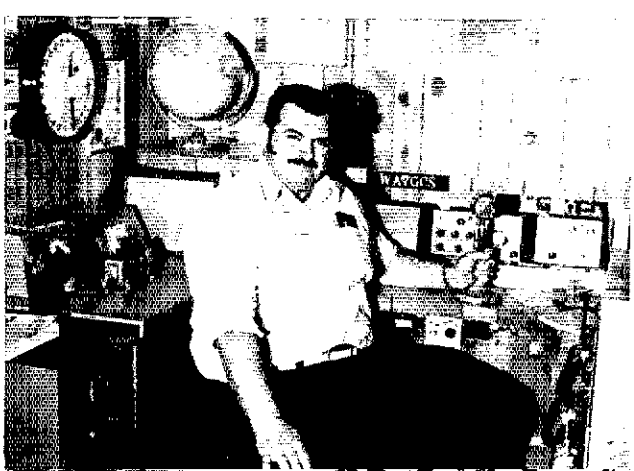
WB5BKY, Okla.: WA2PKY, N.Y., K4QIF, Va., W4WNH/8, Mich., W7JRG, Mont.

WA9QZE/5, Texas: W9YYF, Ill., WØLER, WØRLI, Minn., W9JDJ, Wisc., W8KPY, Ohio, KØMQS, Iowa, (Dallas apartment-bound kilowatt and 14-element Yagi).

W4WNH/8, Mich.: WB5BKY, Okla.

W9JDJ, Wisc.: K1AGB, Mass., K1HTV, K1PXE, Conn., W5LO, N.M., WA9QZE/5, Texas, VE2DFO.

WØMOX, Col.,: WA5UNL, Ark.



Lou, WA7GCS, of Tigard, Oregon (near Portland) completed his 50-MHz WAS this summer working KH6EQI in July.

QST for

VE2DFO, Quebec: WØRLI, Minn., W9YYF, W9AAG, K9HMB, W9JDJ, Ill., W9NHE, Wisc., KØWLU, S. D., WØDRL, Kansas. Now at 37 states.

VE2YU, Quebec: KØWLU, S.D., K5BXG, Okla., W5RCI, Miss., W4LNG, Ga. Now at 32 states.

VE7SL, B.C.: W7RQT, Utah, (Ex-VE7ANP, now at 5 states.)

W1FZA, N.H., nearly completed a July 28 moonbounce contact with W6PO, and then on August 25 did the job, for state number 16.

Another moonbouncer, WA2WOM, disagrees with the September column comments of WA9HUV that the moonbounce propagation mode should not be used for counting new states worked. WA9HUV based his thoughts on what appeared to him to be the unfair advantage that some stations have because of large land acreage. Not so says WA2WOM. Herb works his EME from a multi-storied apartment building in the heart of New York City with a KWM-2, 62S1 and an 8877 amplifier coupled to four 12-element Yagis and rotated by a Ham-M. "Hardly an esoteric equipment layout," says Herb. His remarks are offered as a rebuttal and not for the sake of starting an argument.

Similar comments came from K2UYH who said, "I don't see how you can differentiate between a signal reflected off a meteor, an airplane or the moon. As for the comments that lots of space is needed, this just is not true." EME activity would drop if it was not usable for WAS credit. "EME offers an exciting new frontier," W1FZA agrees that EME contacts should count for WAS credit, but asks that consideration be given to a "common window," so more stations could participate by working such stations as W6PO, without the need for steerable arrays. WB5BKY, who has not worked EME yet, says, "if you are going to set up a separate box for EME then you should *jolly well* do the same thing for tropo, meteor, lightning and aircraft scatter, and aurora." Comments supporting EME for credit towards WAS came also from W2AZL, W8KPY,and W6PO as would be expected. And I personally agree with them. I do see, however, an advantage to indicating with an asterisk (*) in the boxes those stations having EME capability, so others working towards EME systems can easily identify who may be workable via that mode. Any comments on that suggestion?

Turning to tropo, long-time vhf DX hand K4GL found the July column tropo information interesting. Jack says nearly everything he has read treats tropo as if it's present or not present. "There are many stages in between. Whether a duct was too large or too small or just broken I don't know, but there are many times when the band is almost open. This can produce a condition in the 400 to 600 mile range that could be mistaken for meteor scatter, except that there are no long bursts and one or two letters is the maximum that can be copied. I call this discontinuities of the tropo. Tests run with W8TIU over an extended period of time often produced ping counts in the 60s to 90s during our half hour schedule, but never enough to exchange useful information. Finally after about 7 months of nightly schedules the signal was solid, but weak. A QSO was completed and the schedules discontinued. It could be low *D*-layer meteors, but I think it was merely discontinuities of tropo, that sound like meteor scatter over short distances."

WA4CQG/4, Auburn, Alabama, worked Wisconsin and Illinois August 21, over 700-mile tropo paths. Dale would like schedules on 2 meters for his 100 watts and Yagi. K5BXG, Tulsa, is making moonbounce tests with W6PO, and also desires schedules via meteors with anyone running 100 watts or more in Wyoming, Nevada, Idaho and Oregon. For a guy with 41 states, Charlie, you sure ask alot!

K9UNM, Ft. Wayne, says tropo conditions were good the seven-day period August 20 through 27. Among those worked was KØALL, North Dakota, Bringing Jim to 31 states worked with 50 watts of c w.

A series of solar flares September 6 and 7 brought auroral buzz for the September contest. WØOHU, Minnesota, reports the aurora between 2045 and 2310 GMT, September 9. Ed heard W2AZL for three minutes, and says closer stations were very strong. He reports that KØMQS worked stations in Vermont, Virginia and North Carolina. In Oklahoma City, W5ORH, alerted to the aurora by W5TVB, worked several 9s before heading for the tennis court. I suspect this aurora produced many fine contacts that had not been reported at this writing.

August 25 and 26 found Minnesotan WØKRX working Ohio, Michigan and Indiana on tropo fm simplex. Bob uses a single 4CX250B amplifier and a 44-element Yagi array at 70 feet. Similar results were had during the same period on 432 fm.

Recent moonbounce contacts at VE2DFO include those with W8KPY and W6PO. Don is scheduling also DK1KO and DL3YBA in Germany.

220 MHz produced at least one persied meteor contact. Lee, WA5MFZ, wife of W5LO, near Albuquerque, N.M., exchanged with K9HMB, near Chicago Aug. 11. Lee also worked WØEYE, Colorado, on tropo August 26, over a difficult path. Lee would accept further 220 schedules, I'm sure. At Tacoma, Washington, K7BBO has a 40-element collinear and says W7GLS, WA7NAN, WA7KYZ are all active in Washington, and W7TYR in Oregon. At Chehalis, Washington, K7IEY has a 2C39 rig on the air and is building towards 432.

432 MHz and Up continues to enjoy rapid growth, with results approximating those on 144 MHz just a few short years ago. K2LGJ, Buffalo, runs nightly schedules on 432 over 300-mile plus paths into New England with constant success. He says W8QOB, W. Virginia, is very active on 432.022 and that K1JDY/3, Philadelphia, seeks schedules. K8UQA has a 7-foot dish and 10 watts output on 1296. W8YIO is now using a 7-foot dish at 70 feet on 1296 and feels it does better than his large ground-level dish. K2RIW has a 28-foot dish he plans to mount 75 feet high. K2JNG, New Jersey, now has ten states on 1296, the latest being W3AED, Maryland, August 3. WA5UVM, who worked 4 states from Dallas, is now signing K4VOW at Huntsville, Alabama on 432. W5AJG, Dallas, climbed to 8 states on 432 August 25, working WØYZS and WAØJMC, both Kansas City, Mo. W5GVE, Waco, Texas, stands at five worked on 432, adding K7UMC/5 in Arkansas August 9.

K6YNB and WB6RIV operating YNB's camper truck rig Mt. Ashland in Southern Oregon, gave W6FZJ a new state on 432. The path was a difficult 400 mountain miles. Probably the most interesting development during the August trip came on the 14th at a site near Reno, Nevada. Bill, K6UQH, south of the Bay area at Saratoga, copied the third harmonic of K6YNB's 432 rig on 1296 MHz, over a 250-mile path across the High Sierras!

(Continued on page 117)

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

W1DSF/W5TMP, Frank W. Sullivan, Boston, MA
W1GDP, Walter F. Belcher, Quincy, MA
W1HLY, George V. Ebbitts, Riverside, RI
K1OLE, Clayton B. Straw, Henniker, NH
W1TS, *Donald H. Mix, Bristol, CT*
W1ZYZ, Leighton H. Pearce, Lyndon, VT
K2ENK, Benjamin F. Warrick, Sr., Linden, NJ
W2AG, C. R. Runyon, Jr., New York, NY
WA2ENC, Elwood Schoonmaker, Utica, NY
WA2NRT, Lawrence R. Baker, Vestal, NY
WA2RPM, Franklin L. O'Hara, Lowville, NY
W2VH, Paul Z. Haus, Stamford, NY
*W3BIH, F. Arnold Beaver, Butler, PA
W3ECV, Hoke L. Franciscus, Glen Rock, PA
W3LL, George P. Stout, Baltimore, MD
WA3NVM, Peter N. Fortuck, Kingston, PA
WA4ADA, D. Gregory Knisely, Roanoke, VA
WA4BKS, Tom B. Parks, Charlotte, NC
W4ENH, Charles A. Brady, Jr., Hickory, NC
W4GKA, *Gilbert W. Rhem, Orlando, FFL*
K4GQP, George C. May, St. Petersburg, FL
W4KTF, Heiden L. Kreh, Naples, FL
W4KVL, William L. Allsep, Seneca, SC
K4PUM, Frank E. Lindsey, Knoxville, TN
WB4TZZ, William A. Matheny, Satellite Beach, FL
WB5CJG, Ward Stephenson, Orange, TX
W5FA, Roy E. Armstrong, San Antonio, TX
W5NMV, Martin K. Thomen, Sr., Orange, TX
W4PGJ, Paul E. Bugg, Carlsbad, NM
K5POQ, J. E. "Cotton" Blankenship, Pasadena, TX
W5SSK, Bert Rhodes, Mount Olive, MS
W5WLY, Joseph E. Tanner, Jackson, MS
W6CSE, James H. Paisley, Mariposa, CA
W6CUL, Lloyd E. Hines, Lodi, CA
WA6DHG, Lester W. Nichols, San Francisco, CA
WB6EWF, Robert L. Sheward, Hesperia, CA
WB6HOJ, Ralph L. Myers, Spring Valley, CA
W6OBE, Raymond G. Knorr, Yucaipa, CA
W6WOJ, George E. Wilson, Homeland, CA
W6YWQ, Chester L. Keene, Sacramento, CA
W7CIB, William L. Nutt, Cheyenne, WY
W7INY, J. Leslie Hansen, Phoenix, AZ
Ex-W8CRT, Harry G. Stevenson, Oneida, NY
K8CSV, Albert G. Walter, Bancroft, MI
W8EYO, Julius W. Pantaski, Stevensville, MI
WB8HJP, Donald P. Markley, Plymouth, OH
K8NG, Guy R. Harden, Rogers City, MI
WA8OWL, Ned G. Sebring, Owosso, MI
W8POD, Robert R. Jones, Pleasant Ridge, MI
W8QUH, Raymond F. L. Bosse, Cincinnati, OH
W8UOC, Carl E. Miller, Portsmouth, OH
W8WC/W8SMR, Alban A. Michel, Cincinatti, OH
W8YAE, Donald E. Cameron, Toledo, OH
WA8ZVR, Louis S. Pentler, Westland, MI
W9GOE, *Harold R. Garman, Mishawaka, IN*
K9MYP, Ivan B. Keene, Waterman, IL
W9RZS, Ernest L. Goff, Delphi, IN
K9UAL, James O. Davis, Monroe, WI
W9UBF, Harry E. Neff, Anderson, IN
W0BOQ, Edward T. Magnuson, Marquette, NE
W0CBQ, Otis J. Stanley, Pleasant Valley, IA
W0CTA, John A. Houston, Sr., Council Bluffs, IA
K0CXP, Fred A. Hannu, Robbinsdale, MN
W0EJN, Ellis W. Brake, Downs, KS
K0HIC, Doyle K. Brooks, Hays, KS
W0HTG, Robert E. Lora, St. Louis, MO
W0YQL, Edward A. Osantowski, Bellwood, NE
VE3EDK, Harold A. Whiteman, Kenora, ON
VE3GE, Gordon W. McClain, Toronto, ON
VE3ZH, J. J. Jarvie, Toronto, ON
VE7BAE, M. R. Hill, Penticton, BC
VE7TY, L. D. Jensen, Vernon, BC
KV4FY, John P. Kinzer, Christiansted, St. Croix, VI
GW3YPH, W. E. Turner, Pontypridd, S. Wales
VK2ZW, Alfred J. Perkins, Sawtell, NSW, Australia
7S6IE, D. Kramer, Johannesburg, So. Africa

* Life Member

Strays

David Frazer, KH6BIH,age 36, is deaf, blind, and totally immobilized except for a slight movement of his wrist. His only link with the outside world is via cw tapped out on his wrist or through placing his fingers on a loudspeaker cone.

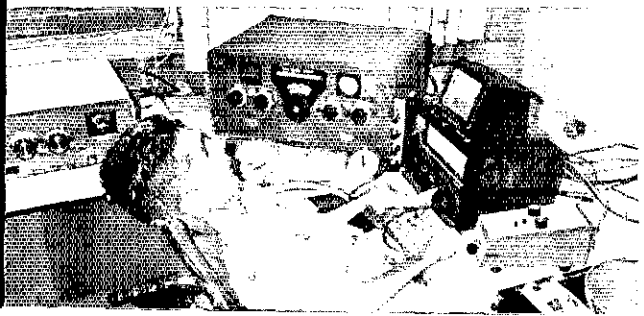
He has every right to act like a vegetable, but he is far from one. He can converse intelligently about world events, is alert, cheerful, and concerned about your welfare. His faithful father and his nurse have become adept at conversing with him via the code tapped on his arm. Other hams who are too modest to admit it have made life bearable for Dave Frazer. John Bothelo, KH6BFU, and Ben *Matsuoka, KH6BCK, among others, helped Dave* assemble his station.

"Shortly after I lost my sight I became interested in ham radio," said Dave. "When I knew my hearing was failing I was worried my ham radio days would end, but a friend showed me how I could receive messages. That friend was Peter Billon, WA6MWG of Palos Verdes, California who is flight engineer with United Airlines on a 747. He and Mrs. Bilon visit Dave regularly.

Dale Miller, W7CGF, of Twamoh Falls, Washington, reads the newspaper via the code to David. "We talk about two hours daily. He keeps me up-to-date on world news events and also gives me baseball scores and tells me what is going on in my favorite TV serial 'The Edge of Night'."

Dave's rig consists of a Central Electronics *100V, a Heathkit linear, a Drake 2B receiver,* a Heathkit electronic bug, and a triband antenna. He listens to cw by placing his fingers against a loudspeaker cone. He sends cw by positioning the paddle of his key between a notch formed by his third and fourth fingers since his fingers are not articulated.

His whole body is ramrod stiff and he must be wheeled into position before the rig. Yet with all his handicaps he enjoys life and most of all he enjoys talking with his friends on 14-MHz cw. Please talk to Dave Frazer. His address is Captain Cook, Hawaii 96704. — *Kutasht Nose, KH6IJ*



David Frazer, KH6BIH

QST fc

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

When:

Something old, something new,
Something borrowed, everything blew.

– Murphy

Single-sideband was crushing DX rocks back in days of spark, as we observed last month, a fact not now widely appreciated. The Bell rig at 2XS in 1923, described in WA9ESO's copy of *Radio Theory and Operating* by Mary Texanna Loomis (1925) would make a 1973 ham powerfreak green with envy. Its final, kicked by a 15-kW exciter, ran 150 ssb kilowatts to twenty watercooled jugs in parallel at 10,000 plate volts. Groovy!

So what else isn't so new? Mary goes into considerable detail about the 63-meter a-m repeater link used by Nebraska's KFKX BC outlet to rebroadcast the early-'20s Pittsburgh programing of KDKA. As for fm, amateurs of those days hollered with little else; the term is less ancient, SSTV? Various telepicture systems are described, some used commercially for transoceanic exchanges of high quality by 1924. "This modulation can be heard on a crystal detector receiving set and causes a peculiar sound easily recognized by one familiar with it as picture sending," she writes. Indeed! Wound any toroids lately? You can go ultramodern by building the 1924 three-tube reflex receiver on page 510 with "a type of coil having no external magnetic field and called by various names, Toroid, Balloon, Circloid, etc." Real state-of-the-art, OM. Pay-TV? Applied principle goes back fifty years to Italy where Hammond's scrambler system "broadcast programs in such a manner that in order to hear anything intelligible the person listening must drop a coin into the receiving set." The obvious clinker nowadays is whether we'll hear or see anything intelligible after parting with our change.

Today's 160-meter DX hounds will dig Ms. Loomis's commentary on the interesting labors of Dr. J. Harris Rogers who patented an all-underground antenna system in 1919. When Doc was burying radials at Hyattsville, Maryland, he didn't fool around. According to Mary's account he "was successful in reaching Europe on extremely short wavelengths with a comparatively low-powered vacuum-tube transmitter" in the spring of '25 while experimenting with subterranean insulated wires as long as 16,000 feet. Plant *that* in your back yard and smoke it.

The ARRL *Handbook* was just a-borning half a century ago so any publication of general wireless appeal was eagerly snapped up and dogeared by amateur and commercial alike. *RT&O* didn't ignore the "kids in the attic." Side by side with photos and diagrams of DX juggernauts KDKA, WEAF, MUU, KPO, NAA, etc., you'll find respectful write-ups on 3BKC, 3TD, British 5WS and other individualistic ham outfits of the time, some material bearing *QST* credit. Page 815, in fact, reproduces an Amateur First Grade ticket and tells you how to get it. Anyone for a sixteen-wire horizontal birdcage? Two blocks long?

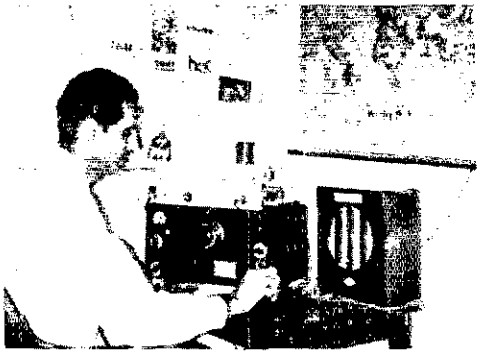
† † †

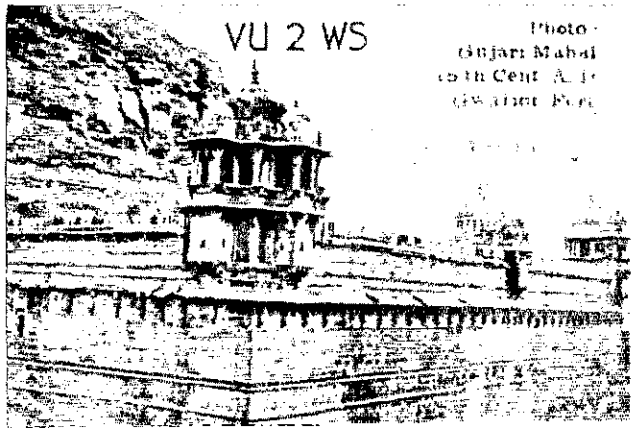
What:

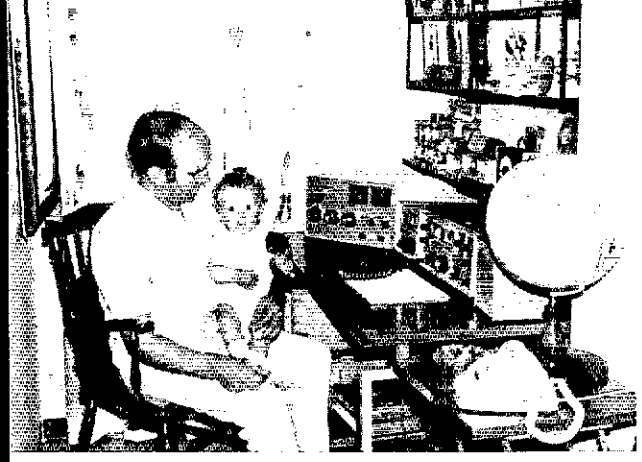
40 PHONE is such a fragmented mess that many of the DX crowd give it a wide berth except for occasional contest multipliers. They may be missing rewarding sport. Some challenge! The voice DX technique on 7 MHz for W/Ks is almost like old times, split frequency and finesse. Because most overseas regions transmit amateur phone no

*c/o ARRL, 225 Main St., Newington, CT 06111.

VU2WS has your QTH of the Month, a fortress of the 15th century. It's Gujari Mahal, now a famous museum at Gwalior, where Sharma works for India's department of archeology. VU2WS likes 20 cw and works more than a few W/Ks with his homespun 10-watter, venerable HRO-M receiver and a ground-plane perched atop one of those corner cupolas. *(Photos via K2JFJ)*







EA6BG breaks in a future DX hound at his comfy Majorca station. Mateo, readying evidence for DXCC and WAS certification, favors 10, 15 and 20. *(Photo via W1RLV)*

higher than 7100 kHz you can't use ordinary climb-on-and-clobber methods. DX delicacies are abundant after 20 meters folds, however, many goodies tuning up into the W/K voice subband as (ugh) SWBC hash permits. Late 7-MHz sideband loggings by W6s AM OKX, K2YFE, WA2EAH. WBs 4UKA 9DRE and the clubs press include A2s CCY CJP, A4XFE, C31FD, CEs 3AQW 3AVB 3RY 3YF 4EM, CM3HG, CN8s BF CG HD, CO2BE, CPs 2BR 5BG 5HJ 6EL, CRs 4BS 6FW 6GA 6HQ 6IS 6LX 6OR 6QU 7GJ, CTs 1BH 2BG 3AF 3AR, CXs 1JM 2AX, DA1ED, DLs 1NA ØWW, DUs 1EJ 6AI, EAs 6BG 6BZ 8CR 8FF 9AI 9EJ, EI 2s DG DK DO EG, DP2WB, F6KAW, FGs 7XI ØGE, FL8OM, FO8BW, FP8s CT DH, FY7s AG AL, G3s HOO QT UBR ZAY, GC3GS, GD3BVY, GI3OQR, GW4BLE, HCs 1AM 1NSC 2TV 2YL 5AJ 8GI, HH9DL, HI8s LC XEK XPA, HKØBKX, HMs 1GD 4FW HPs 1CU 1EE 1IW 1JI 1LR 3EM 3EML 4BC, HRS 1RF 2HHP, HV3SJ, Is 1MOL 8CZW, JA1s DJL OCA/C21, JD1ACF, JXs 3P 7HL, JY9GR, K4LTH/KH6/Kure, KA1CQ, KB6s CU CV, KC4s AAD USN USP, KGs 4CB 4FV 6JBO, KH6s AIB HDB/Kure, KJ6BZ, KP4s AN AST DBN DJE DLW, KS6s DH DY ER, KV4s AA AM FZ GP HW, KX6BU, KZ5s JF NG, LUs 1ADT 2ACD 2FAO 5HFI 7TD 8AJG 9UAI 9VAJ, LX1AJ, LZ1KKZ, M1C, OA4s AKL AMD CBU OS, OAN3AB, OD5s EH GC, OHs 1AD 1OD ØAB ØNI, OK2WF, ON4LF, OR4ES, OX3s MQ WQ YY, OY5NS, OZ5KF, PJs 2AH 2CE 2CW 2MI 2RR 7VL 8CW 8DX, PYs 6BZ 7AUG 7BZD 8AAD 8ADD, PZ1CU, ST2SA, SVØWU, TFs 3EA 5TP, TGs 8IA 8KF 8KY 9GU 9VN ØAA, TIs 2AAC 2CF 2GI 2KF 4PF, TJ1BB, TN8BK, TR8s MC VE, TU2s DF DO, TY5ABK, UAØs FGM FLM NT TO, UD6AI, UF6FBX, UH8BO, UI8s AAL LAG LL, UJ8SAJ, UK9s AAN AAQ, UO5s DN OAB, UQ2s DV ON, VKs 2ADE 2BNR 2RS 2WC 2WX 3BM 3XI 4VU 5PB 9RH, VPs 1BH 2DAJ 2DH 2DWP 2GAI 2GBL 2LAW 2LL 2ME 2MJ 2MY 2SAB 2SBH 2SF 2SRC 2VAV 5GR 5LD 7NH 9GE 9GR 9L, VRs 1AC 3AC, VS6DO, VU2s BG BX KV MX, W1FCR/HK3, XEs 1FFC 1HJ 1SSZ 2ZQ, XF4IX, XG1J, YA1s DT OS, YJ8s BD BL EE, YK1AA, YNs 1AA 1ZBH 1ZTS 9MQ, YS1WPE, YVs 1KZ 3UF 4AGP 5CYS 5MO, ZB2CU, ZDs 3M 7FT 8KO 9GC, ZKs 1AI 1TA 2BD, ZLs IHY 2ACP 2BT 4BO, ZP5s AR CW VQ, ZSs 1MH 2MI 3AK 3GH 5LB 6AWJ 6ZE, 3A2EE, 3E3ML, 4W1AF, 4X4s NF NJ, 5B4AC, 5N2s AAF ABG, 5U7AK, 5W1AU, 5X5NK, 5Z4s KI LW, 6W8DY, 6Y5s EE GL MJ, 7X2MD, 8P6s AH AJ AU, 8R1UGF, 9G1s DY HE, 9H5D, 9J2WR, 9K2AM, 9M2CJ, 9X5VA, 9Y4s AR LD T VT and VU. Note the relative scarcity of Europeans who find the higher reaches of 40 completely glutted with megawatts of SWBC trash right in their own back yard. Yet under certain skip conditions they do make out, wonder of wonders. Maybe next month we'll find space to check radiotelegraphic DX doings on 40, a mode more suited to 7-MHz selectivity requirements.

† † †

160 DX buffs ready their rf arsenals for the annual 1.8-MHz Transatlantic & World-Wide Tests, a top-band activity promulgated by W1BB and colleagues since the early '30s. Test sessions will be held this 1973-'74 season at 0500-0730 GMT on November 18th, December 23rd, January 13th and February 10th. W/K/VEs are urged to call CQ DX TEST during the first 2-1/2 minutes of alternate 5-minute periods beginning on the hour, listening between, until the DX ball gets rolling. Clock accuracy is a must. Europeans are expected to congregate in the 1825-1830-kHz slot, JAs between 1907.5 and 1912.5, ZLs near 1875 kHz, and VKs just above 1800. Remember, these Tests are not meant to be contests. . . . . The lads out west will hit the 1.8-MHz DX trail in another batch of Transpacific Tests at 1330-1600 GMT on November 17th, December 22nd, January 12th and February 9th. "Please report results to your favorite DX news source and/or W1BB," suggests Stew, also offering a copy of his latest 160-meter newsletter in response to your self-addressed stamped envelope. You'll find his thorough top-band commentaries most interesting reading. And keep in mind that the 4th ARRL 160-Meter Contest cuts loose next month. See WA1PID's recap of last year's affair (p. 66, June '73 *QST*) for flavor, also July's "How's". CU on 160!

† † †

W h e r e :

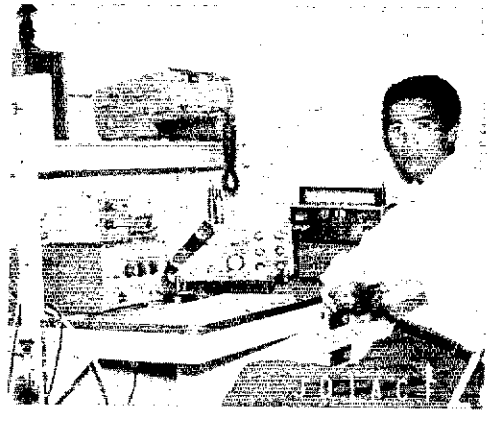
NORTH AMERICA — "QSLers of the Month" specified in *QST's* DX mailbag as punctual even beyond the call of duty include A35FX, A4XFJ, C31GN, CN8BO, CP1JY, CT2AK, DL2AD, EA8s CR IQ, EL2NS, ET3USE, Fs 6AFJ ØAHY/FC, FY7AM, G5AQZ, GM5AXO, HP9s ARW AWW, HK4CJB, HR1RSP, I2MDR, ISØAEW JA1OCA/C21, Ks 5LTH/KH6 7SAD/KW6 KA1DX, KB6CU, KG6AAY, KH6ASN/KB6 KJ6BZ, KX6KO, MP4BJR, OH2NB, SM7DEJ SV1BV, TR8PB, TU2DV, VP8NI, VS6s AW FB

XW8EO of our Vientiane embassy is a consistent entry in W/K logs. In fact Bill piles through so well that QSL manager W3HNK, donor of this photo, is kept well exercised.

WB4BUQ/8R1, XU1AA, YN1s AVE CX, YS1RFF, YV5KL, ZK1s AI TA, ZM3JC, ZP5FN, 5T5LO, 5U7AZ, 6W8FB, 7X2MD, 8P6BU and 9Y4MH as well as QSL aides Ws 3HNK 3RLY 4KGF 5GTW 6KNH, K9KXA, WAs 3HUP 4AGT 6AHF 6NFC, DK3SF, OK1AHV, SM3CXS. ZL2AFZ and 9M2IR, all applauded by correspondents Ws 1OPJ 1RML 2GEY 6OKX, WA3SWF, WBs 2AMU 4TPH 5FML 5HIH 9DRE, WNs 7UMU ØJFJ, KP4BDL and HS1AIK. Any deservables out your way? . . . Poor conditions mean higher QSL values, so the boys are hitting their bookwork with a vengeance. Halp! These italicized brethren need nudgings toward the wallpaper of holdouts mentioned: (W1OPJ) FG7KP, PZ9AB, VP2VW; (WØKMN) JW5SL, ZD8BR; (K5MHG) CE9AF '69, HM1AQ, OB4MS '71, UF6LA '70, UK6AAF '70, UP2OJ '70, 3A2AJ '70, 8R1J; (WA2EAH) CN2AY, FR7s AI/t AM/e, KW6GM, VR2DK, 5N2AAJ; (WA2FIQ) CP5DM, CX1JM, KW6EJ '68, PZ1AN, SV1DB, TI2s AP RT, VP2s AAC VW, YO2BM '69, YS1MAX; (WB2AMU) WØYVA/4 for YV4AGP, 4M4AGP; (WB4UKA) CT3AY, HUP/7p, KR6PO, VP8s LR ME; (WB4WHK) EA8FE, HR3FJJ, TG9DX, VP2MY, WA5ZNY/KV4, 3B8CZ; (WB9DRE) HRs IXAP 2WTA '72; (WN7UMU) CT2AC, CX2CS, FO8DT, FR7AI/e, KS6EM, 4Z4NKB; (WNØIFJ) HA4XS, HC2JP, ZS6s ADE AFC; (VE3CUI) FM7WT; and (VE3EME) JWØAU. Any 'alp? . . . Because no logs have arrived in more than two years I no longer act as QSL manager for 6Y5ET. (WB4EYX). . . I'll need a reliable QSL manager for some special 1974 doings I have in mind. (VO1KE) . . . QSLs for QSOs in next month's PJ1 commemorative activity go to addresses of PJ2s bearing like suffixes. Special cards are in the works. (VERON) . . . More care should be taken in filling out QSLs. Cards bearing cross-outs and corrections should not be sent out because awards authorities probably will reject them. Too many QSL applicants omit s.a.s.e. (self-addressed stamped envelopes) in mailings to QSL managers. Also be sure to use only their latest *Callbook* addresses. (WA3HUP) . . . Very discouraging to see one of my holdouts listed as a QSLer of the Month! I wish DX ops would make out QSLs more carefully, especially regarding letters O and V. Cards arrive here meant for WB2AMV. (WB2AMU) . . . NJDXA deserves commendation for efficient administration of ARRL QSL Bureau's Twoland branch. (W2GEY)

AFRICA — Can't answer cards received for ex-VQ9WF until I hear from Bill whose last known location was California. I continue to receive mail for ET3s USC USE and USF for whom I do not manage QSLs; rightful recipients please claim. I'm sending out about 500 ET3USA-9E3USA-9F3USA cards via bureaus but I cannot confirm QSOs prior to 1970 because of the poor condition of logs. Incidentally, the importance of writing the name of the operator on your QSL to a multioperator DX station cannot be overemphasized, and if the QSO occurred during a contest or other specific activity this too should be indicated. ET3USA-9E3USA-9F3USA October '72 contest logs for 14 and 21 MHz have been lost, unfortunately. By the way, I'd like to add to my collection of International Reply Coupons from forty countries. Any IRC-DXCC claims yet? (W4NJF) . . . I can assist in stirring up QSLs for CT2AE's past QSOs as CR4AX, CTs 1RX and 3AQ. (K9ECE) . . . Be advised that all QSLs for FB8X stations can go via F2MO, for FB8Z calls via F8US, FB8WW via F5QE, and FB8YY via F9MS. None go via 5R8BC. (F9OE) . . . My QSLs can be obtained direct from Beira but W/Ks will get them more inexpensively and quickly by applying to WØGX. (CR7RM) . . . I've been handling ZD7FT's QSLing since August 1, 1973, and my correct address will be found in the most recent *Callbook*. Commemorative postage, s.a.e. and/or IRCs are desired. (VE1AIH) . . . TU2DV's Stateside contacts are confirmed through my new address, 1127 Pioneer Av., Turlock, CA 95380, others via International Short Wave League of London. (WA6NFC) . . . Ask W8CNL about A2CCY's super-QSL of the month next time you work him. (WA7RFH) . . . Ethiopian calls often are quickly reassigned, so I must make it clear that I handle ET3USB QSLs for QSOs made only by former operator Dick. (WB4UKA)

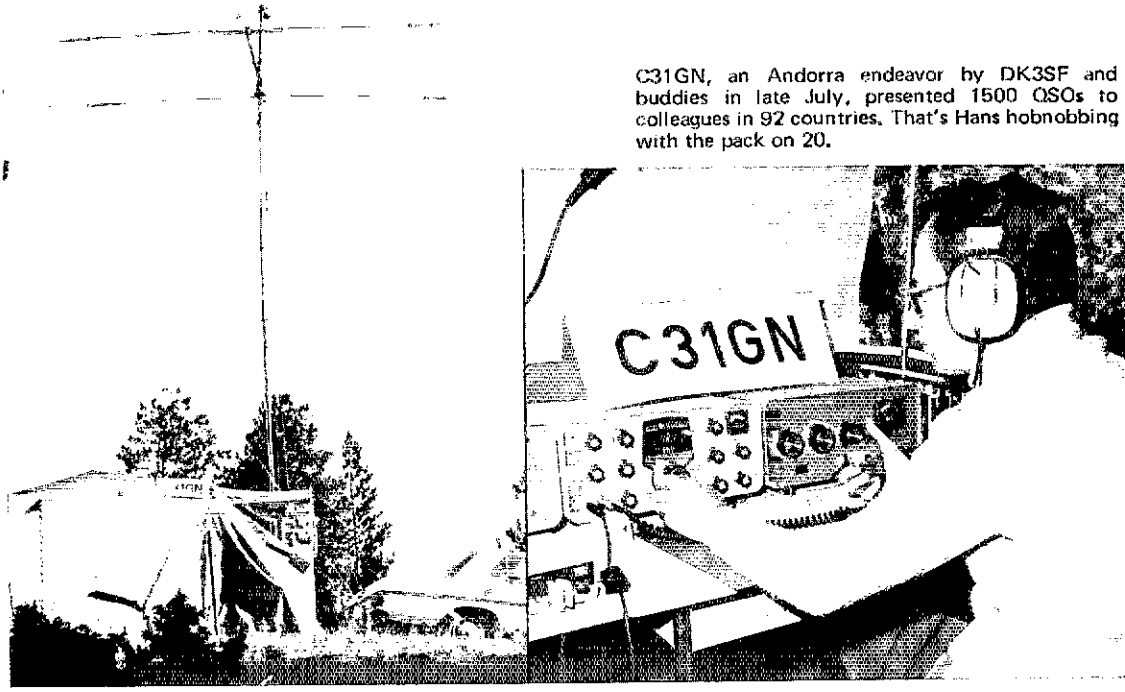
ASIA — The general standard of SWL reports from the U.S.A. is worse than those from anywhere else in the world. Not only are they uninteresting; they arrive direct without IRCs. They haven't a hope. If I am, for example, working a string of U.S. Sixes on 20 meters at strong signal strength, what on earth is the use to me of an SWL report from California? Some Stateside listeners are sending out their cards via "outgoing bureaus" whose shipments take up to two years to arrive. Such ancient information is pretty useless. So is U.S. postage at this end. Reports of uncommon reception on bands other than 15 and 20 meters would probably interest me. Give careful comparison reports when possible, using only Greenwich Mean Time and Date! (9M2DQ via NNRC) . . . I still have logs on hand for old VU2AJW and XW8DK but the latter's records for October '71 contest activity are lost. (WA6NFC)



JD1ACF, operated by JA1YNI, is typical of the frequent DXcursions to the Ogasawara (Bonin) Islands launched by Japan's DX crowd. Tadao reports fine summer conditions and plenty of QSOs. *(Photo via WB9DRE)*

. . . The Cyprus bureau informs me that last year's 5B4AF left the island, no forwarding address available. (W1OPJ) . . . Anyone who worked VU2OMR and didn't get a QSL should reapply with s.a.s.e., or s.a.e. plus IRCs, to my new Virginia QTH. (K4OMR) . . . We ask all QSL bureaus to hold any cards intended for Afghanistan until notified otherwise. Our bureau no longer exists. (CDRC) . . . Consensus credits UJ8AC as the most notorious non-QSLer out his way. QRL, Boris? (WCDXB) . . . A7 is said to be allocated by International Telecommunications Union to replace Qatar's old MP4Q label. (VERON)

EUROPE — Some of those "Halp!" listings suggest that a few of the boys aren't keeping their *Callbooks* current. G8GG tells me he knows nothing about "GD8GG". I have more trouble coaxing QSLs out of DL4s than Russians. DJ8WL says all those DC-prefixed hams are vhf/uhf-only types but the DB prefix soon should be getting around our way. (VO1KE) . . . All QSLs for our July C31GN activity were posted by mid-August. (DK3SF) . . . Just received a missing log page from ex-JW1EE for QSOs on August 14-15, 1972, should anyone still be interested. (W4NJF) . . . My Russian returns are slow, too, running



C31GN, an Andorra endeavor by DK3SF and buddies in late July, presented 1500 QSOs to colleagues in 92 countries. That's Hans hobnobbing with the pack on 20.

about six (6) percent. (W1OPJ) . . . LB1V displays what may be Norway's Novice-style prefix, a ticket good for fifteen watts of cw on 3.5 MHz. (VERON)

OCEANIA – We have many QSLs on file for former KR6-KA6 operators who have left Okinawa. Please claim from Radio Society of Okinawa, Box 465, Fort Buckner, APO, San Francisco, CA 96331. This is also the QSL bureau address for current KA6 operation, not via FEARL. (Anne Szczesniak, RSO) . . . K9KXA became my QSL manager on July 25, 1973. (KH6ASN/KB6) . . . My management of QSLs for 3D2ER and A4XFJ commenced August 15, 1973. (K4FCZ) . . . K8UDJ indicates he handles QSLs for an earlier VS5MC stint but not for Maurice's current use of the call. (DXNS) . . . I'll be YB1AB's QSL tender as of September 1, 1973.

SOUTH AMERICA – Still have a few blanks left for last year's HD8IG operation, also for ZD8HT work. (W3ABC-5R8AC) . . . My appointment as QSL manager for HK7BDA dates from July 16, 1973. (WA1QBH) . . . I'm QSL agent for 9Y4TR as of September 1, 1973. (WA5GFS) . . . HK4AJF's QSOs with W/Ks since the first of this year can be confirmed through me on the customary s.a.s.e. basis. (WB9ACR) . . . Now to specifics but remember that each item is necessarily neither "official", complete nor accurate. . . .

A2CAL, R. Lenicek, P.O. Box 108, Orapa, Botswana (or via DM2DGO)
A2CDN, Box 39, Gaborone, Botswana
A4XFZ, RAF, Salalah, BFPO 66, London, England
C21NI, P.O. Box 29, Nauru Island
DU1FAS, Box 7, Diliman, Philippine Islands
EA6CE, P.O. Box 34, Palma de Majorca, Balearic Islands
EA8IT, P.O. Box 215, Tenerife, Canary Islands
ET3s USC USE USF (see text)
FG7AK/FS7 (via W3HNK)
FK8BU, P.O. Box 12, Noumea, New Caledonia
FY7AM, P.O. Box 508, Cayenne, French Guiana
HK3CVW, Box 5193, Bogota, Colombia
HL9KM, P.O. Box 1183, APO, San Francisco, CA 96483
HS1AIK, D. Brewer, Fed. Elec. Corp. (Eng.), APO, San Francisco, CA 96346 (or to K8DIU)
HS4AJF, B. Holler, Box 5392, APO, San Francisco, CA 96310
HZ1AB, Hq. USMTN (SSC), APO, New York, NY 09616
IA5s ALL RVB, P.O. Box 133, Savona, Italy
K7SAD/KW6 (via WA7GQA)
KC6SX (via JH1s EDC or ECG)
KX6LA, D. Snowden, Box 19, APO, San Francisco, CA 96555
KZ5AA, Box 771, Balboa, Canal Zone
MP4BBD, R. Fleming, P.O. Box 68, Awali, Bahrai
VP1RAY R. Auxillou, Box 451, Belize, Britis Honduras
VP2KQ, P.O. Box 364, St. Kitts, W.I.
VP2VBH, P.O. Box 212, Roadtown, Tortola B.V.I.
VP7DX, D. McVicar, Box 467, Miami Springs, F 33166
VR4CM, P.O. Box 21, Honiara, Solomon Islands
W4GIW/VP7 (via K4CDZ)
WA3FBY/6Y5, P.O. Box 837, Kingston, Jamaic
WA9CTS/KM6, D. Drumstra, Box 14, USNavSt FPO, San Francisco, CA 96614
WB2JGD/KP4 (to WB2JGD)
XE1FR, T. Montgomery, P.O. Box 120A, Morelia Michoan, Mexico
XQ3s AL ED (via CE3AA)
YJ8KM, c/o Radio Dept., Vila, New Hebrides
YN1AZ, P.O. Box 5013, Managua, Nicaragua
YV4AOO,16, Calle San Ignacio No. 104, Maracay Venezuela
ZD3M, Fr. M. Cleary, P.O. Box 463, Banju Gambia
ZK1DX, P.O. Box 90, Rarotonga, Cook Islands
ZK2BJ, P.O. Box 37, Niue Island
ZP5HZ, USMAG, APO, New York, NY 09881
3Bs 8DL 9DL (via WA5ZWC)
3D2AZ, Box 184, Suva, Fiji Islands
3D2JA, J. Anthony (G3NDY), Quaker Bridge Ro Croton, NY 10520
5Y4XIP, Box 25285, Nairobi, Kenya
5Y4XNY, Box 90302, Mombassa, Kenya
9K2DC, P.O. Box 77, Kuwait

A4XFD (via G3XEC)
A4XFJ (via K4FCZ)
C31GW (via F5EQ)
C31HB (via DL8NU)
CR3WB (via CT1BH)
CR7RM (via WØGX)
CT2AE (via K9ECE)
PY1RO (to PY1DVG)
PYØAO (via PY1MB)
SPØDC (via SP4CLV)
SVØWGG (via K4EKJ)
SVØWXX (via WB4KZI
TJ1EZ (to PAØEZ)
TU2DV (see text)

EL4D (via WA5ZWC)
ET3USB (see text)
FØAQA (to DK6BX)
FB8ZB (see text)
FGØAUT (via F6ALX)
FP8AO (via W2GNO)
FPØWY (to WAØVPK)
FYØBC (via F5GN)
GB2LSJ (via G3XYP)
GC4CHY (via GC3NDX)
GW4HVN (via GW4NZ)
HC8GI (via KZ5SD)
HG5A (via HA5KDQ)
HK7BDA (via WA1QBH)
HL9VR (via K4CIA)
HL9VV (via W7JNC)
HL9WI (via WA5ZWC)
IHØPV (to IØPB)
JD1AID (via JA11RY)
JD1AIV (via JA3GZN)
JD1YAH (via JH1EHV)
JT1AT (via JT1KAA)
JW1EE (see text)
K4VMA/VP7 (to K4VMA)
KJ6CW (via WB6QAS)
KV4IF (to W2AAF)
KZ5JF (via WA8TDY)
OR4ES (via ON4VL)
PJ8MS (via WB2VKO)
TU4AG (to WA6NAM)
VE2WW/W4 (to VP7DX)
VK4AK/lh (to VK4AK)
VK9DH (via W6LYC)
VP2VAV (via K4CDZ)
VQ9WF (see text)
VR4AA (via ZL4NH)
VS5MC (see text)
VS9MJ (via G3LQP)
VS9RAF (avia G3UAO)
ex-VU2AJW (see text)
ex-VU2OMR (to K4OMR)
ex-XW8DK (see text)
YB1AB (via K9DCJ)
ZD3U (via G3LQP)
ZF1DH (to W5LDH)
ZF1FBI (to WA2FBI)
ZF1KXJ (to WAØKXJ)
3A2GX (via I1ALX)
3D2ER (via K4FCZ)
3D6AY (via 3D6AU)
3E1QC (to HP1QC)
3V8CA (via F6CLW)
6E1EEI (to XE1EEI)
6Y5ET (see text)
7P8AM (via G3SGK)
9H3L (to IT9GKZ)
ex-9J2DN (to A2CDN)
9M8FDS (to GW3OJB)
9Y4TR (via WA5GFS)

Lots of welcomed help from QTH contributors Ws 1JUB 1OPJ 1RML 1YL 2BBK 3HNK 6OKX 7YF 9DY, Ks 2JFJ 5MHG, WAs 2EAH 3SWF 5ZWC, WBs 2AMU 5FML 5HIH 9DRF, WNs 3UJP 6SWM 7UMU, VEs 2WW 7AFX, 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 67, Stevens Point, WI 34481), North Texas *DX News* (W5SZ), 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* (WA7JCB). Got goody or two for this kitty?

† † †

Whence:

OCEANIA – KH6ASN/KB6 will operate from Canton island for eighteen months. Felix, who should also be using a VR1 call from the same location, can be found almost nightly near 14,333 kHz at 0230-0300 GMT. (K9KXA) . . . VR4AA runs 150 homemade watts on 20 cw to a bent-up dipole with an old AR88 receiver. Does real well on our side. (VE7AFX) . . . Just sent in QSLs from G3TR, JA7AO, VK5KO, VP8KF, W4QCW and 5Z4KL for my 160-meter WAC. Still haven't done it on 80 in forty-three years of hamming. (VK3CZ) . . . ZL5AL's smooth cw rolls through from Antarctica's Scott base near 14,050 kHz at 0530-0600 GMT. Nev's Russian neighbor 4K1D is heard on 14,020 kHz at 1500. (W7YF) . . . Look for me on 14,030 or 14,230 kHz at 1100-1200 GMT, also with 100 watts of SSTV. KX6BU should be on RTTY shortly, and we're contemplating 40-meter beam possibilities. (KX6LA) . . . KH6HDB should be available on Kure island till next June. Gene ran up 7000 QSOs in his first three months there and wants to reach twenty kiloQSOs. (WA3HUP) . . . ZL3JC, ZMs ITB 2GH and 4PM qualified me for the British Commonwealth Games Award on 15. (WN2FUN) . . . K7SAD/KW6 looks forward to a year-long Wake tour. (W6OKX) . . . ZK1DX (ZL3DX) anticipates a three-year Rarotonga stint, 14-MHz sideband preferred. (JA3GZN) . . . More Pacificisms via the farflung clubs press: An 80-square-mile block of pumice at least 18 inches thick is said to be afloat near the Tonga islands as a result of underwater volcanic violence. Portable country for carpethaggers' DXCC? . . . WØNDX points out that rapidly expanding commercial airline service and tourist facilities are unrarifying C21 FW8 KC6 KG6 KJ6 KX6 and other Pacific points. . . . KH6HIF itches for another Oceania junket and solicits suggestions for his itinerary. . . . VS5LH (ex-VR2FT) makes good use of the TH3-jr left behind by G3WUW around 14,300 kHz at 1600-1700 GMT. Neighbor VS5MC is hampered by TVI, of all things, and also works 7 MHz. . . . VK9FV's FT200 and 3-el. spinner are very big from Port Moresby on 21,290 or 14,265 kHz. Brian gives priority to U.K. chaps. . . . VK4AK/lh may check in from Lord Howe isle with FT200 split-frequency voice and code possibilities early this month on 15 through 80 meters. . . . "Those beautiful lagoons contain an electrolytic solution that sneaks into the shack, leaving behind only a sort of red and white dust where the gear used to sit," laments 3D2FM, commenting on perils of DXpeditions to tropical paradise. And the insect onslaught is something else. . . . Ex-ZL1BKE signs 5W1AN with an FT401 and dipole on 20 voice and code from Apia. . . . S.a.e. plus IRCs to FK8AU will get you scoop on a New Caledonia certification based on QSOs with six FK8s. A number of them hang around 14,115 kHz at 0600 and 1900 GMT. . . . KS6ES and K4DAO stirred up August's DX doldrums with a CR8AM outburst featuring FT gear on 20. . . . JA1s MCU/C21, OCA/C21 and JE1CKA/C21 accomplished 4900 QSOs during July fun on Nauru. The former scored 52 cw contacts on 1803 kHz with KH6IJ, LU5HFI, VK9DJ, VP8KF, a ZL, five lucky W/Ks and 38 JAs. One-sixty is jumpin' all year long!

ASIA – I'm active from MP4B-land again after a 19-year absence with 35 watts of cw on 20 and 15 meters, usually 14,068 or 21,020 kHz at 0200-0330 and 1300-1600 GMT. Should be running a little more power later on. Conditions are not the best but I've been working quite good DX. (MP4BBD) . . . Ex-ET3USB, back in the States for a spell, soon will be off to India. (WB4UKA) . . . As of August 18, 1973, amateur radio activity in Afghanistan has been suspended. Equipment used for the purpose was sequestered by the ministry of communications. (CDRC) . . . When CR9AK returns from Portugal this month or next KA2DF may have a chance to help turn out Macao QSOs. (W3GID) . . . Enjoyed an eyeball QSO with famed JH1WIX while touring Japan with the San Jose Youth Symphony. (WN6TFK) . . . A4XFJ intends to be active through January on 20. Alex's Oman QTH is actually a combat zone. Myself, I hope the bands improve for more cw W/Ks before I leave Thailand. (HS1AIK) . . . VU2WS answered my 14-MHz cw CQ with his 10-watter after I thought the band had folded for the evening. (K2JFJ) . . . Lots of fun operating in India but I'm glad to join pile-ups from our side as K4OMR once again. (ex-VU2OMR) . . . Yes, 7Z3AB's retirement to the U.S.A. is a severe loss to DX. Henry's activity on and off the air brought the game much good will. (W5ILJ) . . . Aforementioned clubs and groups literature provide more Asiana: YK1OK may be back in Czechoslovakia by now after months of popular multiband maneuvers. . . . JD1s AHN AHR AIV and JA3LWA/JD1 managed five kiloQSOs in their August Ogasawara go. . . . The 1S1A bunch consider a Spratly encore after the monsoon season. . . . Ex-AC4RF of the 1940s who survived long Red imprisonment after the fall of Tibet, now works for the British foreign office in CR6-land. . . . King Hussein is reported building a brand new palace a few miles outside Amman. There'll be a royal shack for JY1/JY2. . . . UAØFGM skeds W6TSQ at 1130 GMT Mondays, 3618 to 3806 kHz, seeking hookups with rare U.S. counties. QST

Operating Events

de W1YL

NOVEMBER

1 *W6OWP Qualifying Run* (W6ZRJ, alternate) 10-35 wpm at 0500 GMT on 3590/7090 kHz. This is 2100 PST the night of Oct. 31. Please note that dates are always shown at least two months in advance and times are always the same local "clock time," i.e. 9 PM local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid and send to ARRL for grading.

1-2 *YL Anniversary Party* phone, p. 110 Sept.

3 *KP4USN Hobby Fair*, p. 110 Oct.

3-4 *Trillium Weekend Contest*, sponsored by the Ontario Trilliums, from 0030Z Nov. 3 to 0030 Nov. 4. The Trillium YLs will call CQ TW, others use CQ TOT. Exchange signal report, name, QTH (the Trilliums will also give their club numbers). Cw and phone contacts count 5 points. Mult. of 1.25 for 150 watts cw, 150 watts am, 300 watts PEP and under. Each Trillium station may be contacted twice (i.e. one phone and one cw QSO same band, two phone QSOs different bands, two cw QSOs different bands, one phone and one cw on different bands.) No cross band. Cross mode is permitted. Logs must show date/time (Z), RS(T), mode, TOT no., as well as name, address and claimed score. All logs must be signed by the operator. A bonus of 100 points will be added for working 10 members of the club, an additional 100 for 20 members, etc. All participants submitting entries participate in a lucky draw. The high non-member will receive an engraved placque. Suggested freqs.: 3170 3855 3685 7240 7103 14280 14140 14035 kHz. Logs must be postmarked by Dec. 31 and sent to: Irene Williams VE3BEI, 18 Montgomery Ave., Agincourt, Ontario, Canada M1S 2G3. *Worked All El Paso Contest*, p. 110 Oct. *RSGB 7 MHz DX Contest* phone, p. 110 Sept.

5-11 *QRPp CW QSO Party*, p. 110 Oct.

10 *Frequency Measuring Test*, p. 110 Oct.

10-11 *Sweepstakes* phone, p. 50 Oct., *Ex-G Contest*, p. 110 Oct.

11 *OK DX Contest*, sponsored by the Central Radio Club of Czechoslovakia, the full GMT period (every second Sunday of November). Participants may work stations of other countries according to the ARRL Countries List, contacts between stations within the same country count for multiplier only. 160-10 meters, phone and cw (note that OKs may only use cw on 160). Cross band and cross mode are not permitted. Exchange signal report and ITU zone no. (see page 87 of April 1972 QST). Each OK QSO counts 3 points, others 1 point, your own country zero points. A station may be contacted only once on each band for points. Multiplier is the sum of ITU zones on each band. Categories are single op, all bands, single op, one band, multiop, all bands. Assistance in the form of logging, monitoring, etc., makes the entry multiop. Club stations are considered to be multiop. Logs must show date/time(Z), stations, exchanges, points plus notation of the ITU zone the first time a new one is worked. Usual statement, appropriate awards. Logs must be postmarked by Dec. 31,, send to Central Radio Club, Box 69, 113 27 Praha 1, Czechoslovakia.

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 Nov. 15. 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.

17-18 *Sweepstakes* cw, p. 50 Oct.

24-25 *CQ WW, cw.*

DECEMBER

1-2 *College Bowl Contest*, sponsored by the MSC Radio Committee of Texas A&M University. Any accredited university, college, or junior college amateur radio club station may work any licensed amateur, while all others work only college club stations. Stations may be worked once on each band and mode. Club stations must operate single transmitter class only. Only 22 hours of operation out of the 30 hour contest period are permitted (the period starts 0000Z Dec. 1 and ends 0600Z Dec. 2). College clubs send RS(T), name of college, QTH (state, province or country); others send RS(T), QTH (state, province or country). QSO points times multiplier equals final score. Each QSO counts 3 points, multiplier for all stations is the sum of states, provinces and countries worked. Suggested freqs.: 3560 3710 3910 7060 7110 7260 14060 14280 21060 21110 21360 28060 28110 28560. Appropriate awards. Summary with all info. plus signed declaratio must be mailed by Jan. 15. (Enclose an s.a.s.e. for a copy of th results.) Send to Memorial Student Center Radio Committee, Bo 5718, Texas A&M University, College Station, Texas 77840 *Telephone Pioneer QSO Party*, , from 1900Z Dec. 1 through 0500 Dec. 3. All bands may be used. Suggested frequencies may b obtained from your chapter secretaries. Info. from WA2NHH of th Stanley S. Holmes Chapter of the Telephone Pioneers of America 100 Central Ave., Kearny, NJ 07032. *Lone Star QSO Party*, sponsored by the Austin Amateur Radio Club, from 2000Z Dec. through 0200Z Dec. 3. Texans send QSO no., RS(T) and county others use state/province/country. Each QSO counts a point, wit the following exceptions: a contact with a novice counts 2 points, novice-novice contact counts 3 points. Texans multiply QSO point by the sum of TX counties, states (except TX), VE provinces, an DX countries worked. The same station may be worked on eac band and mode for QSO points. Mobile/portable stations changin counties can be worked again for QSO points as well as ne multipliers. Texas-Texas QSOs are permitted. Suggested freqs phone 3900 7265 14275 21350 28600, cw 3560 7060 1406 28600 (yes, they say 28600), novices in bottom 20 kHz of the subband, vhf 50110 50400 52525 144100 145350 146940; 220 an 432 MHz. Texans are asked to be QRV on 15 on the hour and 10 o the half hour during the day. Appropriate certificates, trophies. minimum of 15 QSOs for any award. Single op. only, multiops wi be listed but ineligible for awards (this restriction does not apply t mobiles). No repeater contacts allowed. Remember to use cw c vhf. Decisions of the awards committee are final. The ARR disqualification criteria will be enforced. Send s.a.s.e. for log form Logs (and dupe sheets for TX entries over 100 QSOs) with summary and usual statement must be postmarked by Jan. 15. Sen to: Tom Morrison, WA3GBU, P. O. Box 13442, Austin, TX 7871 *Delaware QSO Party*, sponsored by the Delaware Amateur Radi Club (W3SL) the full weekend GMT. No power restrictions and th contest is open to all amateurs. Stations may be worked on mo than one band, but no credit for contacts with the same statio using two modes on the same band. Exchange QSO no., report an county (for Del.) or state, province or country for others. Suggeste freqs.: cw 3560 7060 14060 21060 28160, phone 3975 727 14325 21425 28650, vhf 50.4 and 145.1 MHz. Novice spots 371 7120 21120 28160. Del. stations score 1 point per QSO an multiply by the no. of states, VE provinces and countries. Outsi stations score 5 points per Del. QSO and multiply by 1 (for 1 count worked), 3 for 2 counties and 5 for all 3 counties (New Castle, Ken and Sussex). Appropriate awards and a certificate to statio working all 3 Del. counties. Deadline for mailing is Jan. 15. Send John R. Low, K3YHR, 11 Scottfield Dr., Newark, Del. 1971 Apply to this address for the W-DEL Certificate (no fee, but a s.a.s.e. required).

1-30 *PJ Activity Month*, sponsored by the Netherlands Antill Society VERONA, to celebrate the 25th anniversary of the societ PJ stations will be on the air frequently during the month an VERONA members will use a PJ1 prefix. Special QSLs will be se for all QSOs with PJ1 stations. The beautiful Curacao certificate w be supplied without any fees for working 3 PJ1 stations during th month. Applications with QSO details no later than Feb. 1 airma to: VERONA, Box 383, Curacao, Netherlands Antilles.

5 *W6OWP Qualifying Run.*

8-9 *ARRL 160-Meter Contest*, full rules this issue. *E Contest*, cw, sponsored by the Union de Radioaficionado Espanoles, runs from 2000Z Sat. to 2000Z Sun. Non-EA statio try to work as many EA stations on as many bands as possible in EA districts 80-10 meters (cw only). Two points per EA QS Repeat QSOs with EAs on different bands permitted. Total QS points times the sum of EA districts on each band represents fin score. Full log info, should be sent to the URE along with the call the station, the op,, and full mailing address. Usual conte declaration necessary. Reports must be sent within 1 mon following the end of the contest to the URE (International C Contest, Box 220, Madrid, Spain.

11 *WIAW Qualifying Run.*

15-16 *NEW ARRL 10-METER CONTEST*, full rules this issue.

15-17 *KH4NC operation*, sponsored by the Raleigh Amate Radio Society, commemorating the 70th anniversary of the fir powered flight at the actual site, Kill Devil Hill. The operatio starts 0000 Dec. 15 and goes to 2400Z Dec. 17. Freqs.: cw, 35

(Continued on page 174)

Operating News

GEORGE HART, W1NJM
Communications Manager
ELLEN WHITE, W1YL
Deputy Communications Mgr.

"Is the Frequency In Use?" We continue to get suggestions that there ought to be a Q signal for this, for cw use. One enthusiast suggested QRM?, which means "Is my transmission being interfered with?" This didn't sound as though it suited the need, so an alternative was QSY?, meaning "Shall I change to transmission on another frequency?" which was considerably better. The point our friend (sorry we can't remember who he was) was making was that we don't need a new Q signal, one is already available.

But if you dump a strong signal on a used frequency and send QSY?, you're already blotting out a sizable chunk of conversation if the frequency *is* in use. By the time the other guy gives you a QSY reply, the QSO is interrupted.

What was the matter with the proposal that we adopt the old signal used on spark, many years ago? Too reactionary? Before you call someone, or call a CQ, just send IE (dididtdit). If the frequency is occupied, the answer will be an immediate AS (didahdididit), or maybe a C (dahdidahdit). The inquiry has been made, a reply received, very short and snappy, usually necessitating no break in the QSO. Why use a cumbersome Q signal? This is standard ARRL practice, let's popularize it.

On voice? Just ask "Is the frequency in use?" If it is, the reply might be "Please stand by." No special procedure necessary, just say it with words.

Listening first. And this brings up an old subject, that of "listening first." This is something you should always do before you fire up a rig – and something oh so many of us neglect! It takes only a second, and can avoid much QRM, which goodness knows we have enough of without such carelessness. (We won't even mention those few who do it purposely.) Listening first on 80, and usually on 40, and almost always on vhf, will tell you whether you have a clear channel. But when skip is long, you just may not hear anything on 40, 20, 15 or 10, so you go ahead and transmit only to find that you have inadvertently QRM'd someone. You may not be able to hear the transmitting station, but the operator he is transmitting to can hear him very well – and when you come on, he can hear you, too! Loud and clear; or loud, anyway. Also, when you are in QSO listening to your buddy and a loud station comes on asking if the frequency is clear, resist the temptation to tell him that if he'd open his ears he'd know that it wasn't. Strange how many of us assume that because we can hear a signal, anyone else can also hear it. "Skip" is a very common phenomenon with which we're all familiar. Don't forget it exists when some seemingly-deliberate QRM annoys you.

Why Doesn't W1AW Listen First? Recently at a hamfest we were collared by an irate amateur who wanted to know why we kept preaching about listening first, then didn't follow our own preaching. Seems he was in a QSO on 75 meters which was interrupted by a W1AW bulletin.

It would seem that of all stations, W1AW would set the example and never but never start a transmission on the frequency of an ongoing QSO. During general contact periods, the operators at W1AW are indeed careful about this. But for bulletins, it just isn't practical. Still, we continue to get complaints. W1AW bulletins and code practice are sent simultaneously on eight different frequencies. It's just not possible to listen on all 8 and make any necessary adjustments before starting a bulletin. The alternative is to listen on one band, find a clear spot, then send the bulletin on that band only, after which the same process can be repeated on another band. This, too, is impossible, because it would require more than 8 times as much time for one-way transmission as is now

Here's Lake County Amateur Radio Club (affiliated in 1949) operating W9LJ/9 at the Lake County Fair at Crown Point, IN during mid-summer. Left to right (seated) WB9JOU vice president, WN9JVB, WN9IZL, WN9JTT; (standing) WB9CAC president, WN9IHH.

WIAW 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[6]	50.190*	145.588*	1.820*	21.390*
0230	←	CODE PRACTICE[7] (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*	3.990*	7.15 Nov.[5*]	3.580*
1340	.....	←		OSCAR[9]		→	.....
1400	.....	CODE PRACTICE[7] (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
5-7-1/2-10 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 dates and *QST* practice text (from the issue 2 months previous) to be sent in the 0230 GMT practice on the following dates:

Nov. 5:	It Seems to Us	Nov. 27:	ARPS
Nov. 15:	Correspondence	Nov. 30:	World Abo
Nov. 21:	League Lines	Dec. 3:	YL News

used. Figure it out. On an average week day, W1AW spends as many as five hours making one-way transmissions: bulletins on cw, phone, RTTY and Oscar, plus code practice three times. It's a gruelling, grinding schedule, but it's all in *QST*, every month, and available separately to anyone who wants it. Five hours times 8 frequencies is 40 hours, and there aren't many days that come with that many.

So what to do? One suggestion was that we give a one-minute notice of an upcoming bulletin; this would allow anyone on the frequency to move elsewhere – but probably mumbling and grumbling and as mad as or madder than they would have been if we had just come on with the bulletin. Another suggestion was that we listen on the first band, adjust the frequency, start the call-up, then listen on the next band, repeat the process, then continue to the next, until we have all bands covered, at which time the bulletin, or whatever, could start.

But this procedure has a lot of drawbacks, too. It would take about 15 minutes before all 8 bands could be set; meanwhile, a useless QRM-causing call-up would be going on. Our normal call-up time is two or three minutes. There are about a dozen one-way transmissions a day. Fifteen minutes times 12 is three hours. Besides, how practical is it to

5-BAND AWARDS

(Updating the September 1973 listing.)

5BDXCC: (Starting with number 275), YU1EXY W4MCM I5FLN YU2NFJ W3NB JA2AAQ K6SSN.

5BWAS: (Starting with number 158), W5VJP W4KA WA5EEM.

monitor a frequency when you already have three or four separate kilowatts blazing away on three other bands in the same shack?

Our inability to listen before starting W1AW transmissions is disturbing, both to us and some of you, but how about looking at it this way: While it may cause QRM occasionally to stations conducting a rag-chew on the frequency, W1AW has a greater responsibility to the many hundreds (thousands?) of people who rely on the published information on W1AW scheduling in order to copy the bulletins and code practice. Finding a clear spot, especially on the busier phone bands, is not easy. If we go hopping about the bands until we find one, we may in fact do a disservice to a far greater number who rely in W1AW showing up when and where advertised.

So please be reasonable, fellows and gals! The only alternative is to reduce the number of transmissions, while the pressure continually mounts to increase them. Can't we put up with an occasional minor inconvenience in order to fully realize a much bigger and broader gain? – *W1NJM.*

OSCAR 6 Slide Collection. The ARRL Training Aids branch now has a slide collection on the OSCAR 6 satellite available for club use. Included is a taped commentary which includes background information on the OSCAR program; the slides themselves are concerned only with the OSCAR 6 satellite.

While it is impossible to produce a slide collection on the OSCAR program which will remain current, this particular set of slides documents the construction and testing of a satellite which will probably be an example for future satellites. The particulars may change, but the techniques will likely be valid for some time to come. – *WA9AUM.*

New A-1 Operators

W9IE WB2AEH W9ZHE W2MOY WA3KSH W9FZC W6HAW IT9RCJ K2MUB WA2VEN ISØVSG

SEPTEMBER 9 FMT RESULTS

The September 9 ARRL Frequency Measuring Test brought in a total of 143 entries representing 2250 individual measurements. Entries received after the announced date of September 20 are not listed (that's the date W1AW started carrying the results of the test). The umpire measured frequencies for the early run at 3560.427, 7062.385 and 14,097.818 kHz. The late run checked out at 3544.431, 7028.807 and 14,110.471 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 November 10 FMT, full rules p. 110 October *QST*. – *W1YL*

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 this listing.

W1BGW W1PLJ K1VHO W2AIQ WA2KSB W4AAD/K3WIK K4KA W4NTO WA4YVQ W5FMO W5IJW W5OS W5QI/W5ZTN W5QLO WB6AAL W6BEW WA6CKD W6CLM K6KA K6MZN WB6MZP WB6OEX W6OQI W6RQ W7FNA W9EKJ W9KO W9MNY WBØBAM WNØHWL WØIHI WØMDL WØMVF KØQVF KØRPH KØVQM Ireland

In the following tabulation, error percentage can be determined by moving the parts-per-million decimal point (the figure shown in parenthesis) 4 places to the left. 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.

(.5) WA9VDJ, (.6) WA6RZJ WA8MSC K9BGL W9VOX, (.7) WA3FYZ, W3BFF WØPHY, (.9) W6RSI, (1.0) W6FB, (1.1) W1JUM WA1LNF W2DW WA3KEG, (1.4) W3CSZ W9HPC, (1.7) VE7TT, (2.1) K9WMP, (2.3) W6CBX, (2.5) WA2ODO W9REC, (2.7) W4LDF W5YX/5, (3.0) K4LO W7DNQ, (3.2) WA1FBE, (4.3) VE3AC, (4.9) WØMTA VE6MJ, (5.6) WØDGS, (5.7) W1DDO, (5.9) WØBV, (6.1) WAØDYZ/Ø, (6.4) W1VH, (6.9) K6EC, (7.3) KØQNU, (7.6) W1JH, (8.4) WB5ETT, (8.6) K2EK, (8.9) KØAZJ, (9.9) W1AYG W6AUC, (10.1) K4AMN, (10.4) K4JK, (11.0) W2TLI, (11.4) WNØHDH, (11.7) K6BI, (12.1) W4QN, (12.2) K4VI, (12.5) K6CL, (12.8) WA1HSN K7ISL, (14.3) WB4BAP, (16.2) WB6OYN, (16.7) W3ADE, (16.9) VE3FVW, (17.4) WA7HGB, (17.6) WØKTU, (18.7) WA6MWG, (19.5) W3CPU, (20.4) WA7EYZ, (20.5) WA7OBH, (20.6) W1PL, (21.8) WØLYC/5, (22.0) W2BHJ, (24.3) WB6OKF, (25.4) WA5ZBN W9UC, (25.7) WA5LES, (26.7) WB4FBD/WB4WDJ, (26.9) K4QE, (27.5) WA1GGN W3KEK, (29.0) W6PRP, (29.1) VE3GEQ, (29.6) W2JDC W8IBX, (30.8) W4PKD, (31.2) WA3RBI, (35.2) W2AZO, (36.3) W6AEE, (36.6) W7CHI, (36.8) K6GG, (39.8) W8JSC, (40.0) W5QNQ, (40.4) W5YG, (41.9) WA4EPH, (43.4) K1WXZ, (45.7) WB2TFH, (46.1) W6MUL, (47.4) WA3JSZ, (48.0) K4IQC, (53.3) W9MJM, (54.0) W5PW, (64.8) W9DOB, (70.2) WB4MWC, (71.9) K8TMK, (75.7) WA2PJL, (75.8) WB6RDA, (162.8) WA8LWB, (180.0) K6BCT, (412.7) WAØHOC, (428.0) WA6DWP, (569.6) WRBU, (3125.2) K1EPW, (3787.9) W2DYS.

DXCC Notes

Announcement is hereby made of one deletion and two additions to the ARRL Countries List. The deletion is the present listing of *Germany*. The additions are the *Federal Republic* of Germany and the *German Democratic Republic*. DXCC credits for the two new listings may be claimed for contacts made with these countries on or after September 18, 1973. Contacts made with stations therein before September 18, 1973, will be creditable toward the German listing only. Contacts made September 18, 1973 and after with stations located in West Berlin will be credited toward the Federal Republic of Germany listing. Stations located in East Berlin will be credited toward the German Democratic Republic listing. DXCC credit submissions for the two new listings may be made starting December 1, 1973. Submissions received for these two listings prior to that date will be returned without credit.

DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings – August 1-31, 1973

New Members

JA1KSQ	315	JA4GZT	203	JA1VZM	128	HK7BDA	110	WA1MCY	105	DK4YG	101
JA2BTV	305	K7DVK	200	JA1WOO	128	OH2BMC	110	W9EXM	105	SM7CMY	101
EL2CB	300	UA1CS	196	WA2LDX	128	UB5IS	110	ZF1WP	105	K9IQZ	101
JA1JRK	291	JA4BTY	191	JA2AYH	125	ZL2AAV	110	SK4DM	104	UA4AY	101
JA6BEE	279	WBØHAI	182	JA6SUO	124	HB9APF	109	HS3AIG	103	W6NHX	101
WØEFK	278	JA8AYN	181	LA7FD	123	SVØWIT	109	UK5WBG	103	WB8GKC	101
W2SUA	275	*UA3VB*	*160*	*DJ6QV*	*122*	*WØCAQ*	*109*	*WAØUXN*	*103*	*UA1IL*	*100*
JA7HZ	262	UK3XAB	159	UK1ZAB	121	YU2RKC	109	WBØAEZ	103	UW3TR	100
W6MAR	253	JA2BAY	151	W2IBR	115	UK2GBY	108	DJ1PQA	102	K4BZH/VP7	100
JA1KF	243	UG6JJ	143	JH1IQC	114	WB5HIH	108	DJ9IH	102	WA1GZY	100
JAØSZ	245	VE4SL	139	YU2NHS	112	K7GYF	107	DM2BFM	102	WB5BHN	100
F2VX	241	WB2FVO	131	JA1ILL	111	UA6PG	107	UA3QO	102	WB6DOI	100
W6UA	239	SM6EOS	130	JAØGZZ	111	DK5WL	106	UA9FAL	102	W9LIJ	100
JA2IYJ	227	DA1ED	129	OK3UN	111	PAØUB	105	WA3EDS	102		

JA1KSO	*306*	*JA2IYJ*	*213*	*VE4SL*	*139*	*SM5AHK*	*116*	*JA7LZG*	*105*	*WA9KGO*	*102*
I5FLN	301	DK1AQ	210	ET3JH	130	K2LQQ/TF	116	ET3RS	104	WAØUXN	102
JA2BTV	300	K8SQE	203	K6CN	130	W2IBR	115	JA1VZM	104	DK4YG	101
JA1JRK	290	W1JNA	198	WB9GVW	128	WB4PAB	115	K4DV	104	OH2BMC	101
F5VU	271	JA4BTY	191	JA1WOO	127	JH1IQC	114	WB6ECI	104	WØDAK	101
K2OUS	271	DL5BR	188	JA7DT	126	W9YIE	114	I7TBL	103	DK5IO	100
W2SUA	271	DU1EJ	184	W4OMW	125	JA1DIO	112	JA1GTF	103	G3SEM	100
JA6BEE	269	DJ1TC	171	JA2AYH	124	JA1WSA	112	JA8AYN	103	K3CI	100
JA7HZ	261	HP1KC	167	I8JN	120	DL7PD	111	K9BGL	103	KA6UA	100
W4MCM	*257*	*XE1LLS*	*164*	*JA6SUO*	*120*	*JA7ILL*	*111*	*PY1RDU*	*103*	*WA1GZY*	*100*
JA3KWJ	254	JA4GZT	157	I1BJU	119	JA7WS	110	SP6DXB	103	LU8AGT/W4	100
W6HQN	231	K8IQQ	154	CT1XKA	119	JAØGZZ	108	HB9APF	102	W5HIC	100
JAØSZ	230	JA2BAY	151	K8DTG	118	WA2PBC	107	JH1AGU	102	W5PDG	100
YU2HLU	223	K6QX	151	K8HBN	118	W5PW	107	ON5OA	102	WB6OFX	100
JA1KF	217	K2ZCD	145	W2CKR	118	JR1TSH	106	W5SPD	102	W9EXM	100
		ZD7KH	142	KR6HB	117	K2LQQ/1	106	WA5ZDF	102		

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.

KH6IJ	330	OZ3PO	305	WB6WHM	270	HP1AC	220	W2FBF	180	PY1BDU	140
W5NW	330	DK2BI	300	DK3GI	260	VE3GFY	220	WA2JRD	180	VE3BVD	140
HB9PL	325	WA2BED	300	JA1AAT	260	K2GBC	220	WB6RKH	180	W2UZL	140
VE3AAZ	325	W9KB	300	JA3BG	260	W1CNU	220	A6XB	160	WB4RUA	140
W1WY	325	DJ4PI	290	K4BHG	260	W4WRY	220	DL8BB	160	WB4TDH	140
W5LCI	*325*	*DL6KG*	*290*	*LA9HC*	*260*	*W5ZV*	*220*	*G3TOE*	*160*	*W6EGX*	*140*
K4MZU	320	GM3CSM	290	OZ8BZ	260	WB6URS	220	DL2CQ	160	W7CLS	140
W5CP	320	K5EVK	290	VE3BBH	260	W6EOI	220	JA3AUQ	160	W9MYG	140
WØCKC	320	W2FR	290	W3BBO	260	YU2NFJ	220	K6CN	160	WB9GVW	140
DL3OH	315	WA2HIN	290	LA6BN	250	DK1HP	200	K3YWJ/9	160	WØEWN	140
DL7BK	315	W5KYD	290	JA2AN	250	JA1HGB	200	LA4LN	160	K1ALP	120
DL8NU	315	W9IRH	290	JH1HWN	250	K6UQO	200	SM5KG	160	KH6HC	120
K8WOT	315	ZE4JS	290	K3SXQ	250	KØALL	200	WA3QFG	160	SM6EBQ	120
W6FET	315	JA2KLT	280	K6QX	250	KØSGJ	200	W4JVN	160	SM7RS	120
I3PRK	*310*	*JA8MS*	*280*	*SM5AQB*	*250*	*VE6TK*	*200*	*W4KFB*	*160*	*VE2BRW*	*120*
K2LGJ	310	JH1CJQ	280	WB2RBG	250	UA1DI	200	W4MOX	160	VE8OO	120
PY3APH	310	PY1LW	280	W4PGW	250	W2BZL	200	W4MVE	160	W4WFL/1	120
WA2HSX	310	PY2CAB	280	YU3OV	250	W6SBX	200	WA4YBV	160	WB2VXN	120
WB2UKP	310	W3HNK	280	JA1GTF	240	W6DFR	200	WB4NDX	160	W3FTG	120
WA4MUB	310	W4WWG	280	JA2PH	240	W9IVF	200	WA5YSC	160	WA3LFU	120
W5KGJ	310	W6HQN	280	OE1CP	240	WA9JCO	200	W7RCF	160	WA3OER	120
JA2AAQ	305	I2FO	270	VE4TT	240	K4PRT	180	YA1OS	160	WB4LLT	120
K2OUS	305	JA1HHM	270	W4HY	240	K8LJD	180	DL8IH	140	W5ISF	120
K4RTA	*305*	*JH1EJG*	*270*	*WA2AUB*	*240*	*VE7HQ*	*180*	*JA6MBU*	*140*	*W6YKS*	*120*
K9YXA	305	K9TZH	270	WB2HNO	240	W1RME	180	K5DUT	140	WØJKF	120
		W4VJH	270	WØJS	240	WA1NRV	180	K7NTW	140		

W2GKZ	320	K5EVK	280	JH1HWN	250	WØOVL	220	VE3GFY	180	WB4INC	160
W5MB	320	OE3WWB	280	K2LGJ	250	YU2NFJ	220	W1RYB	180	WB4NDX	160
W8CUO	320	PY2CAB	280	CO2FA	240	DJØYD	200	WA1HOT	180	W5ZV	160
DL8NU	310	WB2VYA	280	CT1ZW	240	HK4TA	200	WA2CLQ	180	WA9JCO	160
I3PRK	310	W5CP	280	JA1RWE	240	I1ASM	200	WA2JRD	180	UA1AH	160
W1FXD	310	W5KGJ	280	SM5AQB	240	K1LWI	200	W6DFR	180	JA6MBU	140
W8ARH	310	W6FET	280	VE4BJ	240	K7DVK	200	W6GTL	180	KL7HFQ	140
K4BBF	305	I1BGJ	270	W1BAL	240	KØSGJ	200	W6OHS	180	LA4LN	140
K4RTA	305	VE7HP	270	YU3OV	240	OE1GHC	200	W6PSQ	180	SM5KG	140
WA2HSX	305	W6LQC	270	I2VX	220	OK2DB	200	WB6RKH	180	W1EKG	140
WB2UKP	305	W7VRO	270	JA1DQT	220	VE6TK	200	W8BQV	180	WA3LRJ	140
WA6AHF	305	GM3CSM	260	JA2PH	220	W1IPK	200	WØMAN	180	W7GYP	140
G5AFA	300	JA1BRK	260	K2DNL	220	WA2AUB	200	A6XB	160	WØJF	140
JA2AAQ	300	JH1CJQ	260	K4BHG	220	W7BKR	200	CT1IC	160	WAØELW	140
WA2BED	300	VE3BDB	260	PY9AI	220	W7EOI	200	G3TOE	160	G3DOG	120
WØMGI	300	W9MJJ/4	260	UY5XS	220	WR2NO	200	JA1QER	160	K1ALP	120
VE3AAZ	290	W5KYD	260	W4PGW	220	WØUCK	200	K3YWJ/9	160	K2RQU	120
W8CFG	290	WB6WHM	260	W4WRY	220	K8LJD	180	KØAEL	160	LU1BAR/W3	120
DL6KG	280	EA6BN	250	WB5DJA	220	KØIUC	180	WB2JSJ	160	SM7RS	120
DL7AH	280	JA1AAT	250	WA5SMM	220	LA8LG	180	W4JVN	160	W6MOS	120
I2BH	280	JH1EJG	250	WB6URS	220	OZ1RH	180	WA4YBV	160	WA8UUY	120
K2KGB	280									WA9AUM	120

July "Open" 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 October CD Bulletin. – *WA1PID*

CW

W6PAA 390,960-1079-72-20
WA2UQO 374,040-1032-72-20
WA5LES 372,395-1044-71-20
K4PUZ 369,580-1080-68-20
W9YT (WA9TPV, opr.) 361,905-1049-69-20
WA2BLV (WA2WLN, opr.) 357,840-1001-71-20
W9DQB 338,800- 962-70-
K4PQL 333,265- 932-69-20
K4SXD 322,410- 971-66-20
WA2SRQ 322,340- 902-71-20
W6DGH (WB6ZVC, opr.) 318,780- 919-69-20
WA1PID/1 316,050- 900-70-20
W3IN 313,950- 904-69-20
WB8AKW 302,840- 900-67-20
K4BAI 297,160- 867-68-18
WBØBCZ (WAØOVW, opr.) 291,040- 849-68-19
K1JYN 286,695- 826-69-18
WAØTKJ 283,900- 831-68-20
KØKU (WBØFGV, opr.) 281,860- 829-68-18
WA2EUO 271,920- 819-66-20
WB4SGV 269,960- 788-68-20
WA9BWY/9 265,990- 790-67-19
WA1JZC 261,120- 762-68-19
W2FVS 257,600- 731-70-20
K2KIR 249,150- 748-66-13
K9ZSE/Ø 246,840- 726-68-20
WA1LKX 239,580- 720-66-19
WA5RXT 228,360- 692-66-15
WA8WNU 228,030- 691-66-20
KØGXR 224,060- 659-68-15
WA3LHG (WA3QIA, opr.) 223,080- 669-66-20
K1OME 221,760- 672-66-18
W3YI (WA8KUW, opr.) 220,430- 651-67-20
WA2MPC 220,160- 683-64-18
WA8YOQ 216,745- 641-67-13
WA1NNC 216,240- 631-68-20
W2AZO 215,800- 659-65-20
K6OZL 215,740- 637-67-16
WA6JVD 213,060- 632-67-20
WA9NPM (WB9BPG, opr.) 210,105- 667-63-17
WAØTAQ 209,550- 631-66-16
WA1LKU 208,705- 619-67-
W9LVH/9 203,450- 621-65-14
W9YB (WB2RKK, opr.) 203,280- 609-66- 8
W9MTT 203,200- 628-64-16
K9HDP 202,620- 609-66-20
W7GHT 201,000- 594-67-18
WB4LQV 199,325- 590-67-19
W2SZ (WA2EUX, opr.) 198,250- 605-65-18
WA2CNE 192,060- 575-66-15
W1DGL/1 188,795- 614-61-18
W9LO 186,930- 552-67-17
WØINH 185,980- 540-68-10
WA8POS 183,330- 577-63-14
WA3PWL/Ø 171,360- 540-63-20
K4EG (WB4VVP, opr.) 170,880- 530-64-17
WB9HAD 170,730- 538-63-20
W5TNT 162,825- 501-65-19
K2OWR (WB2CST, opr.) 161,200- 517-62-18
WA3AFQ 161,160- 469-68-17
K4IAF 160,890- 514-62-16
K4IU 158,100- 458-68-15
W1FBY 156,160- 482-64- 8
WB4LHK 154,690- 499-62-20
K6VNX 154,665- 487-63-17
WB9KVN 150,150- 450-66-18
WB4RUA 148,490- 472-62-13
WA3JYB 140,800- 433-64-20
W2BHP 140,075- 426-65-20
WB8AYC 136,175- 415-65-16
WB4OGW 135,135- 422-63-11
VE3GFN 133,300- 425-62-19
K8RDE 133,250- 404-65-14
W6OKX 132,000- 400-66-19
W6YKS 127,890- 400-63-13
W1AX 126,000- 375-66- 7
WA1NLD 125,240- 398-62-16
WA2AYC 124,620- 395-62- 5
WA1LNQ 123,310- 418-59-13
WB4KVE 121,200- 404-60-
W5RE 120,960- 377-63-11
W6DQX 119,070- 372-63- 6
W2GKZ 119,040- 365-64-14
W3ADE 117,810- 367-63-15
VE3AWE 115,630- 367-62- 9
K3HXS 115,425- 403-57-15
K6QHC 113,100- 348-65-10
WB9JPS 111,375- 400-55-14
WBØXQ 111,325- 358-61- 6
K8RMK 110,980- 358-62- 9
K1GAX 110,670- 350-62-16
WA3QNT 110,175- 334-65-20
K4ZGB/4 110,160- 404-54-18
WA5ZBN 108,265- 363-59-14
W5RUB/4 107,970- 362-59- 8
WB6VZI 107,100- 337-63- 6
W6IPW 105,950- 319-65-20
WA1NRV/Ø 105,710- 338-62- 9
W4KFC 105,400- 333-62- 5
K8MLO 105,280- 325-64- 8
W7JEG 105,225- 341-61-
W5QGZ 103,630- 322-63- 6
W5WG 103,230- 329-62-17
WA5SOG 102,365- 347-59-12
WØLQ 102,070- 340-59-11
WBØAMJ 101,775- 341-59-11
WA2TRK 101,565- 329-61-15
WA2DLV 101,260- 329-61-19
VO1KE 101,080- 355-56-14
W8SQO 100,200- 327-60-12
W1AW (K1ZND W1s BGD GNC WPR WA1ABV WA7ISP) 565,750-1543-73-20
K9IU (3 oprs.) 248,745- 717-69-19
WB4FDT (+WA4QEL) 165,375- 519-63-18

PHONE

WB2OEU 423,750-1130-75-20
WA5RXT 415,510-1123-74-20
WA5LES 414,375-1100-75-20
K5PFL 357,750- 950-75-19
WAØTKJ 332,150- 906-73-20
W2GUH 331,890- 897-74-19
W9DOB 331,150- 889-74-
WA1RBR (WA1JYY, opr.) 331,055- 903-73-20
WA9BWY/9 319,200- 908-70-19
WA6AHF (WA9UCE, opr.) 315,000- 840-75-17
W8SH (WB8IJI, opr.) 314,500- 850-74-
W6PAA 280,460- 751-74-15
WØIYP (WAØWEZ, opr.) 251,300- 712-70-12
WB8AYC 244,605- 705-69-17
KZSJF 227,920- 616-74-17
WA2FUO 222,840- 614-72-16
WA9NPM 207,900- 630-66-14
WAØTAQ 206,240- 588-69-18
W1GNC 185,500- 528-70-16
WB9HAD 183,400- 520-70-18
KØGXR 181,040- 496-73-11
WA1NLD 178,200- 489-72-20
WB5DCY 165,760- 515-64-12
WA6HTT 162,750- 462-70-14
W3CRE 161,600- 500-64- 8
K1OME 160,300- 458-70-12
WA2MPC 157,185- 494-63-14
WB2JSJ 149,075- 442-67-16
W9LVT/6 143,280- 398-72- 8
KØLUZ/Ø 136,825- 415-65-11
WB2IEC 133,610- 424-62-12
WB4OGW 127,680- 392-64-13
K3HXS 122,130- 410-59-15
W2FZK 121,110- 360-66- 9
K4BAI 113,920- 349-64- 5
WBØAMJ 112,770- 354-63-13
K5AM 112,530- 341-66- 5
W2AZO 112,140- 351-63- 9
K1GAX 109,820- 316-68-15
WB4LHK 107,970- 366-59-15
WA3KFR/1 107,730- 342-63-13
W6DKQ 104,040- 303-68-10
W5WG 100,750- 305-65-18
WA7QRC 99,160- 296-67-13
WA1ABV/1 99,000- 392-50-10
WB9CEP 96,380- 316-66-17
K4DTD 92,400- 304-60-13
WA3LHG (WA3QIA, opr.) 87,900- 286-60-11
W1FLM 87,000- 295-58- 4
K4FU 85,680- 245-68- 9
WA1OLV 83,250- 333-50-16
W7GHT 81,200- 250-65- 8
WBØHZE/7 82,895- 281-59-19
W2GKZ 81,840- 257-62-10
W5LL 80,535- 267-59- 9
W9LO 80,520- 238-66- 9
WA1JZC 74,465- 275-53- 5
W6DGH 73,080- 245-58- 5
WB8KXV 72,800- 257-56-12
WB9DED/Ø 72,800- 256-56-11
W1AX 71,390- 235-59- 5
WA3TOE/3 67,555- 229-59-14
WBØFRM 67,100- 216-61-15
WA1PID/1 65,800- 232-56- 2
WA2DLV 63,280- 223-56-13
K3KNL 63,210- 253-49-16
WA7TZO 60,475- 200-59- 5
WA1PHF (WB2CHO, opr.) 57,855- 200-57-10
WB2LQW 57,190- 263-43-20
K1QFD 56,330- 194-57-14
K4PUZ 55,145- 262-41- 4
K8RDE 54,600- 176-60- 9
WBØBCZ (WAØOVW, opr.) 53,820- 200-52- 3
WB4SGV 53,655- 213-49- 4
W4KFC 53,480- 184-56- 2
K4TTN 53,040- 208-51-13
W4HU 52,780- 198-52- 6
K1ZND 52,750- 204-50- 2
WA2OJK 52,250- 209-50-12
WB4PNJ 52,110- 193-54-10
W7TVF 51,800- 179-56-12
WA6CPP 51,570- 187-54- 7
W2FVS 51,500- 201-50- 5
WA4SKP 51,500- 204-50-14
WBRMJT 51,450- 205-49- 8
WB5DTX (WA5UCT WB5AAR) 457,500-1220-75-20
W9YB (WB2RKK WB9KVN) 265,650- 752-70-18
WA3FYZ (+WA3FOP) 160,960- 500-64-19
WA1LKU (+WA1s LAK LKX) 151,470- 455-66-
K9IU (WB9s EAY GVT) 118,140- 354-66- 9
WB4TON/4 (WA1BXQ W4OZF WB4s TIV UNV) 84,000- 295-56-11
WA8FLK/8 (+WA8MOA) 53,690- 177-59-12

QST

World Above *(Continued from page 105)*

To be transmitted the low 1296 MHz output had to travel through 50 feet of RG-8 into a small 432-MHz antenna. Wayne says, "This provides some motivation to add 1296 to my portable station as soon as time permits."

In Kansas, WØDRL has been added to the increasing number of 432 moonbounce stations, working K2UYH on August 18. WØDRL was running only some 250 watts output, to a home made 20-foot dish. On the 25th, Al heard VE7BBG and K2UYH scheduling European stations, and on the following day heard, and was heard by, W6FZJ. WØDRL plans to build a higher-power amplifier this winter to replace his 250 watts. Fine work, Al, and yes, we would like to see details of your dish, that can be built for less than 80 dollars..

August 26-27 provided excellent 432 tropo between the upper Midwest and New York. WØLER, Minneapolis, had many contacts into Ohio and Michigan, and worked K2LGJ, Buffalo, giving each operator a new state. KØAWU, N.D., worked K8UQA over an 870-mile path.

W9JIY, Indianapolis, is back on 1296 after raising his seven-foot dish from 45 to 70 feet. He recently worked K8UQA for state number 5. Win says he doesn't notice much difference in signal levels at the new height, during schedules with WA9HUV, and wonders if the work was worth the trouble. "Sure looks nice though," he says. During the August 25-27 tropo Win managed contacts with WØLER and K2LGJ, but says the Chicago area stations were better located for the tropo. W9JIY is also working towards 2304 before winter sets in, hoping for a quick 185-mile contact with WA9HUV.

QST

Strays

I would like to get in touch with . . .

. . . former Navy operators who held the special "bug" tickets. L. Jerome Stanton, 31 Second Avenue, New York, NY 10003.

. . . meteorologists who would like to form a net. WB2HTJ.

Station Activities

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. New appointments: WA3QLS and WA3QJU OBSs; WA3SKP OPS. Hats off to K3KAJ and the Delmarva Hamfest Committee for their excellent program at Harrington. Field Day results show Brandywine ARC retaining the Field Day Trophy and the Delaware ARC taking the John Thompson Memorial Trophy for VHF activity. Scores were: HF Brandywine 1592, Maverick ARC 1528, First State ARC 1522, Delaware 1428 and the Mason-Dixon Pirate ARS 1330. VHF Delaware ARC 54, Pirates 40. The "Good Neighbor" policy is definitely in effect between Maryland and Del. Traffic nets: WA3GSM, K3KAJ and W3DKX have been on Md. rolls for several years and W3FCS showed up as NCS on the DTN with WA3LOP/W3CWC making the DTN Aug. "Toppers". PSHR: WA3DUM 61, K3KAJ 53, WA3SKP 44. DTN QNI 191, traffic 51/51. Traffic: K3KAJ 150, WA3DUM 137, W3EEB 68, WA3SKP 46, W3DKX 30, K3YHR 5.

EASTERN PENNSYLVANIA – SCM, George S. Van Dyke, Jr., W3HK – SEC: W3FBF. RMs: W3EML, WA3QLG, K3MVO, K3PIE. PAMs: K3BHU, WA3PLP. OBS reports from K3BHU, WA3AFI, W3CL. OO reports from W3CL, K3RDT, W3KCM, W3ZJ. OVS from W3CL. BPLs: W3CUL, W3VR, W3EML, WA3PZO, WA3QLG. PSHR: WA3PZO, WA3QLG, WA3RKH, WA3MQP, WA3ATQ, K3OIO, K3EZB, K3DCB, WA3QDZ. Net reports from EPA QNI 417, QTC 548; PTTN QNI 89, QTC 59; PFN QNI 630, QTC 678. No other reports received for nets. W3EML appears to be on the mend and he reports TCC doing fine. WA3ATQ still skeds HOPE. W3DGX and K3SLG waiting for repeater license and then they will be on 146.04-64 MHz. WA1DJC/3 will be in EPA next two years while at school. The Mt. Airy VHF HAMARAMA was a real wing ding! The Mt. Airy VHF Club is acting as lead club for the 1976 convention. If you are interested in helping please contact W3ZD ehmn. WA3RKH reports K3BSA was a real success. W3OY sporting new Drake gear! W3BNR still on the road but gets in a little time for EPA. W3ZJ is proving it can be done, 78 countries so far with 5 watts. W3LC reports QRP in order to run air conditioner at same time. Hope W3BUR's XYL is on the road to full recovery. W3WRE reports a collection of 193 keys! W3EU says new Novices are using the good stuff, he has the equipment that needs repair! W3GMK still doing battle with the high water! WN3VDQ can't wait for his big G so he can get into more traffic work. WA3QYY reports their club has no equipment but they are still busy training new Novices. W3KCM reports WN3PLM expired but now passed his General and will soon be on the nets. 8 million meter net started in EPA. WA3LAK, W3INV and W3HK (abt 25 miles) have a morse telegraph line going using same system that was used in mid 1800s. WA3LAK found an old tariff rate that makes it practical. Anyone wanting to join in and learn the old American morse code contact WA3LAK. By this time there will have been an election for a new SCM. I was not renominated in time so this will be my swan song! I'd like to thank all the members of EPA for their fine work and hope they will continue under the new chief. The section has been up near the top on all counts and is the result of the individual stations efforts and not the chief, again many thanks and 30. Traffic: (Aug.) W3CUL 2090, W3VR 703, K3PIE 571, W3EML 537, WA3PZO 523, K3EZB 251, WA3QLG 214, K3DCB 186, WA3ATQ 134, K3OIO 116, K3MVO 96, K3BHU 66, WA1DJC/3 44, WA3QYY 37, WA3MQP 36, WA3RCD 32, W3ADE 27, W3CL 21, WA3RKH 17, WA3UKZ 13, WA3RKJ 10, WN3VDQ 9, W3OY 8, W3BNR 7, K3KTH 6, K3MNT 6, W3ZJ 6, W3CBH 5, W3OML 5, WA3BJQ 2, W3LC 2, WN3TMP 2, W3BUR 1, W3EU 1, W3GMK 1, W3WRE 1. (July) W3OY 8, W3GMK 1.

MARYLAND-DISTRICT OF COLUMBIA – SCM, Karl E. Medrow, W3FA – SEC: K3LFD. RM: W3QU. PAM: K3TNM. NCM: W3LDD. PSHR winners for July were WA3RCI with 59 and W3QU with 30 points. W3OKN forgoes most of his operations to help all of us at the next ITU conference. WA3QDH got some excellent pictures of the gang at the MDD-MEPN-MDCTN do. WA3TMO is now a General, WA3IIV and WA3GXN found the oldest (97 year) active Canadian VE1 during their trip to Canada. WA3FYZ is proud of his first jr. op with XYL WA3TBZ his producer. W5TWT w/ K3JYZ all of which is part of an involved plan to get back home t Calif. WA2ABY/3 on 2-meter fm in Laurel is soon to be a new WA3EOP has learned the BPL secret, and WA3RCI says it's back t work getting on the BPL bandwagon again. WA3RJS has ne antennas for 80, 6 and 2. W3QU has WA3IYS, K3KAJ an WA3DUM top brass for July. WA3MJF putting out a big signal the days. W3FCI clockwork regular on MEPN. W3BHE repor WA3UHK is an Advanced – congrats. W3CDQ hoped to make th Roanoke Convention at Reston. K3NCM has son WN3VGV doin the traffic chores. WA3OHF makes it a permanent move to Cali WA3SWS leaves the DC bands for the 2-meter fm and 450 MHz fu K3TEZ has been bit by the traffic bug. WA3MSW got in his lock during the summer relief from the U of Md. Look for WA3PJG W4VSV Vanderbilt. W3FZV sports a new QTH with an outsi antenna at last. WA3LQV exchanges the summer job for wint school. WA3RVU has a new location. K3TNM is about to reconfin those MEOP appointments. The MEPN Aug. toppers are W3ADC W3LDD others W3DKX, WA3EOP, W3FCI, W3GLI and W3JQN MEPN in 26 sessions had 94 messages and a 26.7 QNI averag MDCTN in 17 sessions had traffic 59 and a 17.3 QNI average. Th July MDD was 62 meetings, 258 message and 7.8 average QN W3QU has been on the White House assignment wherever that ma take him. WA3IYS is back to school with a new box number. Th PVRC has W4YZC, boss; K1LPL/3, activities; WB4BGY, secy W4WSF, treas. The Nat. Cap. DX Assn. starts the season wit W3ZNH, prexy; W3BWZ, vice-pres.; W3DBT, secy.; K4CFB, trea W3ABC is back home from 5R8AC and arranging to QSL 1002 Traffic: (Aug.) WA3RCI 415, WA3EOP 281, W3FA 209, WA3MS 161, WA3QIA/VE2 99, WA3QDH 62, WA3AFQ 61, W3QU 6 K3TNM 57, W3FCS 48, W3LDD 33, W3BHE 31, W3FZV 2 WA3MJF 22, K3TEZ 17, WA3FYZ 14, W3ADQ 8, WA3SWS WA3RVU 7, WN3VGN 6, W3FCI 5, WA3LQV 5. (July) W3QU 14 WA3RCI 67.

SOUTHERN NEW JERSEY – SCM, Charles E. Travers, W2YP – Acting SEC: W2YPZ. PAM: WA2TRK. RM: W3JL.

Net	Freq.	Time	Sess.	QNI	Tfc.	Mgr
NJSN	3730	8:15 ea ev	25	103	50	WA2TR
NJPON	3930	6:00 Su ev	4	69	79	WB2FI

All roads led to Malaga, N.J. for the 25th annual SJRA Picnic an Hamfest on Sat. Sept. 9. A day of fun, eats and fellowship w enjoyed by a very large gathering of hams and friends. W2 received the 50 year plaque. The Cherry Hill HS East now back c the air and expects to have a complete RTTY station operating, reports Mark Orthner, secy. who recently became a member Navy-Marine Corps MARS. The AREC program is in need of help keep it going as a working department. Availability in the time emergency is necessary and this is the time to build the organizatio to be ready at short notice to render an important service. If you a not a part of the AREC program now is a good time to becom involved; as an EC member, cw operator or phone operator. Speci attention should be directed to the use of emergency equipmen Contact this office for an appointment and become active in ARE NOW! Traffic: WB2VEJ 254, W2ZQ 170, WA2TRK 123, K2EF 97, WB2FNK 64, WB2FCD 33, K2PWK 12, W2YPZ 12, W2JI 1 W2IU 4, WB2SFX 4, W2ZI 4, W2CDZ 1.

WESTERN NEW YORK – SCM, Richard M. Pitzeruse, K2KT Asst. SCM: Rudy Ehrhardt, W2PVI. SEC: W2CFP. Novic interested in the WNY Novice Net should contact WN2HYP, 22 Raphael Drive, Webster, N.Y. 14580. WB2FNQ having fun DXi and trafficking with his new Advanced. NYS cleared 326 messag with 612 check-ins for Aug. Welcome to WB2KLD, new Schoharie County from NNJ. The Saratoga County ARCES Assn. a new ARRL affiliate. EC K2AYQ of the Glens Falls area continu

Save on Holiday

For a limited time only, SWAN ELECTRONICS and participating dealers are offering the best-buys-of-the-year in amateur radio . . . *complete* mobile or home stations . . . at very low "special package" prices. Act now. Be sure orders are placed early to assure early delivery – these special offers will expire December 25, 1973.

PACKAGE #1

A LUXURY SWAN TWINS HOME STATION WITH MATCHING DELUXE SPEAKER AND QUALITY DESK MICROPHONE

COVERS ALL 5 AMATEUR BANDS – SSB/AM/CW

It's all here – the most envied and sought after amateur radio system – at a special reduced price that may never be repeated again. You'll save more than $125 if you take advantage of this offer, now!

You get: The SWAN 600R/Custom Receiver including the ICAF 500 audio notcher-peaker and NB-500 noise blanker; the 600 watt P.E.P. input SWAN 600T Transmitter with self-contained heavy-duty AC power supply; a deluxe SWAN 600SP Speaker and cabinet with FP-1 phone patch, headphone jack and tone control; plus, the SWAN 444 desk microphone . . . A $1,228.90 retail value!

Among many features included are: • Mode selectors • Band selectors • Plate and antenna load matching controls • Selectivity and sensitivity controls • Hi-Lo power switch • Full break-in or semi-break-in CW with sidetone • VOX or PTT switch • Dual-ratio planetary tuning • Tuning eye and S-meters • Controlled AGC • VFO selector • and much more . . . practically every condition you'll ever want is at the control of your finger tips.

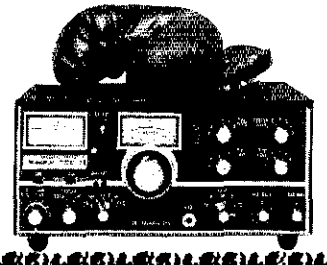
THIS COMPLETE DELUXE PACKAGE IS YOURS FOR $1,099.95 or just $110 down and no monthly payments until next year when ordered on an approved SWAN Revolving Credit Service account.

NEW 700CX CHAMPION SSB TRANSCEIVER

Less than 82¢ per watt! Punch through QRM for more contacts with 700 watts P.E.P. without an expensive accessory amplifier. The most power for the money available today . . . compare any others, you'll see it's a fact!

- SSB/CW/AM
- Dual-ratio planetary tuning
- 5.5 MHz crystal I.F. filter
- 5-Bands, 3 to 30 MHz
- ALC and AGC
- 2.7 kHz bandwidth

Choose a winner – SWAN's 700CX CHAMPION – It's gotta lotta punch!



$569.95

SWAN FM-1210A and Power Supply

2 Meter FM 144 Channels $359.95

Independent switching of 12 transmit and 12 receive channels gives you up to 144 possible channel combinations for your communications pleasure. Now you can move off the crowded frequencies, effectively eliminating unwanted QRM. Eight crystals are included for the most popular frequencies.

The FM-1210A is the only 2 meter transceiver providing a crystal oven for superior stability in the coldest of weather conditions. Transmitter is fully solid-state. DC power cord is included for mobile operation and the heavy-duty pedestal type AC power supply is perfect for home station applications. Mobile mounting bracket and dynamic microphone is supplied.

The FM-1210A transceiver may be purchased without the AC power supply at just $319 for mobile installation off any standard 12V DC system.

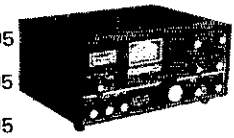
Specials from Swan Electronics

Compact Quarters? Need Space? Try the 300B Cygnet *de novo* with built-in speaker and AC power supply

Yes! A complete amateur radio station expertly engineered into this newest generation of portable Cygnet SSB/CW transceivers. It's lightweight, less than 25 pounds. An ideal traveling companion for Hams on the move. Take it on vacation — operate from motel room, hunting cabin, boat or car. Connect an AC power source, plug in your microphone and antenna — you're on the air!

With 5 bands and 300 watts P.E.P. input, the Cygnet *de novo* has all the control and power necessary to work the world. A CW sidetone monitor is provided along with capability for CW semi-break-in with an optional VOX unit. Requires plug-in DC converter for 12V DC mobile operation

300B Cygnet *de novo* . . $499.95
VX-2, VOX unit $35.95
SWAN 14-A, converter . . $44.95

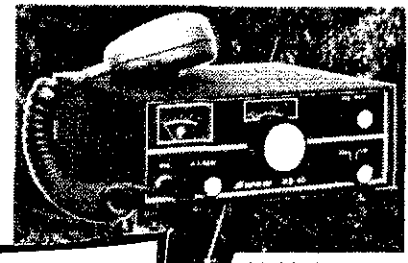


DON'T FORGET YOU CAN CHARGE YOUR PURCHASE TO YOUR SWAN REVOLVING CREDIT SERVICE PLAN

As little as 10% down will bring you any item in this ad — including the Special Holiday Packages — on any approved SWAN Revolving Credit Service account. Also, after placing your down payment, you do not have to make any further payments until next year. That's right,

NO PAYMENTS UNTIL 1974!!

(If you don't have a SWAN Credit Card, see your dealer or write the factory for details.)



PACKAGE #2

ALL SOLID-STATE SSB MONOBANDER MOBILE INSTALLATION WITH YOUR CHOICE OF 40 OR 80 METERS

Economical—Superior Quality—Amazing Clarity—Easy to use! That's the reaction to this installation. Specifically designed for the mobile ham, here is 50 watts P.E.P. input radiated through the most efficient heavy-duty single-band mobile antenna we know of. No tune-up time required. Just flip on the power switch and you're in operation. An easy to see light emitting diode, on the S-meter face, is activated to let you know when you're transmitting. The built-in speaker reproduces the most natural sounding voices we've ever heard in a mobile rig.

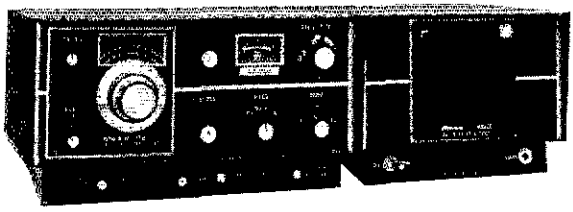
Like its big brother, the SS-200, this monobander needs no transmitter tuning and is infinitely protected from VSWR damage. Front-end overload, distortion and cross-modulation is virtually eliminated.

Select the MB-40 for 7.0 to 7.3 MHz use, or the MB-80 if you prefer to work 3.5 to 4.0 MHz. Whichever monobander you select, we'll include the correct single-band coil and whip antenna together with a bumper mount and microphone. A total value of $374.00 offered during this special holiday season for only $320. SAVE $54.00.

Includes: SWAN MB-40 or MB-80 transceiver, appropriate antenna coil, 6 foot whip and 36 inch antenna base section, SWAN BMT mount, SWAN 404 microphone, and all necessary mounting brackets, coax and connectors.

THERE'S MORE (PLEASE TURN THE PAGE)

...More Swan



JOIN THE NEW AGE OF AMATEUR RADIO ELECTRONICS! THRILL TO THE SWAN SS-200 EXPERIENCE

Completely solid-state • 200 watts P.E.P. input • Operates directly from any 12V DC supply • 3 to 30 MHz • Broadband transmitter eliminates operator tuning adjustments • Full power maintained on all 5 bands • Selectable SSB/CW • Semi-CW break-in and monitor • Infinite VSWR protection • Crystal I.F. filter with 1.7 shape factor • 2.7 MHz audio bandwidth • Noise blanker with variable threshold control • and more! Also available in 15 watt P.E.P. input version. Home station power supplies may be purchased for 115V AC or 220V AC installations.

SS-15 (15 watts P.E.P.) $579.00
SS-200 (200 watts P.E.P.). $779.00
PS-10 (115V AC power supply) $89.00
PS-20 (115V AC power supply) $139.00

SWAN MARK 6B — Linear Amplifier. 2,000 watts P.E.P. input. Compatible with SWAN 250C. 50 to 54 MHz. Complete with power supply. $679.95

SWAN VHF-150 — 2-Meter Amplifier. 150 watts P.E.P. input. Will operate class "B" or "C". Rugged self-contained power supply $299.95

SWAN 117-XC — 117V AC power supply with speaker, phone jack and indicator light. Ready to plug in and operate $109.95

SWAN SS-16B — Super Selective I.F. Filter. Exclusive 16 pole filter has a 1.28 shape factor with an ultimate rejection in excess of 140 dB. In easy-to-install kit form. $79.95

SWAN FP-1 — Hybrid Phone Patch. Separate receiver and transmitter gain controls. Exact voice reproduction . . $48.95

SWAN 55C — 5-Band Remote Control Mobile Antenna. Power rated at 1000 watts P.E.P. A SWAN exclusive . . . $129.00

SWAN 45 - 5-Band manual switching version of the 55C $79.00

SWAN TB-2A — 2-Element Beam Antenna power rated at 2000 watts $89.95
SWAN TB-3A — 3-Element Beam Antenna power rated at 2000 watts $108.00

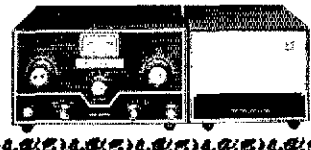
GOLDEN SWAN 1040-V — Trap Vertical Antenna. 10, 15, 20 and 40 meters, PR @ 2000 W. $69.95
75 Meter add-on kit $36.95

2-METER MOBILE FM STATION FEATURING THE NEW FM-2XA TRANSCEIVER

Transmit 10 watts of RF power over 12 channels from 144 to 148 MHz. Operates directly from any 12V DC battery system. MOS FET front-end substantially eliminates cross modulation and overloading. Infinite VSWR protection. Dynamic microphone and all necessary cables and connectors are included. The 3 dB gain whip is stainless steel with tapped transformer moulded at the base. Your choice of roof or deck mounting. A real value, worth up to $288.70. You save up to $23.75 at this low bargain price of $264.95 for this complete package deal.

2000 WATT P.E.P. INPUT MARK II LINEAR AMPLIFIER

Full frequency coverage from 10 to 80 meters plus MARS. Requires 100 watts of drive — compatible with SWAN 270B, 300B, 500CX, 700CX and 600T. All controls are easily accessible on the front panel. Provides full legal power limit on SSB, CW, AM and RTTY. Meter switch allows you to read Plate Voltage, Plate Current, Grid Current and Relative Output. Separate matching AC power supply included with 4½ foot connecting cable.



$679.95

Holiday Offers!

You may use this Special Holiday Purchase Form to place your order or you may want to use it as a HINT CHECK-LIST for your XYL or YL! Don't forget to point out the unique amateur radio gift counseling service available especially for her:

ATTENTION ALL XYL's and YL's — If you're in doubt about what to get the OM or YM, or if you have any question at all about SWAN equipment or services — call SWAN's Gift Information Service . . . collect! Call area code 714, 757-7525 (between 8 AM and 4 PM Pacific Time) and ask for our Gift Information Service. You'll receive our most courteous and confidential assistance.

CUT ALONG DOTTED LINE

AND MAIL TO SWAN OR BRING TO YOUR LOCAL SWAN DEALER

☐ **PACKAGE #1 — $1099.95**
LUXURY 600
HOME STATION

☐ **PACKAGE #2 — $320.00**
☐ MB-40
☐ MB-80

☐ **PACKAGE #3 — $264.95**
☐ Roof Mount
☐ Deck Mount

☐ 700CX Champion	$569.95	☐ 117-XC, AC Power Supply	$109.95
☐ FM-1210A & AC Power Supply	$359.95	☐ SS-16B, Super Filter	$79.95
☐ FM-1210A Mobile Unit	$319.00	☐ 510X, Crystal Oscillator	$53.95
☐ 300B Cygnet *de novo*	$499.95	☐ FP-1, Phone Patch	$48.95
☐ VX-2, VOX Unit	$35.95	☐ WM-1500, Wattmeter	$49.95
☐ 14-A, DC Converter	$44.95	☐ 55C, Mobile Antenna	$129.00
☐ SS-15 Solid-State Transceiver	$579.00	☐ 45, Mobile Antenna	$79.00
☐ SS-200 Solid-State Transceiver	$779.00	☐ TB-2A, Beam Antenna	$89.95
☐ PS-10, AC Power Supply	$89.00	☐ TB-3A, Beam Antenna	$108.00
☐ PS-20, AC Power Supply	$139.00	☐ TB-3HA, Beam Antenna	$125.00
☐ Mark 6B, Linear Amplifier	$679.95	☐ TB-4HA, Beam Antenna	$148.00
☐ VHF-150, 2-Meter Amplifier	$299.95	☐ 1040-V, Trap Antenna	$69.95
☐ Mark II, Linear Amplifier	$679.95	☐ 75 Meter Add-On Kit	$36.95

This check list can be used as an order form. Check the items you want, fill in all necessary data, and mail to SWAN or your favorite dealer. All shipping charges will be collect. Sales tax will be added where appropriate.

NAME _____ AMATEUR CALL _____

ADDRESS _____ PHONE _____

CITY _____ STATE _____ ZIP _____

Payment by: ☐ Check/Money Order ☐ C.O.D. ☐ SWAN Finance (10% or more down payment enclosed) ☐ BankAmericard # _____ Expires _____

☐ Master Charge # _____ Expires _____ Interbank # _____

☐ SWAN Account # _____ — Check here if this is an add-on order ☐ QST

(All prices contained herein are subject to change after December 25, 1973)

SWAN ELECTRONICS
A subsidiary of Cubic Corporation

305 AIRPORT ROAD
OCEANSIDE, CA 92054
TELEPHONE (714) 757-7525

BONUS COUPON

If your total purchase of SWAN equipment ordered from this advertisement exceeds $600, present this coupon for an additional 2% discount off the total list price of your purchases. This coupon is not valid unless signed by an authorized purchaser.

Name _____ Date of Purchase _____

Signature _____

Expires December 25, 1973
clipped from QST magazine

to have a fine organization going with the assistance of WB WB2GCN, W2FEM, W2BOR, WA2PCK, WB2RPL and WB WB2DXM has joined us up Watertown way and is chief engin a BC outlet there – Bob very active in traffic. WN2JRX has his General – congrats. K2LWR up over 215 worked on countries that is! Latest is YK. K2LGJ still knocking them o ALL bands and is up to 315/313. Bob believes in DXing bands and is up to 13 states, 8 call areas and 675 miles on 432 BPL this month to WB2ADW. Congratulations to W2ICE on selected to give the Dedicatory Lecture for the four commemorating the Progress of Electronics. If you haven voted for Atlantic Division Director, by all means do so. F W2DYD is now W4REQ and is visiting hometown Roc WB2NRS has built a monitor scope and is now working keyborad keyer. WA2IQQ of Cortland doing a pro job NCSing Traffic with * indicating PSHR: W2OE 444, WB2ADW W2MTA* 245, W2ER* 231, W2RUF* 214, WA2EXX/2 WA2AYC 108, WB2VND 94, W2HYM 57, WN2JRX 51, K2U WA2TPC 38, WB2DXM 33, WA2LUF 31, W2MSM 31, W2P2 W2EAF 24, W2RUT 24, W2WAM 24, W2PZK 21, K2IM WA2PUU 17, W2RQF 16, WB2LKK 15, K2OSV 14, WA2AE WB2JWM 11, WB2QAP 4, W2PVI 2, K2IMI 1.

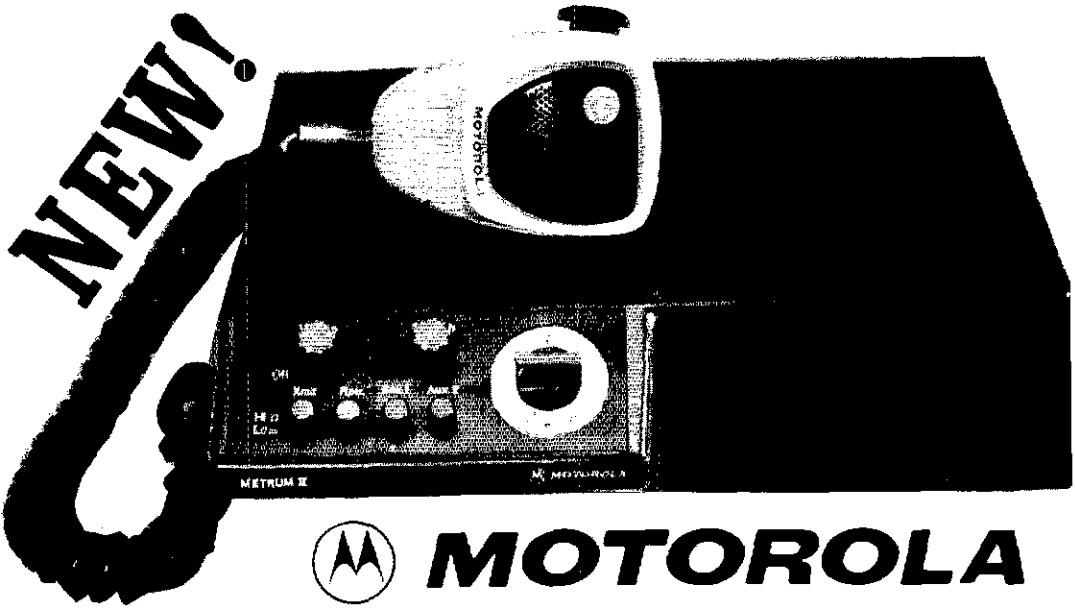
WESTERN PENNSYLVANIA SCM, Robert E. Ga W3NEM – SEC: W3KPJ. PAM: K3ZNP. RMs: W3KUN, W WA3PXA. WPA CW Net meets daily on 3585 kHz at 7:0 KSSN meets daily on 3585 kHz at 6:30 P.M. Both local time with our deepest regrets that we announce the Silent K W3BRC. The WPA CW net gang had their annual business m and family picnic get together at Cook Forest State Park w amateurs and 19 WPA top notch traffic men attending the The Juniata Valley ARC has started another code and theory Their last class reaped a fabulous harvest of new hams Crawford Amateur Radio Society announces the birth of WR3 WA3RPO is a new Extra Class and has a three-element tr beam up 40 feet to go with it. Congrats. WA3MZD had an mobile trip to Boston. He gave out over 300 contacts with som Penna. counties, plus he worked an SM5 and a French n station. WN3SPG is a new General Class as is WN3TTS. WN3V a new Novice in the Lewistown area and WN3VDK is a new N in the Greensburg area. Congrats men. WN8OZM/3 is atte classes at Duquesne University and says he will be active from The Penn State Univ. ARC and the Nittany ARC of State C had a joint meeting and the new ham radio film "Fine Business shown. PSHR for Aug.: WA3SWF 63, WA3PXA 42, W2LO W3NEM 39, W3YA 34, K3CB 34, WPA had 31 sessions, 286 and handled 191 messages. KSSN had 12 sessions, 46 QNI a QTC. BPL: WA3SWF. Traffic: WA3SWF 426, W3YA WA3LDA 238, K3CB 137, W3NEM 112, W3LOS 105, W3KU WA3PXA 60, K3ZNP 47, WA3IYA 42, WA3GJU 40, WN3TT W3SN 21, K3VQV 21, WA3JIH 19, W3ATO 9, W3IDO 9, W 6, K3SJN 5.

CENTRAL DIVISION

ILLINOIS – SCM, Edmond A. Metzger, W9PRN – Asst. Harry Studer, W9RYU. SEC: W9AES. RM: W9MUC. WA9LDC and W9PDI (vhf). CookCounty EC: W9HPG.

Net	*Freq.*	*GMT/Days*	
IEN	3940	1400 Su	no
ILN	3690	2330 Dy 0400 Dy	no
NCPN	3915	1300 M-S 1800	
Ill PON	3915	1430	
Ill PON	145.5	0200 MWF	
Ill PON	50.28	1200 M	
ILNN	3720	0000 Dy	no

The League's Executive Committee has approved the applicat the Evanston Township High School Amateur Radio Club of affiliation. New EC appointments include K9IIT Madiso K9DCG Boone Co.; K9MWA Macoupin Co.; WA9PDS Verr Co.; W9FJP Wabash Co.; WA9VCW Effingham Co. and K Montgomery Co. New Novice in the Springfield area is WN9 This Division sends its sympathy to the family and friends of A. Michel W8WC who passed away as this column was writt was the ARRL Director of our neighbor the Great Lakes Di He was a devoted amateur and spent a considerable part of promoting the League and amateur radio. He will be greatly by the Ham Fraternity. W9KRR has moved to Atlanta, Ga. pres. of the CSRA (Chicago). WB9EAF is now WB9NDP officers of the Lakeview ARA are WB9FRX, WB9GKM WA9VGK. WB9IPH and XYL are the proud parents of a harmonic girl. The ILN held their first annual picnic on Sept. Vermillion County net meets at 1300 Sun. on a frequency of



MOTOROLA

METRUM II 2M FM Transceiver

MOTOROLA – Big name, but now priced for the Ham. The Metrum II features high Quality and High Performance in the Motorola Tradition. The Metrum II has 12 Channel capability (146.94 MHz supplied) And requires only one crystal per channel. Repeater operation is accomplished by installing an optional Repeater Offset crystal. In Repeat mode, the transmitter frequency is shifted.

Receiver specs are on par with their commercial models; Typical: .35uv-20db quieting (.25uv sinad), Intermod –50db, Spurious and Image rejection –65db. Very sensitive! – But provides "Garbage-free" reception in metro areas where some rigs are "Wiped out" by adjacent channel interference and intermod.

Available in two models – 10 or 25 watts output. Both have hi/lo power switch to reduce output to one watt. Other features include back-lighted control panel, polarity and antenna mismatch protection and 5 watts of audio power. Microphone and mobile mount included. Ready to go on 12vdc. 2¾" h, 9¼" d, 11" w.

Amateur Electronic Supply has been selected to distribute this fine new product. Write or phone today for more info – Trades – Financing – etc.

INTRODUCTORY OFFER: If you purchase a new Motorola Metrum II FM rig at the Regular price and without a trade-in, you may take a $50.00 "Bonus Credit" toward the purchase of other merchandise (such as xtals, antennas, supplies, etc.)

Branch Stores in:
ORLANDO, FLORIDA
&
CLEVELAND, OHIO

master charge
THE INTERBANK CARD

MOTOROLA METRUM II PRICES

10 watt Model	$399.95
25 watt Model	499.95
Crystals (one per channel)	9.00
600 KHz Repeater Offset Crystal	13.50

AMATEUR ELECTRONIC SUPPLY

4828 West Fond du Lac Ave. Milwaukee, Wis. 53216
Phone (414) 442–4200
STORE HOURS: Mon & Fri 9-9, Tues, Wed & Thurs 9–5:30; Sat 9-3


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P

Heathkit Gear puts Christmas in the air.

A) SB-102, 80-10 M SSB Transceiver... world's most wanted rig, 180 W PEP SSB, 170 W CW. Front panel selection of built-in 2.1 kHz or optional CW crystal filters. Solid-state LMO. 0.35 uV receiver sensitivity. Fixed or mobile operation with optional power supplies.
Kit SB-102, 24 lbs. $385.00*

B) SB-401 Amateur SSB Transmitter... performance companion to the "303". 180 W PEP SSB, 170 W CW on 80 thru 10. Built-in power supply. Assembled LMO. Requires SBA-401-1 crystal pack for operation with receivers other than SB-300/301/303.
Kit SB-401, 36 lbs. $299.95*
SBA-401-1, crystal pack, 1 lb. $29.95*

C) SB-220, 2 kW Linear Amplifier for a really big signal at lowest possible cost. 80-10 M coverage. Uses a pair of husky Eimac 3-500Z's. Continuous monitor of Ip, switch-selected monitor of Rel Pwr,, Ep & Ig. ALC output for prevention of overdriving.
Kit SB-220, 70 lbs. $369.95*

D) SB-200 kW SSB Linear Amplifier... 1200 watts PEP input SSB, 1000 watts CW on 80 through 10 meters. Built-in antenna relay. SWR meter, and power supply. Can be driven by most popular SSB transmitters (100 watts nominal output).
Kit SB-200, 50 lbs. $229.95*

E) SB-303 Solid-State Amateur Receiver. 80-10 M coverage plus 15 MHz WWV. Dual gate MOSFET front end for high sensitivity. Pre-assembled solid-state LMO. Built-in 2.1 kHz crystal filter plus optional CW & AM filters available. The hottest ham receiver ever made, at any price.
Kit SB-303, 22 lbs. $319.95*

F) SB-650 Digital Frequency Display lights up to show receiver or transceiver operational frequency from 80 through 10 meters with 100 Hz accuracy. Operates with Heathkit SB-100, 101 and 102 Transceivers and SB-300, 301 and 303 Receivers.
Kit SB-650, 10 lbs. $179.95*

G) HW-202 2-Meter Transceiver gives pushbutton selection of up to 36 channels, 10-15 watts transmission into an infinite VSWR. Sensitivity is 0.5 uV for 12 dB quieting. Shown with optional four-position Tone Burst Encoder.
Kit HW-202, 11 lbs. $179.95*
Kit HWA-202-2, Tone Burst Encoder, 1 lb. $24.95*

H) HA-202 2-Meter Amplifier gives any 2-meter rig 40 watts out for 10 watts in. Pulls just 7 amps from 12 VDC system. Works with any 2-meter exciter delivering 5 to 15 watts.
Kit HA-202, 4 lbs. $69.95*

I) HW-101 80-10 M SSB/CW Transceiver... an improved version of the famous HW-100. New receiver circuitry for 0.35 uV sensitivity. New dial drive mechanism for smoother, more positive tuning. New selectable CW filter option. The world's best buy in an SSB rig.
Kit HW-101, 23 lbs. $259.95*

J) HM-102 Wattmeter/SWR Bridge... a low cost, high performance accessory every ham needs. Reads RF output from 10-200 & 100-2000 watts. Built-in calibrator permits 10% accuracy of meter in any location. 50 ohms.
Kit HM-102, 4 lbs. $29.95*
Kit HM-2102, 2-Meter Wattmeter/SWR Bridge, 4 lbs. ..$29.95*

K) HW-16 Novice CW Transceiver... a high-performance 3-band CW transceiver... covers the lower 250 kHz of 80, 40 & 15 meters. 75 watts input for novice class – 90 watts for general class. Provisions for VFO transmitter control with Heathkit HG-10B.
Kit HW-16, 25 lbs. $99.95*

L) HW-7 CW QRP Transceiver. Features VFO & provision for xtal transmit operation. Covers CW portion of 40, 20, & 15 meters. Transmitter circuitry provides input powers of 3 watts on 40 meters, 2.5 watts on 20 meters, 2 watts on 15 meters. Operates from optional AC power supply or 12V battery.
Kit HW-7, 6 lbs. $69.95*
Kit HWA-7-1, AC Power Supply, 4 lbs. $14.95*

M) HR-10B Amateur Band Receiver... with extra-durable two-tone wrinkle finish to match the DX-60B transceiver. Tune AM, CW and SSB with 80 through 10 meter coverage. Provisions for plug-in 100 kHz crystal calibrator.
Kit HR-10B, 20 lbs. $79.95*
Kit HRA-10-1, 100 kHz crystal calibrator 1 lb. $9.95*

N) DX-60B Phone & CW Transmitter... with wrinkle finish matching HR-10B. Here's 90 watts on 80 through 10 meters... operates at reduced power for novice class. Provisions for VFO control with HG-10B.
Kit DX-60B, 24 lbs. $79.95*

O) HM-2103 RF Load/Wattmeter has a 50 ohm non-inductive load resistor and features less than 1.2:1 SWR for measuring frequencies from 1.8 to 30 HMz; built-in wattmeter with 0-200 and 0-1000 range, accuracy within ±10% of full scale; power rating of 175 W continuous, 1000 W maximum.
Kit HM-2103, 6 lbs. $59.95*

P) HD-15 Hybrid Phone Patch. Has individual receiver-to-line & line-to-receiver gain controls; VU meter; 30 dB isolation for positive VOX operation. Matches 3-16 ohm speakers & hi-Z or 600 ohm inputs; operates VOX or PTT.
Kit HD-15, 3 lbs. $24.95*

FREE '74 CATALOG
Describes these and over 350 other kits. Save up to 50% by building them yourself. Use coupon and send for your FREE copy!

HEATHKIT ELECTRONIC CENTERS – 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), Tampa; 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; NEB.: Omaha; N.J.: Fair Lawn; N.Y.: Buffalo (Amherst), New York City, Jericho, L.I., Rochester, White Plains; O.: Cincinnati (Woodlawn), Cleveland, Columbus; PA.: Philadelphia, Pittsburgh; R.I.: Providence (Warwick); TEXAS: Dallas, Houston; WASH.: Seattle; WIS.: Milwaukee.

HEATH . Schlumberger

HEATH COMPANY, Dept. 9-11
Benton Harbor, Michigan 49022

☐ Enclosed is $_____, plus shipping.
Please send model(s)_____
☐ Please send FREE Heathkit Catalog.
Name_____
Address_____
City_____ State_____ Zip_____
*Mail order prices; F.O.B. factory. AM-289R

The Illiana Repeaters System, Inc., has a membership of 4 Ill. and Ind. counties. The call is W9MJL and operates on 146.34 a 146.94. WB9DVV, K9EYT, WB9KZP and WA9LEQ are the ne officers of the Northwest Amateur Radio Club. The Northern I DX Assn. held their Annual W9DXCC meeting at the Holiday Inn Highland Park with an FB gathering with W9HPG, W9PRN a WA1PID/WA8VRB representing the League. As a personal messag wish to thank the hundreds of amateurs who have written to t FCC in protest to Docket 19759. WB9FHL is the only BI recipient this month. Traffic: (Aug.) W9MWA 414, W9NXG 26 WB9NDP 244, W9AES 176, WB9JPS 174, WB9FHL 147, K9K2 126, W9MUC 125, W9JXV 116, WA9LDC 82, W9OYL 75, K9ZT 54, WA9LZN 38, W9HOT 23, W9KRR 20, WA9PDS 20, K9BG 18, WB9ELP 14, W9PRN 14, W9RYU 12, WB9FWO 7, WB9JNT (July) K9ZTV 8. (June) K9ZTV 3. (May) K9ZTV 8.

INDIANA – SCM, William C. Johnson, W9BUQ – SE WA9YXA. RMs: WB9LHI, W9HRY, WB9KVN, WA9EED. PAM WB9FOT, (vhf) W9HWR, W9PMT.

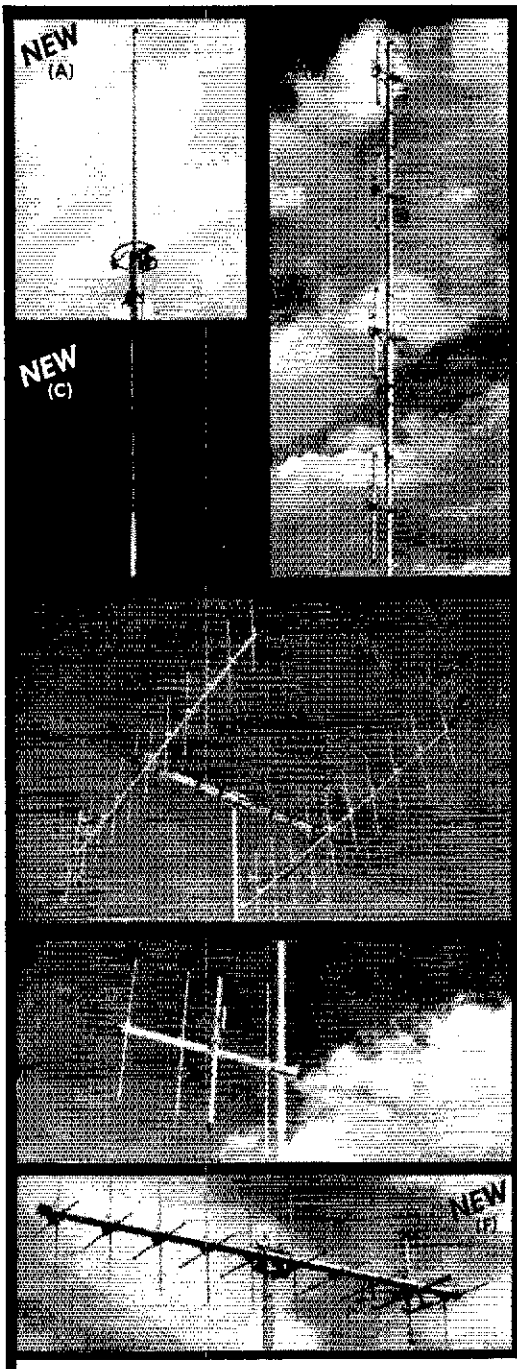
Nets	*Freq.*	*Time(Z)/Days*	*Tfc.*	*Mgr*
ITfeN	3910	1330-2300 Dy 2130 M-S	490	WB9FO
QIN	3686	0100-0400 Dy	303	WB9LI
IPON	3910	1300-2130 Su 2000 S	7	WB9AI
IPON VHF	50.7	0100 MWTh	15	WA9UL
IPON CW	3712	2330 Dy	44	WB9KV
IPON SSB	50.2	0200 Dy	20	WB9CY
Hoosier VHF			19	W9PM

With deep regret I report the following as Silent Keys: W9RZ W9UBF. INDY Hamfest was going good until the rain came, fir prize winner WB9GNK. IRCC Picnic and Hamfest at Lafayett Field Day Award went to DI6RD/9 High Frequency; Six-met W9REG/9; Two-meter K9YCJ/9. W9BUQ won the Outstandi Amateur of the Year Award for 1973. LaPorte ARC sponsored booth at the LaPorte County Fair Aug. 13-18 K9JSI/9. Youth w be served, WB9BAP, 13 years old, has been NC for ITN7, doing fine job. WA9ABI is an Honorary Marconi Wireless operato W9BUQ had a little lightning trouble, was off the air about a wee WA9AUM has left Ind. for Newington and working at ARRL. In Amateur Radio Week starts Dec. 9-15, 1973. If you want to fin out what is happening in Ind. listen on 3910 kHz. Madison ARC being reactivated with WB9INF, pres.; WB9HPR, vice-pres WB9AHJ, secy.-treas.; W9HMR, trustee. QIN Honor Roll: W9E W9KX, WB9GVT. QIN Operator for The Month W9EI. 9RN 6 sessions, traffic 494, BPLs: K9HDP, WB9CAC. Traffic: (Aug WA9EED 354, K9HDP 306, WB9FOT 289, WB9KVN 212, W9E 198, WB9CAC 186, K9FZX 178, WB9GVT 113, W9FWH 11 K9IU 75, W9QLW 66, K9HYV 54, K9RWQ 42, W9BUQ 3 WA9OHX 37, WA9OAD 34, W9KX 32, W9PMT 31, W9UEM 3 K9PSI. 29, WA9BWY 25, K9YBM 25, W9DZC 24, K9CBY 2 K9RPZ 21, WA9TSJ 21, WB9BAP 20, W9DKP 19, W9HWR 1 WA9AXF 10, W9RTH 10, K9DIY 9, W9KT 9, K9ILK 8, K9FQT W9LJ/9 4, WA9ULH 4, WB9BEE 3, K9JQY 3. (July) W9KX 33.

WISCONSIN – SCM, Joseph A. Taylor, W9OMT – SE W9NGT. PAMs: K9FHI, WA9OAY, WA9QKP. RMs: W9UC K9LGU, K9KSA. Net statistics: Wisc. Sideband Net QNI 1060, QT 88; Wisc. Intrastate Net (Early Session) QNI 166, QTC 68; Wis Intrastate Net (Late Session) QNI 130, QTC 74; Badger Weather N QNI 454, QTC 249. By the time this is printed the FCC w probably have decided what it will do on the 200 MHz situatio Thanks to all who sent in comments on the docket, we ha received several copies from section members. WB9FMR repor that the Wisc. Novice Net is doing an FB job. They have been liaisc with the WIN and the IIn. Looks like a good place for sectio Novices to learn a few cw net procedures. K9DKW now /7 in Ari working in the broadcast business. He is still able to work the hom QTH as K9OXY reports working him on 50 MHz. WN9LSP has project going by which he is helping Packer fans around the sta voice their opinion to retire Number 66, Ray Nitschke. It has helpe to stimulate a little extra business on the Novice Net. W9NN who a member of our section and also on the ARRL DX ADviso Committee, is anxious to hear comments from members on DXC rules. Whether they are pro or con send them to him anyway. W often complain about not having a say in matters so let's take th opportunity to express our views. Traffic: K9CPM 382, WB9FM 127. K9FHI 68, K9LGU 54, K9KSA 41, W9KRO 39, W9DND 3 K9JPS 31, W9UCR 31, WA9OAY 26, W9DXV 22, W9AYK 1 W9NN 10, K9WIE 10.

DAKOTA DIVISION

MINNESOTA – SCM, Casper H. Schroeder, WAØVAS – To Minn. section net members. I am happy to report that from now I will be able to keep up the column. I hope I have not given anyo



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 High

Priced New Equipment ★ EZ Terms—Convenient REVOLVING CHARGE Payment Plan ★ Order Direct from this A

ALLIED RADIO
SX-190 Receiver $175
A-2515 Receiver 59

AMECO
CN-50 (14–18) $ 29
CN-50 (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
RR-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
75S-1 Receiver 325
75S-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. 175
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
2AT 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-208 gen. cov. Rec. $99
G-209 Ham band Rec. 99

GLOBE/GALAXY/YRL
6-2 VFO $ 34
Galaxy 300 Xcvr 139
PSA-300AC-Clock 49
VX-1 VOX 9
Galaxy V Xcvr 299
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-2525 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
90LA 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 Xcvr 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 Transceiver 225
SB-200 Linear 219
SB-610 Sig. monitor 69
SB-620 Scanalyser 119
HG-10B VFO 39
HW-29A (Six'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-55S 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 59
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-B 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 6-2m 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 59
350 Transceiver 279
SW-117C AC supply 75
512 DC supply 75
X2 VFO adaptor 19
500 Transceiver
500C Transceiver
117XC AC supply
14-117 DC supply
14A DC module
14X DC module
117X Basic AC sup.
NS-1 noise silencer
FM-1210A 2m FM
WM-1500 wattmeter
AF-800 CW aud. filt.
Mark I Linear
VHF-150 Amplifier
1200-W Linear amp.

TMC
GPR-90 Receiver $

TAPETONE
XC-50 (14–18) $

TEMPO
502 2m Amp. $
Tempo One
AC/One

TEN-TEC
PM-2A Transceiver $
PM-2B Transceiver
PM-3 Transceiver
PM-3A Transceiver
Argonaut
250 AC supply
210 AC supply
TX-100 Xmtr
RX-10 Receiver
S-30 Signalizer
KR-5 Keyer
KR-40 Keyer

UTICA
650A 6m Xcvr/VFO

VARITRONICS
PA-50A 2m Amp $
FM-20BM AC supply-amp
HT-2 Mk II 2m FM walkie-talkie
FDFM-2A

WATERS
359 Compreamp $

YAESU
FTDX-400 Xcvr $2
SP-401 Speaker

10/10/73

NEW EQUIPMENT SPECIALS & CLOSEOUTS

Due to the low prices and limited quantities of the merchandise listed below 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
325-3 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	$875	$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	179	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.	NO
HB254 4 stacked 2m Halos	54	
400 Rotor	229	
TH-6DXX torn carton (repaired	189	
14-AVQ torn carton (repaired)	55	

KENWOOD

	reg.	NO
R-599 Receiver	$389	$
T-599 Transmitter	429	
CC-69 6m Converter	31	

LINEAR SYSTEMS (ADCOM)

	reg.	NO
350-6 6v DC supply	$125	$

MOSLEY

	reg.	NO
CL-33 shipped to customer in error	$153	$1

PENWOOD

	reg.	NO
100E-24H 24-hour clock	$ 16	$

ROSS & WHITE

	reg.	NO
FM-144-10J 2m FM Xcvr with tone encoder	$329	$2

SBE

	reg.	NO
SB-36 Transceiver – New	$969	$6
SB-SV Scanvision Monitor and Camera – New	999	$
SB-144 2m FM - new display	359	
SB-450 450Mc FM Xcvr	399	2
SB-2MIC Mike (dynamic)	16	

STANDARD

	reg.	NO
SR-C826MA – New Display	$398	$2
SR-C14U – New Display	595	4
SRC-146A hand-held – Demo	289	2

SWAN

	reg.	NE
fm-2X 2m FM Transceiver	$299	$2

VARITRONICS

	reg.	NO
PA-50A 2m FM Amp 12v	$129	$
FM-20BM Base Amp/supply	285	
FM-20M Mobile Amp	150	

★ – with 90-day A E $ 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.

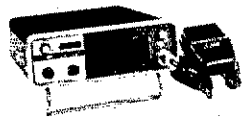
17929 Euclid Ave.; Cleveland, Ohio Phone (216) 486–7330
621 Commonwealth Ave.; Orlando, Florida Phone (305) 894–3238

AMATEUR ELECTRONIC SUPPLY

is the Best Place to purchase your new

DRAKE *gear for the following reasons*

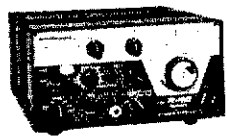
TR-72 2m FM Xcvr, 12vdc, 23 ch.	$299.95
TR-22 Portable 2m FM Xcvr	219.95
AA-22 Rec./Xmtr. Amplifier	149.95
MMK-22 Mobile Mount	9.95
AA-10 10 watt 2 meter Amplifier	49.95
AC-10 supply for TR-22/AA-10 TR-72	39.95
Extra crystals for TR-22, TR-72 each	5.00
DSR-1 Digitally synthesized Receiver	2195.00
Rack 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
729SRD Microphone with plug	19.95
SPR-4 Programable Receiver	579.00
ACCESSORIES FOR SPR-4	
5NB 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



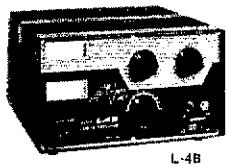
TR-72

TR-22

Order Today
Direct from this Ad



R-4C



L-4B

your
BANKAMERICARD
welcome

- 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

Ray Grenier, K9KHW
Mgr. Mail Order Sales

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

the impression that I didn't enjoy writing the column, but si Dec. 1972 I have had doctor, hospital and Government appo ments which hopefully now are all over. Thanks for sticking w me. MSN (Minn. sr. cw net) no reports. MJN (Minn. jr. cw r WAØYAH RM, sessions 27, QTC 8, QNI 55, high 5, high 6, low low 1, average 3, average 2.1. NCS WAØYAH, WAØTFC, WBØGK VE3AXD (TEN rep. VE3AXD). MSPN (Minn. section phone n Noon Net (KØFLT) PAM, sessions 31, QNI 799, QTC 103, high high 14, low 10, low 0, average 25.8, average 3.3. MSPN (Mi phone net) Evening Net (WAØVYB PAM), session 31, QNI 11 QTC 137, high 48, high 15, low 21, low 0, average 36, average 4 PAW (Piconet All Day Watch) WAØYVT Net Mgr., QNI 3556, Q 333, 173 hours, average 20.6, patches 58. Traffic: WAØVAS 10 WBØFMN 444, WBØHOX 341, WAØYVT 216, KØCSE 94, KØZI 80, WAØTFC 79, KØPIZ 68, WAØVYB 66, WBØFTL 64, WØB 61, WBØBQA 51, WBØCYM 27, KØZBI 26, WBØFMI 24, KØJTW WAØYAH 24, WBØAYN 23, KØFLT 19, WAØCCA 18, KØEDS WBØFVY 13, KØRAB 7, WØFDM 5, WØIRJ 5, WAØJPR 4, WØUI 3, WAØVYV 2.

NORTH DAKOTA – SCM, Harold L. Sheets, WØDM – SE WAØAYL. OBS: KØPVG/Ø. RM: WAØMLE. OO: WØBF. We reg to report that WAØSJB has left the state for Washington, D.C. will be sorely missed in both PON and RACES activities as well the Peace Garden Hamfest promotions. KØPYZ reports 26 ha plus 19 more showed up for his annual corn feed. WØHSR, anot OT, has recently acquired a YASU 401 and back on the air fr Hatton. WØCGM retired in July and is busy around the shack w teletype. WØDM and XYL stopped by for a short visit while in t area. KH6GH/Ø still at Sutton working portable and mob WBØFDT putting out a good signal. WØDM put the bumper mou on the Hornet. The HW-101 is still in the shack. KØRSA has a n antenna up at the new QTH and now on the air. WBØFVT retir from the farm and operating in Harvey with an SB102. WØR reports from Lisbon a new Novice WNØKTF and a Conditio WBØIAE. WØCGM had a band in that one too. Welcome fello WAØREW, WØOUX and WBØAUM of the Theodore Roosevelt Al went on a fossil hunting expedition. KØBAE is on two with a Hea HW-202. KØCLD returned from vacation in Canada working t meters while mobile. KØGRM, WBØFUO and WØHVA have be working on the repeater equipment for the Minot area. WØH busy building up a pair of 813s amplifier. WNØKTU on with a Glo Scout but went to NDU. Thanks to WØGRM for all the do WBØBMG appointed mgr. of the PON to replace the depart WAØSJB. We need operators to check into the 10th Region Dayti Net daily on 7263 kHz at 1900 GMT to receive traffic for N. WAØMLE again made BPL and PSHR for Aug.

Net	*kHz*	*GMT/Days*	*Sess.*	*QNI*	*QTC*	*Mg*
Goose River	1990	0900 S	4	50	5	WØCI
RACES	3996.5	1830 M-F	23	401	53	WBØA WAØS
PON	3996.5	0900 S 1830 S-S	–	–	–	

Traffic: WAØMLE 289, WAØSUF 32, WØDM 15, WØCDO WBØBMG 6, WØMXF 5.

SOUTH DAKOTA – SCM, Ed Gray, WAØCPX – WØR received WAS certificate dated Aug. 9, 1973. The Sioux Falls A is organizing a local 10-meter net meeting on 28.8 MHz every W at 2000 local time. WAØROK made BPL and the Public Serv Honor Roll this month. The Rapid City Repeater group participa in a two meter Civil Defense drill over WRØABL. Static participating were KØZUN, WAØVPY, WAØNRE, WNØJE KØBQQ, WØYOB, WØJLS, K4GXV/Ø WBØGCY, WBØGK WAØWVW, WAØUEN and WØONA. Pennington County CD Direc Don Martini observed the drill. Net reports: Early Morning Net 415 QNI, 53 QTC; NJO – 516 QNI, 29 QTC; Early Evening – 4 QNI, 6 QTC; Late Evening – 953 QNI, 27 QTC; SDN CW – Q 192, QTC 252. Traffic: WAØROK 614, WAØUEN 128, WAØN 58.

DELTA DIVISION

LOUISIANA – SCM, Louis A. Muhleisen, Jr., K5FVA – SE K5SVD. RM: W5GHP. PAM: WA5NYY. VHF PAM: WA5KN SEC K5SVD has recently been appointed to the Emerge Communications Advisory Committee by Pres. Dannals. Bill's a of responsibility is the 5th call area. In order to be as effective possible; he would like to hear comments from members of section on matters to be presented to this committee. It seems though if you have been wanting to upgrade your license that ARCOS is the club to belong to. Recently Troy Balla ex-WA5CHZ, passed the General, Advanced, Extra Class lice exams in one sitting. Congrats Troy. Also congrats to ARC

The TRITON is a One-of-a-Kind HF transceiver, totally solid state including the final amplifier. The new generation that does more things better than ever before. One, you can change bands instantly. Just turn the band switch—and go! Two, there is less internal heat to prematurely age components and no high voltage to break down insulation or cause accidental shock. Three, it has ample reserve power to run at full rating even for RTTY or SSTV without limit. Great for contests or emergency service. Four, it is light and compact with a detachable AC power supply to work directly from 12 VDC—For mobile operation without tedious installation. *Five, the TRITON is a delight to operate. SSB is clean, crisp and articulate.* Amplified ALC puts all available speech power into the antenna without splatter. CW is wave-shaped to cut through QRM and pile-ups. Instant break-in (not "semi" which really isn't break-in) lets you monitor the frequency while transmitting. And six, a lot more goodies such as excellent dial illumination, plug-in circuit boards, offset tuning, built-in SWR bridge, speaker, crystal calibrator, snap-up anti-parallelax front feet, light indicators for offset and ALC, direct frequency readout, WWV, entire 10 meter band coverage—and a lot more. The TRITON brings together all that is new and exciting in Solid State for your greater enjoyment of Amateur Radio.

TRITON I 100 watts input	**$519.00**
TRITON II 200 watts input	**606.00**
Model 251 Supply for TRITON I	***69.00***
Model 252 Supply for TRITON II	**89.00**

We'll be happy to send you full information.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862

members WB5FVF, WB5FEY and WB5GHN on recently passing General, and to WB5JJT, WB5CMI and WB5DDX on recer passing the Advanced. ARCOS's new acting secy. is WN5CHO. NOVHF Club now reports 125 active members. K5DZE/5 is r active on Oscar 6 and is looking forward to Oscar 7. The RAAR doing well and now meets every 3rd Tue. of the month at 7:00 P at the Ruston Mental Health Center. Plan now to attend the D Division Convention, sponsored by the LARC, which will be h Mar. 1, 2 and 3, 1974. Further information maybe obtained fr K5ARH. Traffic: W5GHP 377, WA5ZZA 59, WA5NYY 38, W 18, WA5EID 9.

MISSISSIPPI – SCM, Walker Coffey, W5NCB – Asst. SC Gene McGahey, WA5JWD. SEC: WA5FIL. RMs: WA5YZ WB5EIN. PAMs: W5IHS, WA5KEY. Membership in section reached 444, up about 100 in last year. Lets make it 544 in ' WB5DCY and K5YIN handled an emergency patch to NY XE2JN to obtain critical drugs. WN5IHFA has 25 wpm CP certific and does an FB job as NCS on MNN. W5TAD busy tracking Sky and looking into the why and how of seismo measurements. W5 rebuilt his station and operating position FB. W5GWD at Bernai is active 220 MHz through 160 meters. WB5BUE as mgr. K5YPR as asst. mgr. of MSBN did fine job. WB5BKM elected n MSBN. WB5FML needs Vt. for 40 WAS. also made BPL. Cong to WB5EIO now General Class. WA5EGC gave amateur radio a boost with a TV clip on a Jackson station using shack at WA5CI Our sympathy to the family of W5WLY now a Silent Key. K5Y and WB5FML made PSHR. Welcome to WN5KEL, WN5KE WN5KFN, WN5KFZ and WN5KHB. It's your ARRL, use t ballot.

Net	Freq.	Time(Z)/Days	QNI	QTC	M
MTN	3665	0045 Dy	158	143	WA5Y
MNN	3733	0100 TTHs	--	--	WB5E
GCSBN	3925	0030 Dy	--	--	W5J
CGCHN	3935	0100 Dy	1379	172	WB4R
MSPON	3970	0045 MS	259	33	WAØGVC
MSBN	3987.5	0015 Dy	898	80	WB5BI

Traffic: WB5FML 245, W5EDT 107, WB5DLW 101, WA5YZW W5NCB 81, K5YTA 57, WN5HYR 37, WAØGVO/5 20, WB5D 17, W5BW 13, WB5BUE 7, WB5BKM 5, WA5FII 4, W5AMZ 3.

TENNESSEE – SCM, O.D. Keaton, WA4GLS – SEC: WB4D PAMs: W4PFP, K4MOI, WA4EWW, WA4NEC. RM: W4ZJY.

Net	Freq.	Time(Z)/Days	Sess.	QNI	QTC	M
TPN	3980	1145 M-F 1300 SSuH	31	1356	27	W4P
TSSBN	3980	2330 M-S	26	1519	26	K4M
ETPN	3980	1040 M-F	22	508	11	WA4EW
TPON	3980	2330 Su	5	171	9	WB4BI
TN	3635	2300 Dy				WB4Y
TNN	2300	2300 Dy	19	89	14	WB4N
FTVHFN	50.4	2300 MWF	12	124	0	W4S
ETVHFN	146.2	2300 TTh	9	36	0	WB4D2
ETTMN	28.7	0100 W&F	8	39	0	WB4N
MTTMN	28.8	0100 T&Th	9	64	0	W4EA
KVHFN	50.7	0000 T	5	15	0	WB4M
ACARECN	146.28 146.88	0000 M	5	64	0	WA4B

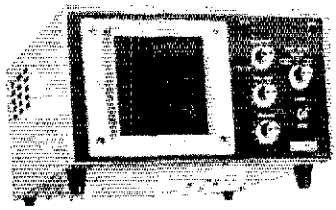
I am sorry to report that W4ZJY has resigned as RM. Many thar Dave for the fine job while you served. You know by the abo statement that I am looking for an RM. I am pleased to report t Max Arnold, W4WHN, Delta Division Director is recovering v well from recent surgery. The new combined Tenn. Phone N rosters are now being mailed to net control stations. The Cedars Lebanon Hamfest was a success, everyone won a prize. WA4V was the first prize winner, W4PFP was presented a nice plaque his 22 years of continuous service as Sun. morning net control the Tenn. Phone Net. Traffic: K4CNY 150, WB4DJU 138, W4O 89, WB4NEG 49, WB4NIR 44, WA4GLS 36, WB4DYJ 20, W4P 20, WA4URA 13, W4RUW 10, WA4AVD 9, WB4ANX 7, W4CYL W4SGI 6, WB4UZD 4, WA4CGK 3, WB4MPJ 2.

GREAT LAKES DIVISION

KENTUCKY – SCM, Ted H. Huddle, W4CID – SEC: WA4GE Endorsements: W4BAZ as ORS; WA4AGH as OO; W4BAZ as OI K4LQL as EC; W4NBZ, W4OXM and K4UMN as OPSs. BE WB4ZMK.

Net	Freq.	Time(Z)/Days	QNI	QTC
KRN	3960	1130 M-F	260	20
MKPN	3960	1330 Dy	556	36
KTN	3960	0000 Dy	1049	144
KYN/KSN	3600	0100/0300 Dy	246	189
KNTN	3775	0200 Dy	145	70
KPON	3960	1800 S	56	12

WB4ZMK made BPL for the fifth consecutive month in Aug. Go show Jim! The Louisville 'fest was a good success in spite

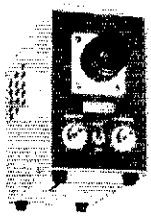


①

We guarantee you'll be satisfied with

the complete line of Robot Slow Scan TV equipment.

②



① MODEL 70 A SSTV MONITOR

Displays amateur standard pictures from any SSTV audio source: station receiver, tape, camera. Six inch (diagonal) display.

Front panel controls for easy station operation. Connectors for receiver, transmitter, microphone, tape, waveform monitor, tuning indicator, and auxiliary demodulated SSTV output for external monitoring.
All solid state except cathode ray tube.

$295

② MODEL 80 A SSTV CAMERA

Generates amateur standard SSTV pictures and fast scan video for viewfinders. Controls for contrast, brightness, vidicon beam, SSTV signal level, black/white reversal, ¼-½-full frame selection.
All solid state except vidicon. All station cabling included; requires suitable C-mount lens.

$295

③ VIEWFINDERS

Choice of 4 inch diagonal (Model 60) or 6.5 inch diagonal (Model 61) display to fit your station.
Displays fast-scan video pictures to simplify setting camera focus and field of view. All solid state except cathode ray tube. Tripod mountable (Model 60 only).

Model 60: **$249**
Model 61: **$239**

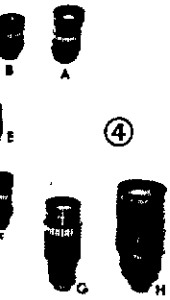
⑤ VIEWING HOOD

Two piece detachable hood. Fits monitor bezel to block outside light.
$25

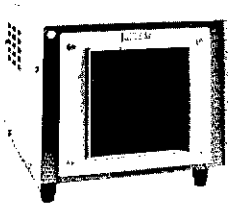
CALIBRATION TAPES

Three inch reel or cassette tape recording aids setting monitors and cameras to SSTV standards.

Cassette **$4** Reel **$3**



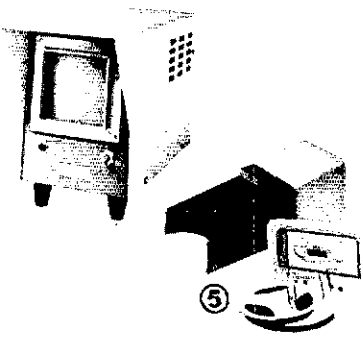
B A E ④ F G H



③

④ LENSES

Lens	Focal Length m m.	Min. f stops (All 22 max)	Min. focus (in inches)	Price
A	12.5	1.9	10	$ 49
B	25	1.9	24	$ 25
E	25	1.4	6	$ 54
F	50	1.9	42	$ 43
G	150	3.2	96	$ 79
H	18-90	2.0	60	$220



⑤

All Robot equipment carries a one-year warranty. Four easy ways to purchase: cash, C.O.D., Master Charge, Bank-Americard.

ROBOT

ROBOT RESEARCH, INC.
7591 Convoy Court
San Diego, California 92111
Phone 714-279-9430

Enclosed $_____ Please send the following equipment via AIR ☐ or SURFACE ☐

_____

_____

_____

Name _____

Call _____

Address _____

City _____

State _____ Zip _____

California residents add 5% sales tax. Prices do not include shipping.

"We have a limited supply of our Model 70's and Model 80's available at a 10% discount. Same full one year warranty as on all Robot equipment."

blistering heat. Good prizes, good food and good hammin', WA4 has a new QTH and equally new antenna system. Owensboro new traffic net on 146.70 simplex. Don't forget the Oct deadline for call letter plates if you're not already reading th Nov. Traffic: K4UNW 212, W4BAZ 204, WB4ZMK 135, WB4 77, WB4ZML 71, W4CID 67, WB4EOR 62, WA4VZZ 51, WA4 48, WB4AUN 42, W4OYI 37, WB4ZDU 22, WB4WCM WA4AVV 18, WA4FAF 18, W4CDA 17, WB4NHO 16, WB4 16, WA4NNZ 11, W4BTA 10, WB4VBG 5, K4AVX 3, W4IQZ 3

MICHIGAN – SCM, Ivory J. Olinghouse, W8ZBT – W8MPD. RMs: W8JYA, W8WVL, W8RTN, K8KMQ, W8C PAMs: W8GVS, W8NDI. VHF PAMs: K8AEM, WA8WVV.

Net	Freq.	Time/Days	QNI	QTC	Sess.	
QMN	3663	2200 Dy	567	358	61	WB
WSBN	3935	2300 Dy	704	98	31	W8
BR/MEN	3930	2130 Dy	762	103	31	W8
OPEN	3920	2130 Dy	622	44	34	WB8
GLETN	3932	0130 Dy	819	162	31	WB8
PON	3955	1500 Dy	982	416	31	K8
PON/CW	3645	2300 M/S	104	9	26	VE3
MI.6M.	50.7	2300 M/S	209	32	26	WA8

The S.W. Michigan WX net reports 73 QNI and 4 drills, K8Z mgr. The 2M nets had 103 QNI and 8 sessions with W8CVQ WA8WVV net controls. Regret to report WA8OWL, K8CSV K8NG as Silent Keys. Correction in July report, UP Net Mgr. sh be WB8IEH and GLETN secy. should be W4PBG. K8MJK has a SB-102, W8BPQ has returned after visiting W3FUS near Baltin Md. WB8IJI has new SB-220 and phone-patch working now, also DX total of 209 worked and 111 confirmed. WB8ITT had DX with his son in PY2-Land. W8JXU says lightning is no good, a vaporized his 40-meter antenna and loading capacitor in his DX- WA8WBZ has a new Tri-Bander. Officers for 1973-'74 for CARS W8CQ, pres.; W8OX, vice-pres.; K8HHY, secy.; W8PSV, treas. is a family of hams – son WN8QOU, fatehr W8QVU, grandmo W8HYO and grandfather W8QGE. W8AZI fed WN8JRK, WN8 and WN8NUE code from a tape all the way to Detroit and bro them back home as Generals. Guess that must be the correct wa do it. Traffic: (Aug.) K8DYI 275, K8KMQ 256, W8GLC K8LNE 178, WB8FBG 114, W8TZZ 91, W8IBX 87, W8IXJ WB8MJI 79, W8OW 78, WB8ITT 77, W8MO 68, W8ZBT K3SJL/8 62, K8JED 58, WA8FXR 53, W8NDI 51, WB8BYB WA8ENW 45, K8LJS 41, WB8DKQ 38, W8GVS 36, WB8DJS WB8NCD 30, WA8OJI 27, WB8HIB 26, WB8KWL 24, W8QWN W8IUC 19, W8VXM 19, WB8HPZ 17, WB8EEU 16, W8HKL WB8FKA 14, WB8IJI 14, W8BPQ 13, K8MJK 13, W8DCN WB8DRT 11, W8UFS 11, K8AEM 10, W8EU 10, WB8GWK K8PYN 10, WA8WVV 10, K8ACO 9, WB8EYM 9, K8GX W8NOH 8, W8OKW 8, W8QBF 8, W8VIZ 8, WB8ANR 6, W8FZ K8SDA 6, K8TIY 6, WB8APN 4, WA8CUP 4, K8WRJ 4, WB8 3, WB8MFG 3, WB8ICN 2, K8JHA 2, WN8ONX 2, WN8ON (July) K8KMQ 320.

OHIO – SCM, William E. Clausen, W8IMI – Asst. SCM: Ken L. Simpson, WA8FTX. SEC: WA8COA. RM: WA8WAK. P K8URK. VHF PAM: WA8ADU. I report with deep sorrow passing of Al Michel, W8WC, Great Lakes Division Director fo past six years. Al's service to the ham radio fraternity will be gre missed.

Net	QNI	QTC	Sess.	Freq.	Time(Z)	
OSSBN	2346	1265	85	3972.5	1530/2100/2345	K8
BN	558	459	62	3577	2345/0300	WA8
O6MtrN	542	87	31	50.16	0200	WA8
ONN	200	171	31	3740	2330	WN8
OSN	158	63	29	3577	2310	WB8
BN RTTY	90	15	31	3605	2300	K8

New appointees: WB8MFD, ORS; WB8HRX, OBS. Renew WA8VKF, OVS; WA8HVR, WB8KKI, ORSs; W8EOG, EC. WA8 is mgr. of the Ohio Post Office Net which meets at 1300Z Sun 3935 and at 1800Z Tue. on 3952.5. The new net directory list Ohio nets, 18 of which are NTS. W8WEG reports that the L Area RC operated a booth at the Allen Co. Fair with RT VHF-FM, SSB and CW gear. K8PBF operated portable and han public service communications at the Van Wert Field Science EC WB8AYM reports the formation of two local nets in the K County area: a ten meter net with WA8TPJ mgr., and a 2-mete net with WA8ONN mgr. Welcome to the Crawford County AR new ARRL affiliate. The Parma RC has started its ham lic classes at Rhodes High School and Columbus ARA has a No class at COSI. The Massillon ARC viewed the film "120 Yea Brasspounding" from the ARRL library, Dec. 7 is the date of Massillon RC Flea Market/Auction at the Amherst Park Shop Center. W8SOU, editor of the Intercity RC (Mansfield) newsle was named "Ham of the Year" by the club. K8ONA's Cleve Plain Dealer column tells of the founding of a new club

Take home this bundle of joy for Christmas

Fill your Christmas Stocking with the exciting family of INOUE 2-meter FM gear!

Make your Christmas bright with the most advanced 2-meter gear around today . . . the all new, super-compact, 67-channel synthesized (with Inoue's unique *Phase Locked Loop System),* **IC-230 for $489 . . .** or the 22-channel **IC-22 for $289** (including 10 xtals) . . . or the 24-channel base/mobile **IC-21** with all the features you'd imagine . . . add on the unique optional rcv VFO for the 21, or the deluxe 3p base power supply for the 22 and 230.

Put a whole lot of Jollies in your Christmas by seeing or writing for the name of your nearby ICOM-INOUE 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

Clip and place in conspicuous place for best XYL results

employees of Gould, Inc. and the club's sponsorship of a Boy
explorer post. W8DSR exhibited antique radio gear from
W8JDV museum at the state fair, sponsored by Cincinnati
Electric. W8UQI and K8CKJ are again teaching code and theo
the Greater Cincinnati ARA. K8CAP spoke to the Cuyahoga
RC on semiconductor theory and WB8KIA escorted the club
visit to the WSLR transmitter. New officers of the Indian Hil
are K8STK, pres.; WB8EHG, vice-pres.; WA8AAV, secy.-treas.
not too soon to start preparing for the Simulated Emergency T
Jan. Traffic: WA8MCR 1368, WO8HIO 381, W8PMJ 309, WA8
290, W8MGA 284, W8ENI 271, W8CUT 269, WB8KXV
W8SUS 231, WA8HGH 230, W8QCU 212, WB8KKI 161, WN8
159, K8MLO 156, WA8WAK 146, WB8JGW 99, WA8VWE
WB8MKZ 91, W8JD 85, WA8DWL 83, WB8ALU 82, WB2FV
75, WB8KZD 64, W8QZK 64, W8OF 47, WA8SED 43, WA8
37, W8BHL 33, WA8ETX 29, W8FGD 28, WA8SSI 27, WB8IB
W8LZE 23, WB8MFD 19, W8MOK 19, W8WEG 18, WB8KWI
WA8UPI 17, W8DCX 15, WA8MHO 15, W8ARW 14, K8RXI
K8HF 12, WB8FIC 11, WB8GGR 10, K8JDI 9, K8CK
WB8AYM 7, WB8OEF 7, WA8DBI 5, WB8MXU 5, WA8MI
WA8FSX 3, K8DHJ 2, K8PBE 2, WA8NOQ 1, WN8OJP 1.

HUDSON DIVISION

EASTERN NEW YORK – SCM, Graham G. Berry, K2SJ
Asst. SCM/PAM: Kenneth Kroth, WB2VJB, SEC: W2URP,
WA2FBI, WB2IXW and K2DN for RTTY. Nets: NYS two
sessions at 0001Z and 0300Z on 3,675 MHz; ESS (10 wpm) da
2300Z on 3,590 MHz; Novice Training Net Tue. 0045Z on 3
MHz. NYSPT&EN daily at 2300Z on 3,925 MHz. Hudson Div
P/R Net 2nd and 4th Sun. at 2200Z on 3,925 MHz open to all
and individuals interested in Public Relations hlep. New app
ments: OPS and ORS to WA2IQO out of Delmar. Westch
County ARFC had a busy summer – handled Walkathon
munications with one central fixed station and a mess of mobi
stations involved WB2AAO, WB2IXW, WB2FNV, WA2
W2GKV, WA2OMT, WA2ROJ, WB2KAF, WB2NLU and WB2V
Later in summer, simulated disaster drill involving 5 hosp
ambulance corps etc. saw WB2FXB as out-point control. K2AV
used for most communications with K2SJO, WA2MCR, WB2
WB2VUK, WA2VKU, K2USB, WA2OMT, WB2NLU, WB2V
WA2ROJ and K2LOZ all helping to earn "well done" from hos
staff members. County EC WA2JWL reports 57 active membe
and still growing! K2DN reports his RTTY net (see above) has a
15 regular members checking in, with about 75 in-and-out sta
showing up now and then. Always welcome new members, he
Communications Club of New Rochelle handled annual City
meet (first started doing the job in 1958!) with WB2NOY, W
and K2JQB at starting line, with officials and at finish. Used 2-m
hand-held fm and report it sure beats loading heavy batteries
small boats as in past years. At Pearl River HS, WB2ABJ re
beam moved and station set up in new quarters elimina
interference from metal working shop near old spot. W2NAD
WA2GQE ran their total NY-NJ 6-meter contacts over 1K on
14. WB2ROJ and WB2SIH were "fox" for Harmonic Hills Hu
Transmitter Hunt Aug. 12. Regret to report their long-time mer
W2VH joined Silent Keys during summer. WA2RAU spent Au
Italy, Yugoslavia, Switzerland and around. Remember the A
National Convention in NYC next July – at the Waldorf on 19
the 21st. Be there to celebrate 50th Birthday of Hudson Divi
Traffic: WA2CNE 215, W2GPH 119, WA2IQO
W2URP/WB2IWE 34, WA2RFP 31, K2SJN 18, WA2HGB
WA2FBI 13, WB2IXW 10, WB2SON 9, WA2EAH 4.

NEW YORK CITY-LONG ISLAND – SCM, Fred J. Bru
K2DGI – Asst. SCM: John Smale, WB2CHY, SEC: K2HTX,
WB2LZN, PAM: WA2UWA, VHF PAM: WB2ROF. The follo
are major AREC/RACES nets; join one!

Bronx	28.64 MHz	50.35 MHz	146.8
Kings	28.64 MHz	50.35 MHz	146.8
Richmond			146.8
New York	29.5 MHz	50.48 MHz	146.8
Queens	29.5 MHz	50.20 MHz	146.8
Nassau	28.72 MHz		145.68
Suffolk(West)	28.73 MHz(Hunt)	50.46 MHz	145.59
	28.65 MHz(Smith)		147.2
Suffolk(East)			147.8

Note: Net times between 2000 and 2100 local, Mon. I trust a
our 4,300 league members in the section filed a letter of commen
the FCC regarding the 220 MHz band question! You didn't?
don't operate VHF! Well, 220 might just be the start and
favorite band might be next! A comment a little late rather
never just might be the one to turn the tide; send it now! F
Washington, D.C. 20554. The Wantagh RC has begun classe

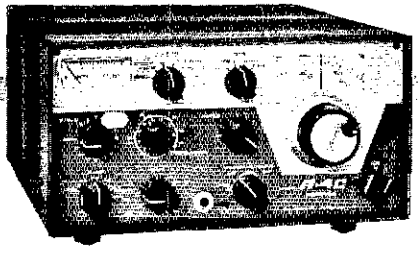
Drake gear keeps getting better and better...

NOW, OUR FINEST... THE NEW

Drake C-Line

NEW FEATURES:

• 1 kHz Dual Concentric Dial Readout • Receiver and transmitter lock together in transceive operation • No side controls • Iridited cadmium-plated chassis • Compatible with all previous Drake lines

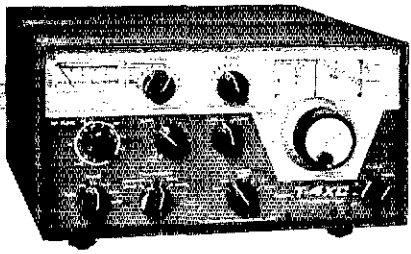


R-4C Receiver

The receiver hams have dreamed of . . .

NEW R-4C FEATURES:

- 8-pole crystal filter combined with passband tuning. SSB filter supplied
- Provision for 15 additional accessory 500 kHz ranges
- Transistorized audio
- Optional high-performance noise blanker
- AVC with 3 selectable time constants
- Optional 8 pole filters available for CW, AM, RTTY
- $499.95



T-4XC Transmitter

The one worthy of the R-4C

NEW T-4XC FEATURES:

- Plug-in relay
- More flexible VOX operation; including separate delay controls for phone and CW
- Crystal control from front panel for amateur, Mars, commercial uses
- Provision for AFSK RTTY operation
- $529.95

See for yourself—at your dealer's.

R. L. DRAKE COMPANY

DRAKE®

540 Richard Street, Miamisburg, Ohio 45342 • Phone (513) 866-2421 • Telex 288-017

Novice and General Class license. Contact Charlie, WB2 516-370-0116 evenings for details. If you are not interested the word, so others may take advantage of the opportunity. I know of other amateur classes being held in the section other the Hall of Science and Wantagh, let me know; many peopl interested in becoming an amateur, but classes are next to nor such a large population area. Even if it is for a local school di the information is vital to me so I may help others in their ef LIMARC held its annual mobile clinic again in Aug. with much given to our many fm mobileers to get them on frequency deviation adjusted. Radio Club of America will have K7UC guest speaker at its Nov. 16 meeting. Contact W2PF for tic K2JFE is back on fm with Swan FM-2x. WB2FIG visited ARR on way to Burlington Hamfest. Help is needed from higher licensees to support the NLS Net. Novices need help and guic to get ahead on the right foot. They need the help that yo when you first started! WA2BRF learned a lesson from re summer blackouts; now has a battery powered fm rig for AE RACES net use! WA2LJS sporting new fm mobile gear. W2 moved to Van Nuys, in W6-land. Election results: Radio Socie Greater Brooklyn -- WB2FIG, pres.; WB2JSJ, vice-p WA6HGC/2, secy. WA2THV will be operating /8 from co (W8EDU). The Larkfield RC held a successful Auction in Sept. RTTY repeater WB2ZWR in Hempstead is in operation acce standard for autostart operation, with no pictures allowed, a t makes sure of it! W2JUP, W2JIA and K2DGI are control sta and should be contacted for information. Frequ 147.87-147.27. This repeater is the basis for an RTTY Net fo section, RTTY enthusiasts contact K2DGI in the West and W2 in the East for participation in this needed project. Traffic: W 184, WB2OYV 160, WB2LZN 122, WB2LGA 87, WB2CHY K2VGD 13, WB2FIG 10, K2JFE 8, WB2BYY 6, W2PF 6, W2 4, WA2PUJ 1. (July) K2VGD 21.

NORTHERN NEW JERSEY SCM, John M. Cro WA2UOO – SEC: K2KDQ. RM: W2ZEP. PAMs: K2KDQ WA2VFH.

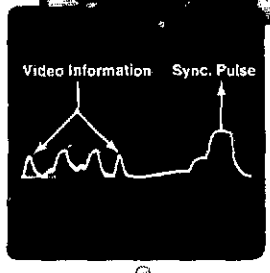
Net	*kHzTime(PM)/Days*	*Sess.*	*QNI*	*Tfc.*	
NJN	3695 7:00 Dy	31	472	207	W2
NJN	3695 10:00 Dy	31	274	71	W2
NJSN	3730 8:15 Dy	25	103	50	WA2
NJPN	3950 6:00 M-S	31	507	176	WA2
NJPON	3930 6:00 Su	4	69	17	WB2

New appointments: K2EK and W2DYS as OOs, Classes III and K2AGZ and WB2TFH upgraded to Classes I and II thr participation in recent EMTs. WA2QNT appointed ORS. End ments: W2NKD as EC for Union County; WA2CAK as WA2SHT and WB2JVN both passed the Advanced Class ex Congratulations, EC WB2HSD reports the Edison AREC will ha net on 29.0 MHz at 0000Z. All local amateurs are urged to WB2PQG has moved to a new QTH in Hopatcong. WB2N received his cw WAS certificate. WN2HSG is busy taking NCS NJSN. W2NKD is performing liaison between RACES and MA W2ZEP spent much of the month of Aug. vacationing in A K2EFA managed NJN during his absence. W2CU is experimen with a new 80-meter antenna to replace his wet wire. W2DY building a frequency counter to enhance his new OO du WA2SRQ is nearing completion of a contest machine of his design. Congratulations to WB2RKK for graduating from Pu with a BSEE. WA2EXX reports his main activity to be tra handling. W2CVW recently visited the Marconi transmitting sig Mass. He kept touch with his NJN buddies with his Ten-Te watter and a wire in his motel room. WBØJMS/2 and many ot report enjoying the New Jersey QSO Party. W2WOJ back in swing of things on NJN. Among those reported returning to col this fall are WB2AEH, WB2FEH, WA2FVH, WB2NOM, WA2Q WB2VPR, WA2EUX and WBØJMS/2. The present roster of includes WB2AEH, Holmdel; WA2CCF, Englewood; WB2CST, Lawa; WA2DNU, Glen Rock; K2DQT, Belleville; WA2E Waldwick; WA2FUI, Bayonne; WB2HSD, Edison; K2KDQ, Pas WA2OKX, Rahway; WA2SOQ, North Arlington and vicinity. If are not presently an AREC member contact any of the abov SEC! K2KDQ for more information. OO reports received f K2AGZ, W2TPJ, W2DYS and WB2TFH. Please make this colu by sending your station activity reports to me each month. others know what you are doing. Traffic: (Aug.) WB2CST WA2EXX/2 148, WA2CNE/2 134, WA2SHT 114, WB2NOM 1 WB2AEH 87, WB2FWW 75, WA2UOO 41, WBØJMS/2 36, W2C 30, W3CU 28, W2ZEP 28, WA2CCF 27, WB2RKK 27, WA2BSU WN2HSG 19, WB2RJJ 16, WA2OPY 15, WA2QJU 13, WA2S 12, K2ZFI 10, W2DYS 2. (July) WA2DWB 11, WN2HSG 5

2nd generation slo-scan system

Venus slo-scan TV monitor

Actual untouched 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

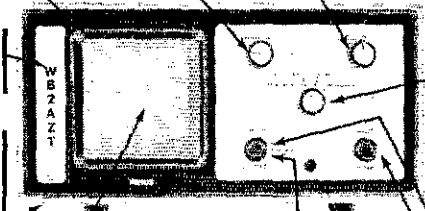
BRIGHTNESS Automatic CRT Burn Protection

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 x5½"Ht.



Amat. Net $349.00

OPTIMUM PICTURE 3¼" x 3⅛" for POLAROID LAND reproduction

TILT STAND Collapsible Rail

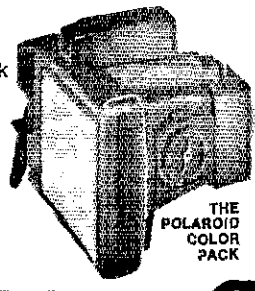
RE-SCAN Retrace Vertical

VIDEO/VOICE SELECT

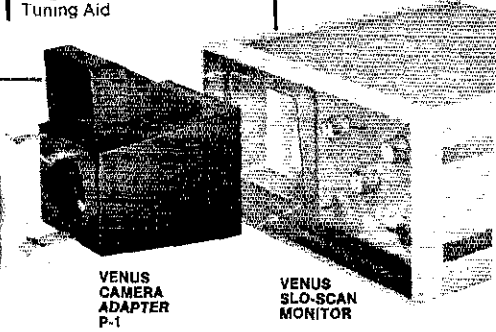
ACCU SYNC© Diagnostic and Tuning Aid

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**

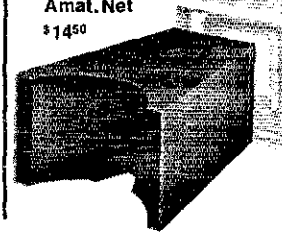
TG *Grey Scale Generator* **Amat. Net $6.50**

TC *Checkerboard* **Amat. Net $6.50**

V1 VIEWING HOOD

Uniquely designed for wide angle viewing by more than one operator.

Amat. Net $14.50

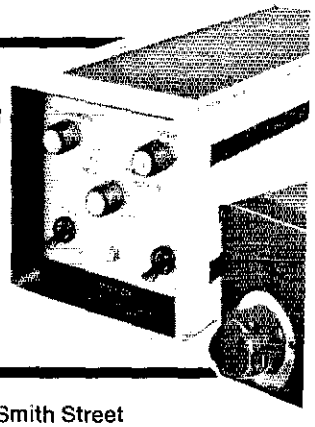


Coming in December

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

MIDWEST DIVISION

IOWA – SCM, Al Culbert, KØYVU – SEC: KØCLL. The big n this month had to be THE PICNIC, which drew 485 people, v even the cw types from Tallcorn were there with Mr. CW, KØ passing out net certificates; for a 75-meter picnic, there sure wer awful lot of 2-meter whips on those cars. The MCeeing wa course by KØLVB who was at his usual best. Congratulation WBØDOH on his graduation from UNI and his subsequent admis to law school. New officers of the Red Rock Radio Amateur A and Key Assn. in the Knoxville area WØMHK, pres.; WØUI vice-pres.; WBØCST, secy.-treas. All the comments from the who have been participating in the "CB" watch run about the sa "what a mess", "fantastic"; say, did YOU write the FCC? sponsors of VHF repeaters within the section have formed Repeater Council and have elected the following officers: KØVC pres.; WØFTM, vice-pres.; WAØNNR, secy. WBØDGF bou WAØKMC's SB-101 and intends to operate some while attend ISU. WAØVZG and WAØVZH have received their DXCC certifica numbered 6597 and 6598, now that is togetherness!

Net	*QTC*	*Q*
Iowa 75 meter (noon)	1440	
Iowa 75 meter (eve)	889	
Tallcorn (cw)	165	

Traffic: (Aug.)KØDDA 243, KØAZJ 149, WAØAUX WA3PWL/Ø 109, WAØTAQ 81, WØLCX 73, WBØDBG 45, WAØV 35, WAØZVF 35, WØWSV 37, WØMOO 30, WØJPJ 24, WBØFEW KØJGI 7, WBØDGF 4. (July) WØMOQ 26.

KANSAS – SCM, Robert M. Summers, KØBXF – SEC: KØJM RM: KØMRI. PAMs: WØGCJ, WBØBCL. VHF PAM: WAØTRO. Aug. 31, KØHIC became a Silent Key. Our sincere sympathy to family. Net reports for Aug.: KWN 31 sessions, QNI 435, QTC 1 QKS 62 sessions, QNI 570, QTC 303. OKS SS 31 sessions, QNI 2 QTC 243. Mid States Mobile Monitor Service QNI 1573 serving mobiles, handling 71 QTC and 50 phone calls and or patch WBØBCL reports activity down somewhat as compared against t time last year. KPN QNI 182, QTC 18, sessions 16. KSSBN Q 779, QTC 98, sessions 27. WØPB appointed to the New Emergen Communications Advisory Committee. Salina ARC will have a sne look at instant Oscar location during the 25th annual Watermel feed – WØCY host, during the month of Oct. South Kansas Assn. had a nice display at the recent Wichita Hamfest. WØS suffered large loss at his QTH in a recent fire. The Wichita ARC now sponsoring an Explorer Post No. 599. I know of one other Po in Holton – are there others? Repeater calls are becoming the n thing to be heard these days. Better keep up with the information the League gang to keep net directories up-to-date, etc. Traffi WNØJEJ 502, WNØHTR 381, WNØITF 360, WBØGVR 2 WØOYH 191, WNØIIQ 187, WØHI 161, WBØHBM 143, WØFIR 13 KØMRI 134, KØBXF 117, WØCHJ 100, WØOF 56, WNØHTH WBØCZR 51, KØJMF 46, WØGCJ 31, WNØHZZ 29, WNØGQL 2 WØPB 24, WBØCUY 19, WØRBO 19, KØYTA 19, WØMA WAØOWH 12, WNØTAS 6, WØEDJ 4, WNØKWI 4, WØNYG 2.

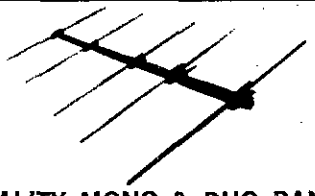
MISSOURI – SCM, Larry S. Phillips, KØVVH – Asst. SC Clifford F. Chamney, KØBIX, SEC: KØBIX. New appointment KØBIX as SEC and PAM; WAØDKS as EC/OPS; WAØFKD OPS/ORS; WBØFND, WAØOIA, WAØKDE, KØVVH, OPS WAØKUH, KØPCK, KØRPH, KØWKC, WBØBSQ, PCs; WA1RLU ORS. Appointments renewed: KØDEQ, WØGBJ as ORSs.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mg*
MOSSB	3963	2300 M-S	27	1029	105	KØPC
MOPON	3963	2200 M-S	26	722	90	WAØTA
HBN	7280	1705 M-F	23	323	29	WØGQ
MEN	3963	2230 MWF	14	260	18	WØNU
MON	3588	0000 Dy	31	197	151	WØB
WEN	28.6	0130 M	4	190	4	WA5KBH/
MON2	3583	0245 Dy	31	139	109	WØB
PHD	50.45	0130 T	4	80	11	WAØKU
MOAREC	3963	2245 M	4	60	1	KØBJ

Congratulations to KØBIX on appointment as SEC. Many thanks KØHNE on the fine job he did as SEC. Congratulations to WØG on receiving his 40 year pin and also for his 44th consecutive year ORS. The Kansas City Assn. for The Blind Amateur Radio Clu invites all to attend their monthly meetings held on the first Sun. every month at 1844 Broadway in Kansas City, Mo. With de regret I report KØRWV as a Silent Key. WBØDAS is looking f contacts on 6 meters from Moberly. KØLCB will be holding Novi classes in Independence. WBØCWA will be operating in Greece fro SVØWY, look for him on 20 meters. Anyone interested in an EC j contact KØBLX. Traffic: KØONK 1184, KØBIX 281, WØBV 22 WØOUD 93, WAØEMD 91, KØVVH 65, WAØFKD 51, WAØTAA 4

WILSON ELECTRONICS

W7GVA designed MONO & DUO BAND BEAMS



QUALITY MONO & DUO BAND BEAMS AT LOW PRICES

Wilson Electronics offer a complete line of Mono & Duo Band Beams. With our purchasing power on large quantities of aluminum and low overhead, we can give you a rugged heavy duty top quality beam for a much lower price than any other manufacturer.

NEW IMPROVED WIDE SPACED 40, 20, 15 & 10 METER BEAMS

All W7GVA beam elements are constructed of the finest aluminum available, 6063T832 and 6061-T6 both top quality alloys.

All Wilson Electronics beams have a 3" O.D. boom made of top grade aluminum 6063-T6.

All our beams come complete with adjustable reactance tuned gamma match network which can handle 4 KW plus on CW and SSB.

WILSON MONO BAND BEAMS

Model No.		
M340	3 ELE. 40 METER BEAM (full size)	$420.00
	Boom length 38.5 ft. 3" OD .200 wall to .065. (w/re-enforcing kit)	$498.75
M240	2 ELE. 40 METER BEAM (full size)	$225.75
	Boom length 16 ft. 3" OD .065 wall. (w/re-enforcing kit)	$278.25
M720	7 ELE. 20 METER BEAM	$409.45
	Boom length 58.5 ft. 3" OD .200 wall to .065 wall. (w/re-enforcing kit)	$431.55
M620	6 ELE. 20 METER BEAM	$314.95
	Boom length 50 ft. 3" OD .200 wall to .065 wall. (w/re-enforcing kit)	$333.90
M520	5 ELE. 20 METER BEAM	$178.45
	Boom length 40 ft. 3" OD .065 wall. (w/re-enforcing kit)	$194.25
M420	4 ELE. 20 METER BEAM	$146.95
	Boom length 30 ft. 3" OD .065 wall. (w/re-enforcing kit)	$159.60
M320	3 ELE. 20 METER BEAM	$ 99.95
	Boom length 20 ft. 3" OD .050 wall. (w/re-enforcing kit)	$108.95
M715	7 ELE. 15 METER BEAM — — Boom length 40 ft. 3" OD .065 wall	$224.95
M615	6 ELE. 15 METER BEAM — — Boom length 32 ft. 3" OD .065 wall	$146.95
M415	4 ELE. 15 METER BEAM — — Boom length 20 ft. 3" OD .065 wall	$ 94.45
M810	8 ELE. 10 METER BEAM — — Boom length 40 ft. 3" OD .065 wall	$178.45
M510	5 ELE. 10 METER BEAM — — Boom length 20 ft. 3" OD .065 wall	$ 94.45

WILSON DUO BAND BEAMS

DB62	6 ELE. 20 & 2 ELE. 40 INTERLACED BEAM	$498.75
	Boom length 50 ft. 3" OD .200 wall to .065 wall. (w/re-enforcing kit)	$570.15
DB52	5 ELE. 20 & 2 ELE. 40 INTERLACED BEAM	$393.75
	Boom length 40 ft. 3" OD .200 wall to .065 wall. w/re-enforcing kit)	$460.95
DB54	5 ELE. 20 & 4 ELE. 15 INTERLACED BEAM	$241.45
	Boom length 40 ft. 3"OD .065 wall. (w/re-enforcing kit)	$257.25
DB43	4 ELE. 20 & 3 ELE. 15 INTERLACED BEAM	$188.95
	Boom length 30 ft. 3"OD .065 wall. (w/re-enforcing kit)	$201.60
DB32	3 ELE. 20 & 2 ELE. 15 INTERLACED BEAM	$115.45
	Boom length 20 ft. 3" OD .050 wall. (w/re-enforcing kit)	$124.95
DB76	7 ELE. 15 & 6 ELE. 10 INTERLACED BEAM	$251.95
	Boom length 40 ft. 3" OD .065 wall.	
DB65	6 ELE. 15 & 5 ELE. 10 INTERLACED BEAM	$230.95
	Boom length 32 ft. 3" OD .065 wall.	
DB44	4 ELE. 15 & 3 ELE. 10 INTERLACED BEAM	$115.45
	Boom length 20 ft. 3" OD .065 wall	

NEW NOW AVAILABLE

DB67	7 ELE. 20 6 ELE. 15 $551.25; (w/re-enforcing kit)	$572.25
M52046	5 ELE. 20 on an extra heavy duty 46' boom. (includes re-enforced element)	$288.75

If not available from your dealer write direct to factory for catalog or information and fast service. All prices F.O.B. factory. Wilson beams are available at the following dealers:

HENRY RADIO STORES	LOS ANGELES, CALIFORNIA
AMATEUR ELECTRONIC SUPPLY	MILWAUKEE, WISCONSIN
HAM RADIO OUTLET	BURLINGAME, CALIFORNIA
HARRISON RADIO	LONG ISLAND, NEW YORK

WILSON ELECTRONICS

P. O. BOX 116 (702) 451-5791 PITTMAN, NEVADA 89044

W0GGR 38, WB0CKJ 35, K0PCK 29, W0EPI 27, W0RTW WW0GBJ 21, WB0FQM 19, WA0YNC 17, K0JTR 16, WA0KUE K0SGJ 13.

NEBRASKA – SCM, V.A. Cashon, K0OAL – Asst. SCM: Ve Sayer, WA0GHZ. SEC: K0ODF. Appointment: W0VYX as C Endorsements: WA0s DHU, JKN, UGC, SOP and W0YFR as I WA0s PSN, RFT and W0YFR OPSs; WA0HWR ORS; K0HNT W0YFR OBSs.

Net	Freq.	GMT/Days	QNI	QTC	
NEB	3700	0000/0245 Dy	30	0	WA0C
NSN I	3982	0030 Dy	2049	20	WA0L
NMN	3982	1230 Dy	1259	28	WA0.
WNN	3950	1300 M-S	489	10	W0I
AREC	3982	1330 Su	165	6	W0I
CHN	3980	1730 Dy	761	10	WA0C
SHN	3950	1830 M-S	225	11	W0I
NSN II	3982	2330 Dy	1822	23	WA0L

WT0NEB in operation at State Fair. WN0LFF new ham in Cr W0LC'E has 60-ft. tower up with inverted V for 75 meters. WA0. has 2 meters installed on motorcycle. W0AP on raft expedit down Niobrara River passed position reports to Storm N W7PQM/0 reports in Nebr. nets from Columbus. W0LRK W0ERM reporting into Nebr. nets. WA0JBJ operates from Way WB0RSK from Shelton and WA0AAN from Coleridge. WA0DCI Swan 500C again perking. Lancaster 2-meter AREC net QNI QTC 11. Speedy recovery wishes to K0UWK. Traffic: (A WA0CBJ 34, W0HOP 29, W0SGA 28, W0AFG 24, W0HTA W0FOR 17, WA0PCC 14, W0JDJ 12, W0NIK 10, W0POP W0DMY 8, K0HNT 8, K0OAL 8, K0AMY 6, W0DJO 5, W0GEC W0HBS 4, WB0INO 4, WA0JIH 4, K0MUF 4, W0VYX 4, W0RJA W0GKK 2, WA0HQQ 2, WA0OQX 2, K0PTK 2, K0SFA WA0YGZ 2, W0ATU 1, WA0JUF 1, K0ODF 1. (July) WA0JIH 8

NEW ENGLAND DIVISION

CONNECTICUT – SCM, John McNassor, W1GVT – S W1HHR. RM: K1EIR. PAM: K1YGS. VHF PAM: K1SXF.

Net	Freq.	Time/Days	Sess.	QNI	Q
CN	3640	1900 Dy 2200	62	549	
CPN	3965	1800 M-S 1000 Su	31	593	
VHF 2	145.98	2200 M-S	23	89	
VHF 6	50.6	2100 M-S	23	88	

High QNI: CN – W1BYW, K1EIR, W1CTI and W1KV. CPN WA1IJR, W1NQO, WA1OPB and WA1PHF. W1HHR suggested clubs offer their services for Goblin Patrols. Please send him a rep so your area will get due credit for your efforts. Director W1 urges all amateurs to support the ARRL position to assure retent of all amateur privileges in the entire 220 MHz band – please info FCC of your feelings! The event of the month was the AR Convention in Hyannis! W1EJI returned from hospital. K1M active at Brooklyn Fair. WA1PHF has new FTDX-500. WA1I working much DX. WA1NLD has new SB-650 frequency displ K1HTV host for Conn. Wireless Assn. meeting. W1VH has compl report on Conn. QSO Party via Candlewood ARA. Norwalk A holding Novice course. Congratulations to: WA1QZH high score Conn. QSO Party; WA1PHJ for Aug. BPL; WA1OPB and WA1P for 100% QNI CPN Aug.! Board Meeting Quote: "every eff should be made to convince FCC of the continuing need for the 220 - 225 MHz Band." NOW is the time for action – individually a club or both. Please do your part. The Aug. issue of QST can full information on this. We hope you have already filed y comments. Traffic: (Aug.) WA1PHJ 231, WA1GFH 146, W1C 142, WIMPW 131, WA1QZH 125, WA1NLD 122, WA1PHF 1 WA1LIR 101, W1EJI 81, W1AW 71, W1KV 63, K1SXF 55, W1G 48, K1YGS 46, WA1RZC 38, WA1IKN 37, WA1HYN 32, WA1M 30, WA1OPB 21, K1MUJ 20, W1QV 13, WA1OUI 11, W1CUI W1BDI 1. (July) W1EJI 170.

EASTERN MASSACHUSETTS – SCM, Frank L. Baker, W1A – SEC W1AOG received reports from ECs: WA1s QEK, DXI; W BAB, UJF; K1s NFW, UAQ, ZUP, CCW. W1GDP is a Silent K W1TPB made WAS and has a new SA5 beam. W1DOM ha "Unique Wire Tuner" which has cured his B.C. QRM. W1AQE all but one USA County. VK4JP visited W1DFS. WA1LEH new Waltham. W1KX moved to Plymouth. K1WKS in hospital 2½ wee T-9 Club met at W1IB's. K1MVT doing a lot of traveling in his j W1MYF retired and has SB-102 and SB-610, a 40-ft. tower beam, having a ball. WA1OWQ busy with RTTY and wor K1CUW. WA1PGY built a WB4VVF Accu-Keyer. WA1M attending U. Mass at Amherst. WA1IGL is mgr. VTSSB. WA1DJ in Wilkes Barre, Pa. WA1RFF has TR-2200 on 2-meter WN1RJW has an SB-401 and a new house in E. Bridgewater. K1Y

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.

- The human voice is a "raspy" signal with high peaks and long, low valleys. If used to modulate an SSB transmitter directly, the low power of the valleys limits the average power output to 12-15% of the transmitter's PEP rating. Operating above this level, the peaks overdrive the transmitter, cause band splatter and poor quality.
- MAGNUM SIX is the first successful RF speech clipper available. Installed in the IF strip, it "mows" the peaks and discards the clipping harmonics without distorting the voice. This allows the level of the valleys (the average power) to be raised up to 6 db. Astounding signal strength improvements — 1 to 1.5 "S" units — have been reported! Some have even reported improved voice quality!!! The ARRL handbook confirms that RF speech clipping is clearly the best way to increase SSB talk power.
- MAGNUM SIX operates like a "time scavenger". Average power is increased merely by causing transmission to occur at slightly below, but never over, rated values more of the time. By increasing the duty cycle, MAGNUM SIX pushes the average output from 12-15% PEP "way up" to 50-60% PEP. Operationally this is impressive because of the clean 6 db signal strength improvement. Equipment-wise this is roughly equivalent to operating at continuous AM, or a little below continuous keyed CW ratings. Tube lives are thus not shortened below rated values. On the other hand, they'll no longer be "loafing" on SSB either. So why not

PUT YOUR TRANSMITTER TO WORK FOR THE FIRST TIME IN ITS LIFE. A MAGNUM SIX CAN ADD MORE POWER TO YOUR STATION PER $ THAN ANY OTHER DEVICE: LINEAR, ANTENNA OR OTHER SPEECH PROCESSOR.

Brochure available on request. Dealer inquiries invited.

Communication Technology Group
31218 Pacific Highway South
Federal Way, Washington 98002

A Division of Bitcil Systems Inc.

also bought a house. WN1RIM has an Alliex AX-190. W1PEX r
BPL. WA1IFE worked WA9POK on 6. WA1NXY, WIA
W1UAX. WA1PBU checked into the EM2MN. K1YCN is editor
the Interstate Repeater Society Newsletter, and is a new O
WA1DFL finally worked So. Dakota on 6. W1QYY had a very
picnic at his QTH for the EMRI and IRN, with a good cro
present; thank you Tom from all of us. W1ALP and WIBIO
cleaning out for the move to Halifax, Mass.! W1GLF, WI
WA1GAJ have retired. W1KVO is home from hospital. Massa
ARA boys working on auction. WN1ROG waiting for his Gen
Class license. New appointments: W1EIH as OO. WA1OML
ORS/OPS. Appointments endorsed: W1ALT, W1LE as E
WA1FNM, W1PEX OPSs; K1BUF, WA1MYK ORSs. WA1CI
WA1KRI. K1NUN, WA1MLO have been giving code and the
classes to The Explorers, all members of the Middlesex At
Capeway RC met at K1BUR's QTH in Hancock, NH. W1EAU
been in hospital. W1SZB is moving to Nova Scotia. Army MA
held a picnic in Natick. This section was well represented at
annual get-together of the Central New England Net at Saund
Bay in NH; a good time had by all.

Net	Freq.	Time/Days	QNI	QTC	Mg
EM2MN	145.8	2000 M-F	94	135	WA1OV
NEEPN	3945	0830 Su	69	6	K1E
EMN	3660	1900/ 2300 Dy	357	183	WA1M

High QNIs in the EMN: WA1s MSK, MXV, OML, NRT, OA
WICE. W1BVI. built a T.P.T.G. transmitter using a UV-211,
watts and worked W8AQ in Maine and Ohio. New hams: WN1s SJ
SJD, SIV, SIW, SJG, SJE, SJF, SIX, SJK, SJH, SJA; WA1s SJ
SJR, SIR, SIG, SHI. Traffic: (Aug.) W1PEX 666, WA1MSK 36
WA1OWQ 181, W1OJM 155, WN1RFD 150, WA1MXV 13
WN1ROG 123, WA1PGY 102, WA1MYK 100, WICE 98, WA1IC
67, W1UX 56, WA1DJC/3 44, WA1DXT 40, W1ABC 29, WA1EY
6, WA1RFF 4. K1UIW 2. (July) W1OJM 172, W1EMG 104, W1U
78, WN1RIM 61, WA1MYK 31.

NEW HAMPSHIRE – SCM, Robert C. Mitchell, W1SWX – SE
K1RSC. RM: W1UBG. New hams: WN1SJJ, WN1SIN, WN1SH
The wandering Gypsy WA1JTM swapped his KG6JBS for KL7HR
When reporting highway accidents W1BYS/K1TXC finds t
W1ALE repeater very helpful. K1ACL has a PE7SW for emergen
power. W1RCC will be operating from Fla. this winter. W1EV
busy on the new DIRN. Welcome W1EUJ as new OVS. WA1JS
reports hams at the tracking station are forming the Granite Sta
Amateur Radio Assn. Radio Club. WN1QNK active on 7149 nee
Kans., Ga., SC, KL7, KH6 and the W7s for WAS. W1EUJ work
NJ, NY, RI, Conn., and Va. on 220 MHz. K4NEH now WA1SCF
Amherst with an NCX-5, MK-II, Clegg Thor 6 and homebrew sol
state 2-meter fm rig. Vern is NCS for DIRN on Thur. WA1JS
vacationed in WI-,2-,3-,4-,5- and 8-Land with 2-meter fm fu
K1PQV and XYL enjoyed an excellent clam, lobster and fish bal
at W1QYY recent EMRI meeting. Welcome back K1PQV as ORS f
another yearly endorsement. Anyone interested in the Daytin
First Region Net should contact WB2CHO/1 on 3930 at 2000
Happy Thanksgiving to all. Traffic: K1YMH 117, WA1MXT 6
K1PQV 33, WA1SCF 17, W1EVN 7, K1ACL 5, W1BYS 5, W1SW
4, WA1JSD 1.

RHODE ISLAND – SCM, John F. Johnson, K1AAV – Ne
Generals in R.I. are WA1POJ and WA1RFT. New Techs. WA1s SG
and SHS. New Novices WN1s SGX, SID and SHZ. WA1POJ has
new Tempo one transceiver plus a 1550 keyer. WA1RFT will
leaving for Univ. of R.I. and hopes to do some hamming for t
school. Now that the summer is over and fall activities begin se
your activities to the SCM for OST. RISN reports 21 sessions, 1
QNI, 29 traffic. Traffic: WA1POJ 113, WN1QAW 63, WA1RFT 2
(July). WN1QAW 31, WN1RFT 16.

VERMONT – SCM, James H. Viele, W1BRG – SEC: W1VSA

Net	Freq.	Time(Z)/Day	QNI	QTC	Mg
VTSB	3909	2300 M-S 1230 Su	496	134	WA1IG
VTPO	3909	2300 Su			K1BQ
Carrier	3935	1400 M-S	220	10	W2DS
Green Mt	3932	2200 M-S			W1JI
Vt. Phone	3932	1330 Su			W1KK

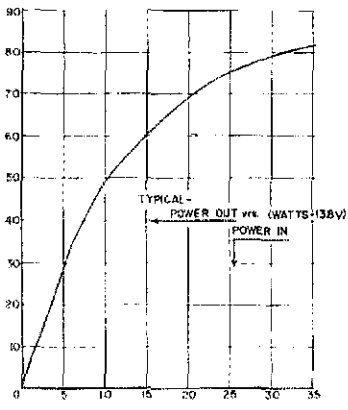
Welcome new amateurs WA1SHV, WA1SIS and WA1SJO. Ne
officers of VTSB Net are WA1IGL, mgr.; W1GFD, asst.; WA1NJ
sec.-treas. Old time Burlingtonian, Cedric Justis, now W3EEB/
vacationed and operated from Willoughby Lake. International Fie
Day in Charlotte was a big success again this year. We sure miss o
good and long-time friend Zip your Zipper. Traffic: W3EEB/1

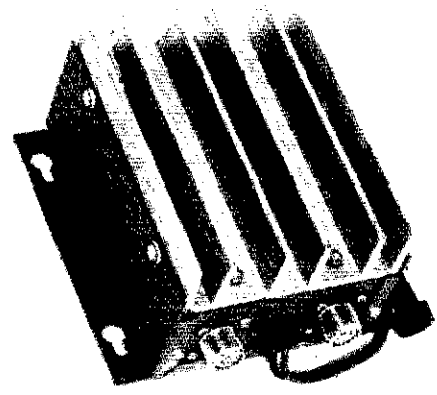
WESTERN MASSACHUSETTS – SCM, Percy C. Noble, W1BV
SEC: WA1DNB, CW RM: W1DVW, 75 Meter PAM: WA1IT
DHF/VHF PAM: W1KZS. Active in connection with the We

DYCOMM SUPER D 80 WATT KIT

DYCOMM OFFERS YOU THE BEST DEAL EVER
FOR A 2M FM (or Oscar CW) AMPLIFIER.

ONLY **$49.95** SAVE $60–$100.00





THE LIST PRICE OF THE TRANSISTORS IS MORE THAN TWO (2) TIMES THE PRICE OF THIS SUPER D KIT!!!

We use a pair of 2N6084 Transistors (each one rated 40 W Infinite VSWR) featuring EMITTER BALLASTED construction and of first Quality, so you can't burn them out in tuning or under any load mis-match; each Transistor has been individually Hand tested at DYCOMM before shipment.

Typical assembly time is 5 hours. Kit is complete with full assembly procedure, including lay-out Photos, and Manual.

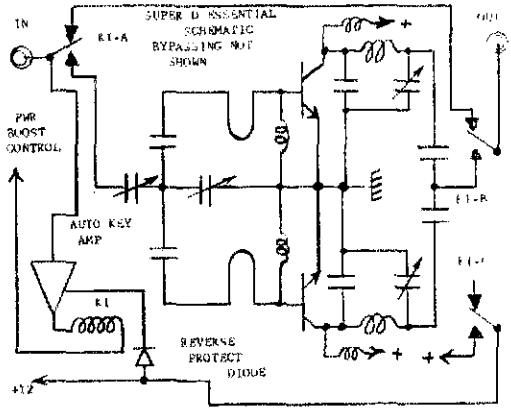
Tune-up and alignment is easy and straight forward using a watt-meter, dummy load and VOM.

Kit includes: 6' control wire, 6' power cables (fused), 4' RG58 to make interconnect cable, 2 PL 259 connectors, and all other parts required for this PROFESSIONAL $150.00 Amplifier.

SUPER D SPECIFICATIONS:
Frequency range: 140-150 MHz. Power output: 80W MAX for MAX input of 35W. Input/output Z: 50 ohms. Input VSWR 1:3:1 Max. Load VSWR: Infinite. Power required: 11-15 VDC @ .6 to 7A. Weight: 2 Lbs. Dimensions: 3" x 5" x 6". Operating modes: CW/FM.

SUPER D FEATURES

Basic design proven in thousands of D's
Operates with ANY 2-35W Rig
Reverse Voltage Protected
Load VSWR Proof — 80db Spurious Outputs
Dashboard control available
Fully automatic operation on command
5 MHz Bandwidth, 140-150 MHz
Harmonics: At least 40 db down
Rx insertion loss less than .5 DB



Prices: KIT $49.95; Wired and Tested $149.95. Residents of Florida add 4% sales tax, shipping (UPS where possible) included. For Airmail add $2.00. Foreign-add postage extra. EXTRA TRANSISTORS $20.50 each (1/3 off list). All parts are guaranteed and if a defective part should be found it will be replaced free within 30 days of shipment. Quantities Limited. First come — First served; this Special offer ends January 10, 1974. Send check or money order to DYCOMM, 948 Ave. E., P.O. Box 10116, Riviera Beach, Florida, 33404. (305-844-1323)

Stockbridge tornado were: ton 2 meters and 2-meter fm – K1F WA1HSO, WA1IQJ, WA1KFN, W1KSD, W1KZS, WA1L WA1MVP, WA1PGP, WA1QDO, WA1QGW. WA1RFA and Pitts CD. WA1DNB activated WMEN – with liaison with the 2-m group, WA1MJE flew over the scene and gave detailed repor WMEN. Details in the Public Service Diary this issue. WMEN h Sun. sessions with QNI of 63 (NCS WA1ITL and WA1DNB). W held 31 sessions, QNI 125, traffic 96, Top 5 in attendance: W1B WA1LNF, W1TM, W1KK, WA1QON. WMPN held 22 sessions, 203, traffic 16, NCS W1OJA, W1BBI, WB2IQQ, K1ZOC, WA1 K1PKZ. (WMPN June, 21 sessions, QNI 156, traffic 20). At EM-RI 1RN picnic at QTH of W1OYY, West. Mass. was represe by W1JH, WA1LNF, WA1LPJ, WA1MUH, W1TM, W1B CMARA reports WN1OPN now WA1OPN. HCRA says W1HDQ guest speaker on "DXing without Sunspots." The club agai running classes at the Boys' Club. Mt. Tom RA says 2-meter h furnished communication at the Kiwanis July 4th fireworks Burlington, Vt. International Field Day, WM was represented W1AEL, K1FNA, WA1SCT, K1TGS, WA1JHK, WA1I WA1FCM speaker of the month. Others were WA1BWF, W1A W1GNF. They list 16 emergency reports by their members! V of Lincoln reports W1DVW alerted the group to an emerge situation in Tolland, Conn. A comm. center was soon set up t by WA1ORT, WA1PLS, W1CSF. Traffic: (Aug.) W1TM WA1KHP 111, W1BVR 106, WA1LNF 101, W1KK 26, W1DVW WA1OUZ 4, WA1QON 4, W1STR 4. (June) WN1QHR 10.

NORTHWESTERN DIVISION

ALASKA – SCM, Roy Davie, KL7CUK – A hamfest between the Fairbanks Club and the Anchorage Club at Talke Aug. 18 and 19 had a very good turnout with some coming f Calif. The guest of honor Dir. Northwestern Division W7PGY ga very good talk. Those attending had an opportunity to meet visi celebrities from the TV show "Gunsmoke." A trip of consider interest was made to the Earth Satellite station near Talkee Thanks to all who helped put the hamfest across. Your SCM went Kodiak for the purpose of coordinating and appointing sev stations to positions in the leadership of this section. KL7HF our new SEC. Please keep the reports coming. Trips are planned Southeastern and Fairbanks very soon. Traffic: (July) KL7HMU KL7HER 9, KL7CFX 7. (June) KL7HMU 14.

IDAHO – SCM, Donald A. Crisp, W7ZNN – The Magic Va Chapter – Idaho Society of Radio Amateurs is now officially ARRL affiliate with W7BMS as pres. WA7BDD is moving fr Hayden Lake to Spokane. Your SCM, W7ZNN, has moved to a QTH in Pullman, Wash. The League By-Laws require the SCM to within the section that he represents so a new SCM must be elec for the Idaho Section. Nominations of qualified amateurs for office of SCM for the Idaho section is needed. See page 106 of April issue of QST for details. FARM Net report: 1349 check-59 traffic, 31 sessions, Idaho P.O. Net report: 13 sessions, check-ins, 8 traffic. Traffic: W7GHT 163, WA7BDD 102, W7ZN W7IY 8.

MONTANA – SCM, Harry A. Roylance, W7RZY – Asst. SC Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA7I WA7HDD is the new mgr. of the Montana Post Office Net. WA7 has given up the post after several years of directing the Congratulations to both. WA7OBH has his antennas up and is in operation. WA7NWP busy rebuilding his AREC and planning try for an Extra Class ticket in Oct. The 7th Region phone net daily operation on 7280 kHz and members are needed. M Traffic Net had 818 check-ins, 32 formal traffic and 23 sessi (MN had 23 sessions with 74 check-ins and 38 pieces of tra WA7IZR spent his vacation in Renton, WAsh. and reports m 2-meter repeaters in operation. WA8ETX made BPL for June July while attending the Wally Byum caravan in Bozeman. repeater licenses here in Mont. as yet. Anyone with ideas for 1974 WIMU hamfest please let the SCM know. We are putting on for your enjoyment. W7DXQ has been spending most of summer in the Bozeman area. Would appreciate a few more rep from you pertaining to your activities and traffic handling. Traf (Aug.) WA7KMP 6, WA7KHM 2, (July) WA8ETX 340. (J WA8ETX 454.

OREGON – SCM, Dale T. Justice, K7WWR – SEC: W7H RM: K7GGQ. PAM: K7RQZ. Section net reports: WA7N reports for BSN for Aug. sessions 61, traffic 147, contacts check-ins 1100, WA7RWM reports for AREC Net sessions 31, tra 5, contacts 45, check-ins 373, W7EFE reports for Nuclear sessions 4, check-ins 19. WA7MHP has been on NAMS as ne extensively. W7HJ has two eleven-element beams up for two me Three large gatherings were held in the section: the OEN pic

CHARGE IT ON

master charge THE INTERBANK CARD

CHARGE IT ON

Your BANKAMERICARD welcome here

DIAL-A-DEAL HAM RADIO CENTER

TOLL FREE NUMBER
(Continental 48 States)
800 325-3636
MO CUSTOMERS CALL
314-993-6060
COLLECT

CALL FREE

CALL FREE

TRADE ON NEW

CALL

TRADE ON USED

Bill Du Bord, WØKF

(9 A.M.—5 P.M. Central, daily except Sunday)

FOR A SQUARE DEAL ON

- DRAKE
- TEMPO/ONE
- HALLICRAFTERS
- CLEGG
- STANDARD
- YAESU
- SWAN
- COLLINS
- KENWOOD
- REGENCY

We carry all major brands and a large stock of used reconditioned equipment

Write for used list

HAM RADIO CENTER INC.

8342 OLIVE BL. ST. LOUIS, MO 63132

Bend hamfest, and Astoria Hamfest. Many League officials present at these events, and lost of members questions answered. WA7KIU won top honors at Bend and took he pre-fab post hole. Traffic: K7IFG 204, K7QFG 144, K7OUF W7ZB 83, WA7NWV 62, WA7MOK 41, K7ZSK 41, W7L K7WWR 18, WA7MHP 13, W7HLF 11, W7MLJ 6, WA7KRH 3

WASHINGTON – SCM, Mary E. Lewis, W7QGP – W7UWT. RM: W7JWJ. PAMs: W7PWP, K7OUV. VHF P K7BBO, K7LRD.

Net	Freq.	Time(Z)	QNI	QTC	Sess.	S
WSN	3590	0145	288	119	31	K7C
NSN	3700	0200	284	78	31	WA7C
NWSSB	3945	0130	857	129	31	W7S
WARTS	3970	0100	2129	310	31	W7C
NTN	3970	1830	1033	102	31	W7I

I regret to report WA7DSK, an amateur since 1907 in Walla W has joined Silent Keys. Northwest Tech. Net has delayed ope date because of power shortage: in public interest this will about 10 kwh each Sun. Stations take note with this shortage p use only as much power as necessary to carry on and compl contact. Mike and Key Club participated in VHF party in S K7GGD received confirmation of Life membership in AR WA7LQV has a new Swan 500-CX. It's OK. WA7MEO will student at U. of Wa. this fall plus joining W7SFA as one of multi-ops for DX contest. K7OXL baby sitting granddaughter w her daughter picked fruit in Yakima Valley for canning. W7 reports Snohomish AREC/RACES new frequency 146.91 in future, present frequencies are 29.6 at 7:15 P.M. and 146.64 at P.M. possible start 3930 this winter 7 P.M. W7AXT acting as on WSN and RN7; his health still prevents handling too much tr on cw yet. Twenty seven amateur radio operators and their hel supplied the communication for Outboard Performance craft the Northwest Marathon Assn. race held on Lake Washington 28/29 and Aug. 5, from the praises coming in it was a job well d under hot and trying conditions. Traffic: (Aug.) W7PI 201, W7I 135, WA7OCV 104, W7FOE 52, W7BQ 40, W7PWP 34, W7BUN K7OXL 33, W7GYF 32, WA7DZL 31, W7APS 28, W7IEU W7AXT 17, WA7KNW 16, K7VNI 14. (June) WA7RCR WA7GVB 4, K7VNI 4.

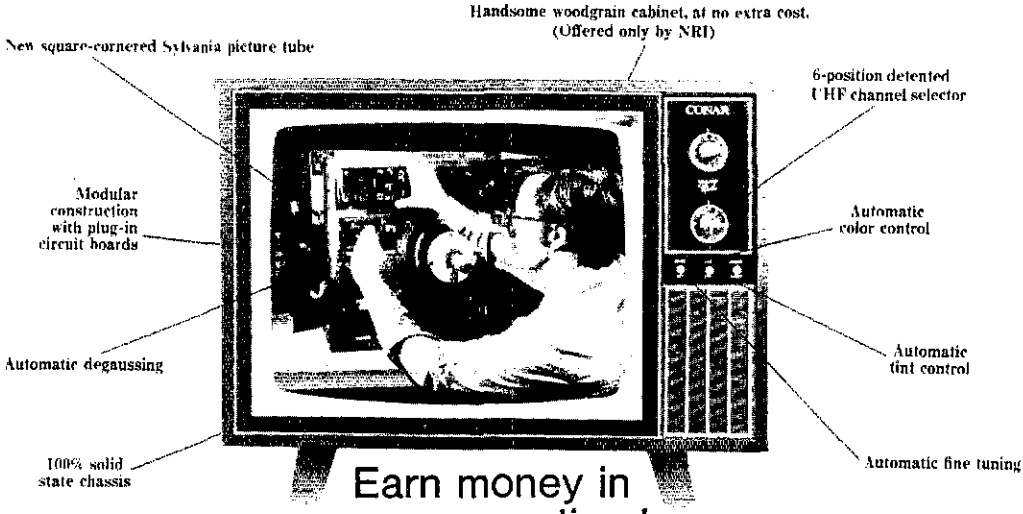
PACIFIC DIVISION

EAST BAY – Acting SCM, Charlie Weber, WB6RPK – F WB6NMZ, Alameda Co.; W6HSY, Contra Costa Co.; WA7KSC Solano Co. The old saying "It's an ill wind that doesn't do so good" definitely applies to the current crop of FCC propo changes. Comment in this section seems to run along the lines t we have been taking too many things for granted for too long, amateur public service. Armond Noble's keynote address at Fresno Hamfest dealt with this subject. International understand through DX is another one. Basically, amateur radio is to intellect what a gourmet restaurant is to the pallet. It provide multitude of new areas to explore. It's a great hobby, so let's behind the ARRL and keep what we've got. The Grizzley Peak Repeater, WR6ABM, is doing a good job of duplicating friendship found around the old country store cracker bar Hayward Radio Club hosted a meeting at which Doc Gmelin gave excellent report on the July ARRL Board meeting.

HAWAII – SCM, Lee R. Wical, KH6BZF – SEC: KH6BZF, F KH6AD. PAM: KH6GJN. VHF PAM: KH6GRU. SRC: KH6F QSL Mgr.: KH6DQ.

Net	MHz	Time(Z)/Days
Hey Bruddah	21,295	2000 S/Su
Friendly	7,290	2030 All
Confusion (Patches)	21,400	0030 MWF
Pacific Interisland	14,305	0800 All
S.E. Asia	14,320	1230 All
Moonbounce	21,415	2200 S
Marine Corps	21,430	1900 All
Cal/Hawaii Tropo	14,225	0400 All

Correction for Oct. QST: Hurricane Doreen vice Emily having effect on Cal/Hawaii tropo on 144,50,432 and 222 MHz resu KH6BZF, KH6HLP, KH6IJ, KH6GRU and Hilo repeater KH6A were reported heavily involved. See the VHF column for deta WN7VXG/KH6 helped pin on CWO-3 promotion on hul W7EOT/KH6. Both work at CDR USASTRATCOMPAC. KH6 reports DXCC, WPX and WAZ certificates now his. WB6BMB wa for surf and sand. Richard eyeballed with his Kaneohe Lions gr and KH6BZF. Ex-KH6DQW now signing W7LAR. KH6G recently visited with K2BX. WH6HSS reports that he passed General but missed his Advanced ticket. Ex-KH6HGP now sign W7WOX. Remember: ARRL Pacific Division Convention at Sa Cruz's Dream Inn on-the-beach, Oct. 13, 14 '73. Contact WA6F



Earn money in your spare time!

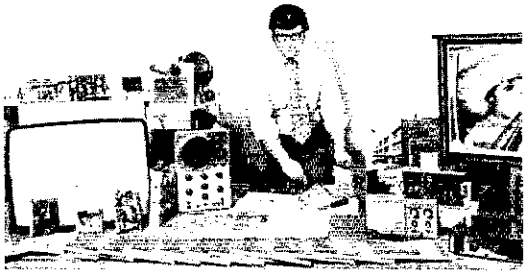
Learn Color TV Servicing as you build NRI's NEW 25" DIAGONAL SOLID STATE COLOR TV FOR HOME TRAINING

You'll learn faster and easier with this exclusive NRI set . . . built from the circuits up specifically for NRI's Color TV Servicing Course

With the big demand for men who can service television and radio sets, you can turn your spare time into money by learning this valuable skill. Now NRI can make it even easier for you . . . with the exclusive 25" diagonal picture tube, solid chassis, color TV set that you build yourself with NRI's TV-Radio Servicing Course.

Learning at home is easy

the simplified NRI way. Texts are "bite-size" and fully-illustrated, leading you step by step to a thorough knowledge of electronics. In addition to the 25" diagonal color TV set, you receive a wide-band service type oscilloscope, a color bar crosshatch generator . . . along with other valuable equipment you will use to perform experiments, introduce and correct defects into circuits, and make repairs on your own and others' sets.



Train with the leader—NRI

The same innovations which have helped NRI train thousands of men like yourself at home are now available to you. Rush the coupon for a free full-color catalog which spells out the NRI "discovery" method of learning in Color TV Servicing, Communications, Industrial Electronics, and even Auto Mechanics. There's no obligation. *No salesman will call.*

APPROVED UNDER GI BILL
If you have served since January 31, 1955, or are in service, check GI line in the coupon.

MAIL FOR FREE NRI CATALOG

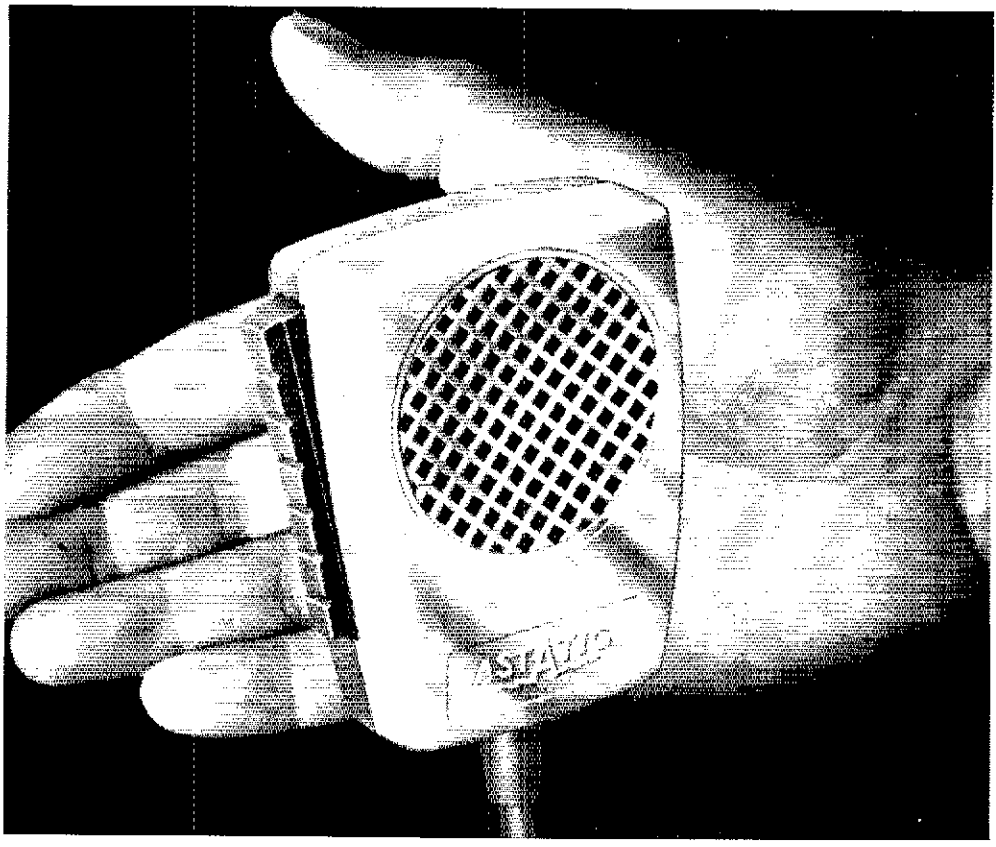
NRI TRAINING 19-113
3939 Wisconsin Ave., Washington, D.C. 20016

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 GI Bill**

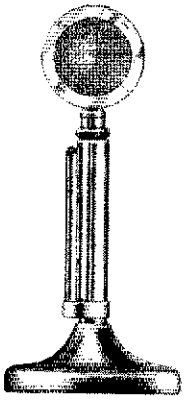
Name_____ Age_____
(PLEASE PRINT)
Address_____
City_____ State_____ Zip_____

ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL



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

or W6WGO at Box 238, Santa Cruz, CA 95061 for more details. See you there.

NEVADA – SCM, Harold P. Leary, K7ZOK – SEC: WA7BEU. As a Novice WA7TYY won Nev. section in Roundup. WA7DSP is working on touch tone pad on VHF. As this is read Nev. will have new rules regarding ham license plates. No Novice plates will be issued. I have blanks for submission to MVD for NEW plates to be made. WA7IPA received Master's degree this summer; has ham station setup in new Eldorado High School in Vegas; and teaching class in amateur radio at school. SNARC put on an FB Hamfest on Aug. 18 in Reno. The swap tables went over big. SNARS has been accepted as member of ARNS. WA7KNL received a letter of commendation from Gov. O'Callaghan for organizing the Nev. RACES program. WA7ESM has a new hobby – boats. W7PRM is vacationing in DL-Land. WØVPH is new to the Las VEgas area. W9RYX is signing W7JDF in the city of many lights. Traffic: W7ILX 86, WA7TYY 8.

SACRAMENTO VALLEY – SCM, Norman A. Wilson, WA6JVD – The GEARS opened their fall season with a steak bake in Chico on Sept. 15. They meet on the 3rd Fri. of each month at 8 P.M. in Plumas Hall on the campus of Chico State College. WB6NKO received WAS number 118 for 50 MHz SSB. Also congratulations to WB6NGF of Davis on a new Extra Class ticket at age 17. WA6LXT reports establishing the first known QSO with VK9 on SSTV. W6GDO has repeater WR6ABZ operational on 2 meters. W6DOR is teaching a Novice code/theory class with the adult education program in Davis and is looking for sources of equipment for the grads. W6VD is now trying his luck chasing DX on 160 meters. Avid DXer and former Vice-Dir. of the SW Division, W6NJU, has moved to the Sacramento area and has accepted the position of Asst. Director of the Pacific Division. He hopes to be on the air soon. WA6JVD has an 80-meter dipole sloping from 90 feet and now sorts cards for the W6QSL Bureau. K6VT has put up a new homemade four-element 20-meter yagi. I am always looking for activity reports especially from our northern counties. Traffic: WA6JVD 2.

SAN FRANCISCO – SCM, Tom Gallagher, W6NUT – We are saddened to note the Silent Key of W6WLV. Hal was well known in the section for many years engaging mainly in traffic and emergency work. Last year Hal was elected your SCM but was forced to step down because of his health. Hal was an amateur in the finest tradition. He shall be missed. A welcome to the City goes to WB4YOJ. Dean gets around and was previously WA1IRG and KH6DKD. W6OAT (ex-K4BVD) is also a new resident of SF. Rusty is attending Hastings Law School. WAØSIG is the new pres. of the Treasure Island ARC. Max has built several WB4VVF keyers from Aug. QST and reports they work FB. W6GGR says the Humboldt ARC had a successful picnic with the Far West Repeater Assn. on Mad River. All set for the ARRL Sweepstakes this month? Give it a try, even for a few hours, as many of the gang hunger for a QSO with this rare section which only includes SF and the coastal counties north excluding Del Norte. If in doubt as to your section, drop me a line. Traffic: WAØSIG/6 65, W6RNL 57, WA6ICO 24.

SAN JOAQUIN VALLEY – SCM, Ralph Sarovan, W6JPU – I failed to mention that at the Fresno Hamfest, held in May, WB6AUH was the principal speaker, and did indeed make an excellent speech. W6IRV, WA6HIN, W6JPU and XYLs attended the Reno Hamfest. WB6DKR is the new pres. of the Tulare County Radio Club. WA6EXV is experimenting on 432 MHz and is looking for a sked with anyone in Phoenix, Ariz. area. The Stockton 2-meter repeater new call is WR6ACC. The rest of the repeater stations are patiently waiting for their calls. The frequency is 146.28 in and 146.88 out. WA6ILA and W6IBC gave a talk at the combined Delta-Stockton Amateur Radio Club meeting. WN6RXI is now WA6RXI. WØOIQ now located in Fresno. WB6RSS handling traffic. It is my sad duty to report W6OBJ a Silent Key. WA6CPP received NZART award No. 8 and also the KZ-25 award. W6DPD worked K6YNB/7 on 6 meters for state No. 47. The Southern San Joaquin Valley Net meets on Tue. at 1900 on 146.88 MHz. W6DPD reports that on his way East, there were 2-meter repeaters in every large city on 34/94 and 16/76 MHz. Traffic: (Aug.)WA6SCE 87, WA6RXI 15, WB6RSS 11, WA6CPP 6. (July) WA6SCE 138.

SANTA CLARA VALLEY – SCM, James A. Hauser, WA6LFA – SEC: WA6RXB. RMs: W6BVB, W6RFF, W6BVB reports NCN had 692 check-ins and handled 282 pieces of traffic in July. WB6WFO is a new 15-year-old Advanced Class licensee just on the air in Salinas. Congrats Jeff. W6YBV, W6AUC, W6RFF and W6DEF made the PS Honor Roll, W6RSY made BPL in July. W6RFF invites all hands to check into the Northern California Slow Speed CW Net

held daily on 3630 kHz at 8:30 P.M. local time. This is a good way to keep your hand in on cw without going too fast. For the fast ops the first session at 7 P.M. is for you. The frequency is 3630 kHz. Traffic: (Aug.) W6RSY 778, W6YBV 174, W6BVR 141, W6AUC 102, W6RFF 97, W6DEE 62, W6NW 60, WA6HAD 55, WB6TYA 25, W6PAA 6. (July) WA6HAD 25.

ROANOKE DIVISION

NORTH CAROLINA – SCM, Chuck Brydges, W4WXZ – RM: WB4ECF, PAM: WB4IMG, VHF PAM: K4GHR. Remember that Nov. is Sweepstakes Contest month and the "SS" is the Grandaddy of them all. The Labor Day week end Shelby Hamfest, annually since 1957, drew over 1200 paid and another 400 either passing through or camping. New officers for the Carteret-Craven ARC are WR4PKC, pres.; K4HLW, vice-pres.; WN4CHD, secy.-treas.; WA4RAQ, comm. mgr.; WA4CFA, act. mgr. New officers for the DX Net (3924 6:30 Eastern) are WA4VTQ, mgr.; WB4SHJ/4, dir.; WB4QOM, secy. W4NXY attended a session at Camp Albert Butler at Elkin. W3EJK/4 is VOA man at Greenville and is ex-KN8FE/CN8IH. Welcome to NC. WA4KWC reports good 2-meter band openings at end of Aug. WN4WII passed General, Harmonie of W4WDN passed Novice. Raleigh ARS now lists 77 members, 71 licensed. The Buncombe County ARC has 40 members. The Forsyth ARC has 51 members. Let me hear from some of you other clubs on your activities, OK? The NC Novice Net (NCNN) active on 3725 kHz nightly at 8 P.M. Eastern and WB4UOP is awarding net certificates for participation. The Eastern NC Repeater, Inc. now has 52 members and the call WR4ABP. The Cape Fear ARS held a Memorial Dinner for Silent Key W9ANA/4 to continue to raise funds for purchasing tapes for his Church's audio-visual system. This is real ham spirit. Let's all get this kind of spirit and let the public at large know what we can do. Traffic: (Aug.) WA4 YDJ/4 303, K4MC 176, WA4CBI 86, WB4OOM 72, WB4OXT/4 42, W4OFO 38, W4WXZ 36, K4EZH 21, W4WCG 20, W4ACY 18, K4VBG 17, WB4AVG 9, WB4HDS 8, WB4CES 4, (July) K4MC 73, WB4OXT 52, K4GHR 10, W4OFO 10, WB4CES 6, K4TTN 4.

VIRGINIA – SCM, Robert J. Slagle, K4GR – Asst. SCM: A.E. Martin, Jr., W4THV. SEC: WA4PBG. PAM: W4HIR. RMs: WA4SMR, W4SOQ, W4SHJ, K4FBY. Note new PAM and RM of VSN; our thanks to WB4RZW for such a swell job in such a short time as PAM. OO W4HU turns in ten pages of CB violations this month! Counties – WA4WQG 3055, W4JUJ 2881, WA4FPH all 95. Va. Virginia Wireless Society had a fine open house complete with "G" rated movies! Congratulations to Richmond Amateur Telecommunications Society on League affiliation. W4DM fished in Maine. K4VIG/4 moved to Radford. WB4FDT on air at school in San Antonio. W4TE full time on NOVARC. W8VDA's new keyer incompatible with linear. WA2ICU off to Univ. of Buffalo. W4YHI operating 3Y8JA. W4YZC planning 160 vertical. Too hot to WB4YIL. W4KAO planning on reworking antenna. Director W4KFC attended Winchester and visited Albermarle RC. WB4WOJ new editor of Virginia Ham. WA4OEL in Charlottesville. WA9MWF/4 back on air in Cape Charles. I guess the Aug. heat got most of us – skimpiest month yet for reports.

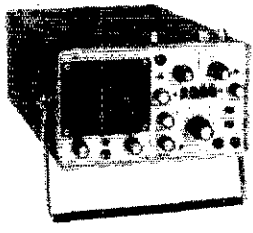
VSMN	3947 kHz	0715/1630 EDST M-F
VSBN	3947 kHz	1800/2200 EDST Dy
VSN	3680 kHz	1830 EDST Dy
VN	3680 kHz	1900 EDST Dy
VBN	3947 kHz	1930 EDST Dy
VRN	3625 kHz	2000 EDST Dy
VPON	3905 kHz	2215 GMT T

Traffic: WA2ICU/4 262, K4KNP 221, W8VDA/4 173, WB4JMI 142, WB4SGV 117, WB4KSG 101, W4UQ 80, K4GR 61, K4IAF 59, WB4DRB 53, WB4RZW 53, K4JM 48, WR4KIT 38, WB4FDT 35, K4KA 33, WB4PNY 32, W4KFC 24, WA9MWF/4 9, W4YZC 8, W4MK 6, WA4EPH 3, W4KX 3, WA4WOG 3, WB4YIL 3, WB4GMC 2, W4JUI 2, K4VIG/4 2.

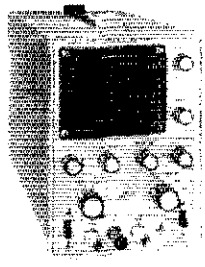
WEST VIRGINIA – SCM, Donald B. Morris, W8JM – SEC: WA8NDY, RMs: W8IIZA, WB8BRG, PAMs: W8DUW, W8IYD, CW Net Mgr.: W8H7A. Phone Net Mgr.: WB8DQX. Monongalia Wireless Assn., new repeater call, WR8ABM, located near Cooper's Rock and controlled from Morgantown. K4COA/8 located at W.V.U. ha new call, WB8OSE. W8IIZA and WA8LDZ used bow and arrow t install new antennas. K8WMX, pres. of Kanawha ARC was chmn. o the Walkathon in Charleston, by amateurs for the March of Dimes Northern Panhandle ARC of Wheeling held annual corn roast a W8JDH's farm. WN8MKL made BPL and along with WB8MZI ha new keyer. After 45 years as Professor at Wesleyan College i Buckhannon, W8LD retired, receiving among other gifts, an HW202 West Va. CW Net in 29 sessions, with 45 stations, passed 2 messages and the Phone Net in 31 sessions, 290 stations, handle 141 messages. Novice Net active at 2130Z on 3730 daily. WB8BBC

get more out of your rig with LEADER

TEST INSTRUMENTS

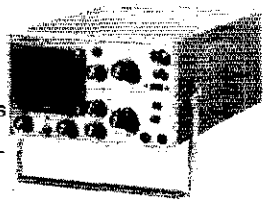


LBO-302 — 3" SOLID STATE DUAL TRACE SCOPE
Solid state. Pushbuttons for trig, auto sweep & "free run". 10mVp-p/div to 5Vp-p/div vert. sens., 9 steps. 10MHz b'width. 1μs/div to 0.2μs/div. (5XMag.), 17 steps, sweep. Sep. or simul. display of ch 1 & 2. Conquers the test bench squeeze.
$699.95



LBO-310 — 3" SOLID STATE GENERAL SERVICE SCOPE
Compact! Lightweight . . . with bright display, extra sharp focus. AC/DC coupled vert. & h'z't'l inputs. Monitors waveforms to 100MHz, direct conn. Sweep range to 100 KHz, 4 steps, cont. adjust. Use in multiples to view sep. phenomena simul.
$199.95

LBO-301 — 3" PORTABLE TRIGGERED SCOPE
Unmatched solid state sensitivity. DC - 7MHz b'width. Vert. & h'z't'l calib. 0.2μs (5XMag.) to 50ms/div, 15 steps sweep time. Compact. Easy to use h'z't'l panel. Services computer circuits to color TV.
$449.95



LDM-815 TRANSISTORIZED DIP METER
A great RF tester. Bat'y operated, portable. For easy rapid checks in 1.5 to 250MHz range. Large 310° dial, 6 plug-in coils, earphone incl. Use to adjust wave traps, align receivers or find parasitic oscillations. **$89.95**

"Put us to the test"

LEADER INSTRUMENTS CORP. 151 Dupont Street Plainview, L.I., N.Y. 11803 (516) 822-9300

K8IJW, WA8ZNH active on 2 meters from dorms, while attendin WVU. WA8NDY acted as judge at RC airplane meet at Jackson' Mill. WN8QDP has ECO 720, active in Novice Net and lookin forward to joining WVN-CW soon. WN8NSL, only active amateur i Ritchie County. Traffic: WN8MKL 178, WN8ODP 78, W8HZA 65 WB8DQX 43, K8QEW 24, W8JWX 20, W8JM 12, WA8LEW 9 WB8MZI 9, WA8KCJ 7, WA8OKG 3, WB8BMV 2, W8DUV 2 WA8TNY 2, K8ZDY 2, K8RCF 1, K8CMW 1, W8CZT 1, WB8EKC 1, K8IXO 1, W8KWL 1, WA8NDY 1, WA8POS 1, WA8TOM 1 WA8YCD 1.

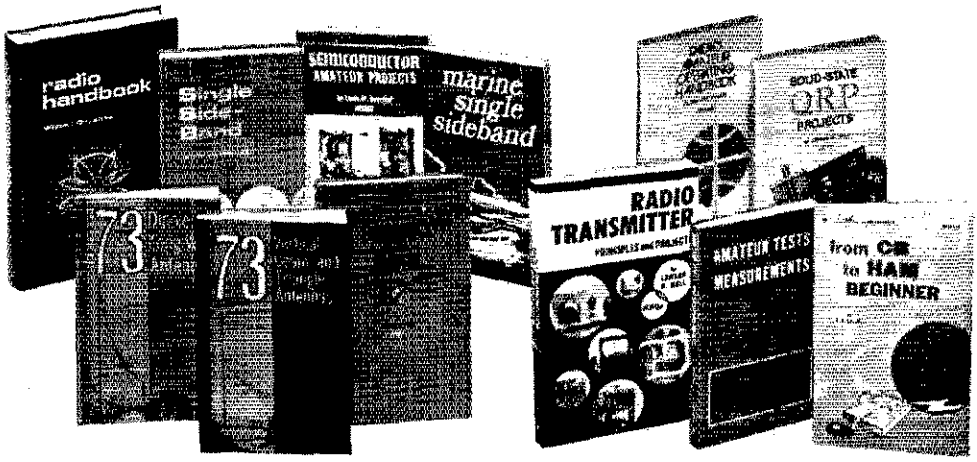
ROCKY MOUNTAIN DIVISION

COLORADO – SCM, Clyde O. Penney, WAØHLQ – SEC KØFLQ. RM: KØOTH. PAMs: KØCNV, WAØWYP. WAØYGQ KØSPR reports handling considerable amount of traffic in con nection with recent Mexico earthquake. WAØSZW enjoying many contacts working QRP, cw on 40 meters. Colorado Traffic Nets ar sorry to lose the services of KØJSP, who has moved out of th section. He was quite active on several of our local nets, as well a TWN, and will be sorely missed. WAØFNO has been off the air fo some time because of illness. We wish him a speedy recovery Congratulations to WBØLGC, newly licensed in the Greeley area. I is with deep regret that we add WØNKR to the list of Silent Keys Ken was an old timer in this area, well known and liked b everyone. We will miss him. Net traffic for Aug.: Hi Noon QN 1080, QTC 40, informals 176, 836 minutes. CCN QNI 178, QTC 121, 31 sessions. Columbine QNI 819, QTC 66, informals 144, 2 sessions. SSN QTC 125, informals 21, 30 sessions, 603 minutes Late net traffic for July: SSN QNI 171, QTC 115, 13 informals, 3 sessions, 511 minutes. Traffic: (Aug.) WBØHSZ 145, WBØHCK 95 WØLQ 78, KØOTH 64, KØSPR 56, WØIW 49, WBØCCB 44 WBØDME 44, WAØZPP 31, WØDSW 29, WØLAE 27, WØJRW 25 WØSIN 24, WAØTMA 24, WØGW 20, WØBY 15, WBØHBT 14 WØKFH 8, WØNZL 8, WAØWYP 5, WAØHLQ 2. (July) WØLQ 166 WØIW 85.

NEW MEXICO – SCM, Edward Hart, Jr., W5RE – SEC W5ALR. PAMs: W5DMG (NMRRN), W5PNY (DNTS). RMs: W5UH (DNTS), WB5CSO/5 (NMN). New Mexico Net after Sept. 30 wil meet on 3585 at 7:30 P.M. local. New Mexico Road Runner Ne meets 3940 at 6:00 P.M. local. New SEC W5ALR. Contact him fo EC appointments and any information on emergency procedures W5PNY is mgr. TWN daylight NTS. Contact him if you can operat during daylight hours on phone. W5UH is the man to contact for cw *work during daylight. WB5CSO/5 is new RM and mgr. of New* Mexico CW Net. The Caravan Club of Albuquerque covered th races for Sports Car Club of American Races at Fort Sumner Activity was on 146.46 and involved ten members. W5DMG took over as mgr. of NMRRN Aug. 25. Traffic: K5MAT 330, WB5CSO/5 75, W5RE 41, W5ENI 40, K5KPS 34, W5UH 24, W5HRS 21 W5PDY 18, WA5OHI 14, WA5MIY 7, W5YQ 7, W5TLK 5.

UTAH – SCM, John H. Sampson, Jr., W7OCX – SEC: W7GPN RM: W7UTM. BUN meets daily at 1830 GMT on 7272 kHz, 82 check-ins, 60 messages. UCN meets daily at 0130 GMT on 357. kHz, 261 check-ins, 53 messages. The Utah Novice Net welcome new check-ins. It is hoped that the Utah section will activel support the new Daylight TWN at 2230 GMT daily on 7230 kHz This is an ssb traffic net. K7CLO has qualified for DXCC and ha received his YLCC certificate. He is studying for his Extra Cla ticket. K1TMK/7 now married and back in school in Provo. H hopes to make the XYL a ham. W7EM and XYL W7VTJ hav moved to Fla. WA7BSG submitted 8 Intruder Watch report Thanks to ham radio, including a bit of welcome relaying, WA7LB was assisted by the highway patrol when her car refused to go ne Bluff. W7UTM has earned the BUN certificate. UCN certificate have been awarded to W7OCX, W7UTM, W7IOU and WA7KHI Atmospheric disturbances have added to the already high noise lev on all nets. WA7RXA administered 2 Novice exams. On June 1973, in Ogden, Utah, WA7RXA ran a phone patch betwee OA6CW in Peru and a hospital bed in Reno, Nev. A mother, nc expected to live, was hoping her daughter and son-in-law in a isolated mining camp near the Chilean border could be reached. Th was done but as it turned out a long delay would ensue before a airport could be reached. WA7RXA provided emergency con munication for a thankful family. Traffic: W7UTM 132, W7OC 60, WA7MEL 27, W7DKB 20, WA7QAR 13, W7FYR 10, K7CLO WA7WIB 5, WA7HCQ 4.

WYOMING – SCM, Wayne M. Moore, W7CQL – SEC: K7NQ PAMs: W7SDA, WA7NHP, K7YUG. OBSs: K7NQX, W7SD WA7FHA, K7YUG. Nets: Pony Express Sun. at 0800 on 3920; Y



Problem-solving handbooks

Highly popular Editors and Engineers books from Sams give amateurs everything they need to know about radio operation and technology. They're authoritative, clear, and easy to follow. You'll want them for your library.

Famous E&E RADIO HANDBOOK—19th Edition
By William I. Orr, W6SAI
The completely updated electronics industry standard for engineers, technicians, and advanced amateurs. Shows how to design and build all types of radio-communications equipment. Includes ssb design and equipment, RTTY circuits, latest semiconductor circuits, IC's, and special circuitry. **No. 24030—$14.95**

SINGLE SIDEBAND: THEORY & PRACTICE
By Harry D. Hooton, W6TYH
A basic text covering the origin of ssb, derivation of signals, sideband selection, ssb generators, carrier-suppression techniques, carrier generators, speech amplifiers and filters, balanced mixers and converters, low-power ssb transmitters, linear r-f power amplifiers, and much more. **No. 24014—$6.95**

SEMICONDUCTOR AMATEUR PROJECTS
By Louis M. Dezettel, W5REZ
For the ham who still takes pride in using his hands and head, here are projects for 16 useful, money-saving accessories, using easy-to-build semiconductor circuitry. Units are for measuring equipment, increasing power and adding convenience, etc. **No. 24025—$4.95**

MARINE SINGLE SIDEBAND
By Donald M. Stoner and Pierre B. Goral
Covers the why and how of single sideband; interpreting specifications, alignment tests and measurements, installations, securing a limited coastal license, high-seas telephone service, and marine radio terminology. **No. 24029—$5.95**

RADIO AMATEUR OPERATING HANDBOOK
By Marshall Lincoln, W7DQS
This single-source working guide is a practical aid for improving the operating methods and techniques of hams. **No. 24028—$4.95**

SOLID-STATE QRP PROJECTS
By Edward M. Noll, W3FQJ
By building QRP equipment you learn solid-state technology, since these rigs include transistors and/or integrated circuits. The low-cost units described have power ratings from less than 100 milliwatts up to about 20 watts. Both cw and phone rigs are included. **No. 24024—$4.25**

73 DIPOLE AND LONG-WIRE ANTENNAS
By Edward M. Noll, W3FQJ
Detailed construction data for 73 different types of wire antennas. Appendices describe construction of noise bridges and line tuners, plus data on measuring resonant frequency, velocity factor, and SWR. **No. 24006—$4.50**

73 VERTICAL, BEAM, AND TRIANGLE ANTENNAS
By Edward M. Noll, W3FQJ
Design and construction of 73 different antennas used by amateurs, each built and air-tested by the author. Also construction of noise bridges, transmission-line tuners, and measurement methods. **No. 24021—$4.95**

ELECTRONICS FOR THE AMATEUR
By Louis M. Dezettel, W5REZ
Covers radio-wave propagation as it applies to amateur band frequencies, reception and transmission pertaining to ham equipment, and the special field of antennas and how to feed them. Provides you with everything needed to pass the theory sections of the FCC exams. **No. 24022—$7.95**

RADIO TRANSMITTER PRINCIPLES AND PROJECTS
By Edward M. Noll W3FQJ
Basic and advanced subjects include radio-frequency oscillators, multipliers, and amplifiers; all modes of modulation; and the important electron devices used. Each chapter presents a related project for beginners and students. **No. 24031 $6.95**

AMATEUR TESTS AND MEASUREMENTS
By Louis M. Dezettel, W5REZ
Shows how to accomplish virtually all performance tests on amateur transmitters, receivers, and antennas, and how to make required adjustments. **No. 24007—$5.50**

FROM CB TO HAM BEGINNER
By J. A. Stanley
Tells and shows how to select and tune a communications receiver, listen in on ham bands, send and receive code, pass the Novice license exam, build or buy an amateur transmitter, erect an antenna, and put a ham station on the air. **No. 20920 $4.25**

Order from your electronic parts distributor or send coupon below.

EDITORS AND ENGINEERS

QS113

Howard W. Sams & Co., Inc.
4300 W. 62nd St., Indianapolis, Ind. 46268

Send me the following books. Nos. _____

_____ $_____ encl

Please include sales tax where applicable

☐ Send FREE 1973 Sams Book Catalog

Name_____
PLEASE PRINT

Address_____

City_____ State_____ Zip_____

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. Note the new manager of the Pony Express Net - WA7NHP. I know that several of you will volunteer to help Leo as NCS. Yours truly returned about the first part of Sept. from vacationing during Aug. in Canada – met a lot of hams up there – all very nice guys. Another new ham in the state is WA7WGF located at Meadowlark Lake. W7HFB and K7WRS vacationed in Tex, K7TAQ has returned from an extensive vacation in Ore. *Traffic: W7SDA 211, W7TZK 125, K7VWA 124, K7ITH 41,* K7SLM 27, WA7HAB 26, W7ILL 2.

SOUTHEASTERN DIVISION

ALABAMA – SCM, James A. Brashear, Jr., WB4FKJ – SPC: W4DGH. PAM: W4RQS. RM: W4HFU. The Huntsville ARC will again provide communications for the Ala. Arabian Horse Assn. endurance ride in Nov. New repeater tickets issued to the Birmingham group are WR4ADD and WR4ACB; congratulations to them. The Birmingham group also is working on several new identifiers. K4UMD reports 20 meters kinda lousy, but fair after midnight. K4JK off to 7- and 6-Land. WB4SVH NM of AENM now QNI on a regular basis. He reports having a little trouble with his 2-meter rig. W4RQS assumed NM duties of AENM on Sept. 1 as well as PAM. He is working on an AENM manual. He has been QNI AENB as has K4MG and we are glad to have them help us out. Welcome to KP4DLW who has recently moved to Huntsville. WA4RBH was recently in Huntsville on vacation. WB4PZU seeking a schedule into the Huntsville area. Sorry I was not able to attend the North Ala. Hamfest (and RNS net meeting) in Decatur in Aug. WB4KSL reports the volume of traffic originated at the Northeast Ala. State Fair was less than expected. Congratulations to WN4UNM on having the top section score in the ARRL '73 Novice Roundup. Hope everyone read Traffic Talk (page 68, Sept. '73 QST) re support of YOUR section Net/s. Welcome to the following new hams: WA4EOR, WB4FNF, WN4s EOW, FDA, FHG, FIK, FKT, FKS and FMB. W4RQS appointed as PAM; WB4EJP as ORS. Endorsements: W4JNU and WB4SVH as FCs; WB4SVH as OBS and ORS. Traffic: WB4EKJ 130, WB4SVH 93, WB4JMH 61, K4AOZ 38, WB4KSL 36, WB4ZQF 19, WA4AJA 4.

GEORGIA – SCM, Ray LaRue, W4BYG – Asst. SCM/RM: John H. Boston, III, *WB4RUA, SEC: K4EQQ.*

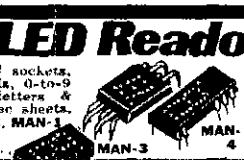
Net	*Freq.*	*Time(Z)*	*QNI*	*QTC*	*Mgr.*
GSN	3595	0000/0300/1130	431	166	WB4UIH (ac
GSBN	3975	0100			K4VNV
GTN	3718	2300	88	11	WB4TVU

K4EQQ is our new SEC. He is an amateur of 13 years with interest from 160 through vhf mostly ssb and fm. He will be reviewing our entire emergency procedures program. If you have suggestions or would like to help, contact him. K4MOG worked a VK2 on 40 meters with 9 watts QRP. W4JM has been vacationing with 40/20-meter mobile. WA4BAA going RTTY. K4HQI reports K4AD now has Advanced ticket; W4VRO's new QTH Lavonia; K4BDJ has new twenty-two-element array on 2 FM. W4LRR says 2-meter am is hot on 145.35 in SE part of the state. WR4ABD (Mableton) has a *new repeater on 220 MHz w/autopatch. K4ZYK conducting new* code and theory classes at the Atlanta Area Tech Vocational School each Wed. He needs help! Call him and offer! The CSC and ARC operated a mobile collection service for the Bobby Dodd Retarded Children's Campaign via the Stone Mountain repeater. Traffic: WA4BAA 122, W4BYG 43, W4CZN 40, WB4TVU 40, WA4RAV 37, W4AMB 29, WB4RUA 21, W4JM 8, WB4NTW 7, K4MOG 5.

NORTHERN FLORIDA – SCM, Frank M. Butler, Jr., W4RKI – SEC: W4IKB. RM: WA4BGW. RTTY: WA4WIW. PAMs: WA4IZM/75, W4SDR/40. WA4IZM is new RACES RO. WA4CAI building new CW ID unit for WR4ACZ. WA4BVO has new L antenna for 6 meters. WA4BMW earned Space Net certificate. The FM Assn. adopted new SOPs. W2GAU, WA7QFW, WN8NHF, WN9KTP and KS6CG/EG, an OM/XYL team recently moved here. PARC activities included a picnic and visit to local PC board firm. W4BKD is on 75-meter SSB. W4AIA a Silent Key. K4KHV moved to Marianna. WA4BJG and W5KIG new hams in Quincy. WB4PNL added phone patch. WB4ZQC put up tri-band quad. W4QBR passed Extra Class and is now K4WJ. The 2-meter repeater moved recent antenna to 400-ft. CATV tower. EC WB4OMG presented program on ARPSC at local club. WB4VYU appointed ORS; WA4EQ renewed OPS. RANGE repeater call finally arrived – WR4AAE. The 6-meter repeater output was moved to 52.64 MHz; input still 52.7(*A Novice code class is in progress at the college in Ocala. Lots o* local 20-meter am activity on 28.650 with converted CB rig. WA8YAD/4 is working at the Springs Campground. K4PCZ stror

7 SEGMENT LED Readouts

All fit 14-pin IC sockets, 5V 10 to 20 mils, 0-to-9 numerals, plus letters & decimal. With spec sheets.
*Monsanto Equal, **MAN-1 Specs.
†3A-Diode Array.



MONSANTO "ALL LED" Type	Size:	Color Display	Decimal	Driver	Each	Special
☐ MONSANTO MAN-1*	.27	Red	Yes	SN7447	4.50	3 for $12.
☐ MONSANTO MAN-3*	.115	Red	Yes	SN7448	2.25	3 for $6.
☐ MONSANTO MAN-3*	.115	Red	No	SN7448	1.49	3 for $3.
☐ MONSANTO MAN-4*	.190	Red	Yes	SN7448	2.95	3 for $8.
☐ MONSANTO MAN-4*	.190	Red	No	SN7448	1.79	3 for $5.
"REFLECTIVE LITE BAR" (SEGMENT) LED READOUTS!**** Decimal right or left						
☐ LITRONIX 707** (MAN-1)	.33	Red	Yes	SN7447	3.50	3 for $9.
☐ LITRONIX 704*** (MAN-4)	.33	Red	Yes	SN7448	3.50	3 for $9.
☐ OPCOA SLA-1** (MAN-1)	.33	Red	Yes	SN7447	3.50	3 for $9.
☐ OPCOA SLA-3H Giant Digit	.70	Red	Yes	SN7447	8.60	3 for $24.
☐ OPCOA SLA-2 Plus/Minus/1	.33	Red	No	SN7447	3.50	3 for $9.
☐ OPCOA SLA-11C (MAN-5)	.33	Green	****	SN7447	4.95	3 for $13.
☐ OPCOA SLA-12 Plus/Minus/1	.33	Green	—	SN7447	4.95	3 for $12.

OAK FEATHER-TOUCH SWITCHES

*For RTTY
*Printed Circuits
*For Unique Panel Switches

Sale $.49

Mfd. by OAK (Ham's note, RTTY, too) data systems, same as used in keyboard Calculator. SPST. Normally Open, 24V 1 amp contacts. Characters and letters easily changed, ¾" high. Printed circuit.

*White top, black numbers.
†Blue top, white characters.

☐ Kit of 17 above switches for keyboard $7.50

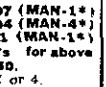
No.
☐ 0*
☐ 1*
☐ 2*
☐ 3*
☐ 4*
☐ 5*
☐ 6*
☐ 7*
☐ 8*
☐ 9*
☐ CE†
☐ CL†
☐ −†
☐ +=†
☐ ÷†
☐ ×†
☐ .*

LIGHT EMITTING DIODE GaAs INDICATORS

☐ 2-MV1*, Amber, visible jumbo epoxy lens upright . . . $1.00
☐ 1-MV2*, TO-18, Dome, green, visible 1.00
☐ 1-MV-2*, green small dome, green diff. lite 1.00
☐ 1-MV-2*, clear small plastic dome, green diff. lite 1.00
☐ 1-MV-3*, micro-mini "pin head" dome, TO18, green lite 1.00
☐ 3-MV3*, visible, "coax pin pak", red, mini dome lens . . 1.00
☐ 1-MV4*, stud, high power, red, 2-watts 3.95
☐ 1-MV4H*, stud, high power, hi-dome, red, 2-watts 3.95
☐ 3-MV10B, visible, red, clear, dome lens, TO-18 . . . . . 1.00
☐ 3-MV10C visible, red, diffused, dome lens, TO-18. . . . 1.00
☐ 3-MV50*, axial leads, micro-mini dome, clear, red 1.00
☐ 3-MV55*, axial, micro-mini, red lite, red lens 1.00
☐ 3-MV5012*, visible, red, small dome lens 1.00
☐ 3-MV5020*, jumbo clear dome, TO-18, visible, red . . . 1.00
☐ 3-MV5021*, jumbo red diffused lens, visible, lite RED 1.00
☐ 3-MV5022*, jumbo red lens, visible RED lite, spade, upri 1.00
☐ 3-MV5024*, jumbo red diffused lens, RED lite, spade . . 1.00
☐ 1-MV5040*, 4-LED red array, with 5-lead pak 1.49
☐ 3-MV5084*, visible, red, jumbo dome lens, upright . . . 1.00
☐ 2-MV5080*, TO-18, micro-mini, clear dome, red 1.00
☐ 4-MV5082, visible, red, clear flat lens, TO-18 . . . . . 1.00
☐ 1-MV5222*, green hi plastic dome, diffused green lite . 1.00
☐ 1-MV5232*, clear hi dome, diff. green lite 1.00
☐ 1-MV5222*, jumbo dome, green, panel snap-in 1.49
☐ 1-MV5232*, jumbo dome, GaAsp, panel snap-in Yellow . 1.98
☐ 1-MV5491*, jumbo, Tri-State, RED, GREEN, OFF, specia 1.98
☐ 1-MV9000*, cartridge panel lamp, sealed, red, clear lens 1.49
☐ 2-MT-2*, Photo Transistor, light sensor, TO-18 . . . . . 1.00
☐ 2-ME-1*, infra-red, parabolic lens, pin type 1.00
☐ 3-ME-3*, infra-red, invisible lite, "pinhead", single lead 1.00
☐ 3 ME-4*, infra-red, "invisible", TO-18, diff. dome 1.00
☐ 3 ME-60*, infra-red, "invisible", axial, micro-mini . . . 1.00

*Monsanto Equivalent

MUX'D DIGITAL CLOCK PC BOARD



Each board properly multiplexed for 6 digits, to hold MAN-1's, MAN-3's, MAN-4's, Litronics 707 (MAN-1) and 704 (MAN-4), and Opcoa's SLA-1 (MAN-1). Board 6⅞" long with spec sheets. * Elec char. same as Monsanto devices MAN-1 or 4.

Your choice $2.50

☐ MAN-1 ☐ Litronics 707 (MAN-1*)
☐ MAN-3 ☐ Litronics 704 (MAN-4*)
☐ MAN-4 ☐ Opcoa SLA-1 (MAN-1*)
☐ 6-MAN-3A's for above board. $9.50.

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

*Your choice of 5 red LED readouts! Only

Buy 3 — Take 10% ☐ $9.99

LED MITY DIGIT DCM

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 4½" x 2" p.c. board with fingers for a FREE edge connector, side-mounting dip socket, LED readout of your choice, resistors, 8 IC's, and Molex connectors (this ELIMINATES SOLDERING YOUR IC's), and booklet. **INCLUDES P.C. EDGE CONNECTOR — FREE!**

* Pin-for-pin MAN-1, ** Pin-for-pin MAN-4, elec. char. same

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 942M LYNNFIELD, MASS. 01940

3 for $27 ☐ 9.95

CALCULATOR KEYBOARD

☐ Etched calculator board with holes, as above, less switches . . . . $2.50 Board

Properly etched, drilled, "MULTIPLEXED," with proper diodes. Ready to go! Used with our own CAL TECH's 5001 chip advertised at $ 9.95 or equal to Cal Tech or Mostek chip. Keyboard uses the new manufactured by OAK, printed-circuit low-profile FEATHER TOUCH switches. 0-to-9 in white with black letters. Decimal white with black dot. CE, CL and the 4 function switches are in blue with white characters. Designed by top maker. Size: 8½ x 4½ x ½". All etched connections link to take a 12-pin edge connector.

12-DIGIT CALCULATOR ON A CHIP

☐ CT5001 Chip ☐ 9.95

Similar to Mostek 5001. Outperforms Texas 8-digit TMS1802. A 40-pin DIP. Adds, multiplies, subtracts, and divides. Use with 7-segment readouts, Nixies, and LED's. We include schematics, instructions to build calculator.

3 for $27.

☐ CTS002-9 Volt version of above — $9.95
☐ CTS005-Same as above with MEMORY — $14.95

NATIONAL EQUAL "DIGITAL CLOCK on a CHIP"

Any "Chip"
☐ $12.88

*Money Back Guarantee!

☐ 5311	28-pin, ceramic, any readout, 6-digits: A-B-D	$12.88	*With
☐ 5312	24-pin, ceramic, any readout, 4-digits: C-D	$12.88	Spec
☐ 5313	28-pin, ceramic, any readout, 6-digits: A-C	$12.88	Sheet!
☐ 5314	24-pin, plastic, LED and incandescent readouts, 6-digits: A-B	$12.88	Save!

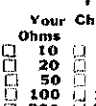
Code: A—Hold Count. C—1 PPS Output.
B—Output Strobe. D—BCD

POTTER BRUMFIELD MINI CAP RELAYS

Measures only ¾ x 1 x 1¼". Plastic cased. Like KNF type. For pc board or socket. 14 lugs, 1-8/32 stud incl. Both 4PDT. All ceramic construction. 3 amps, contacts. For r-f ant, switching. Wt. 1-oz.

Your choice ☐ 115 VAC ☐ 24 VDC $2.49 3 for $6

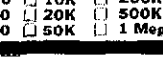
SPERRY "ORANGE" TWIN DIGIT ARRAY



Type SP332, each digit is individually controlled, operates off 180VDC, 100 ua, 200 mw. Color: ORANGE. 7-digits, glass protection over digits, Character height: 0.33, P.C. mounting. Size: ¾" x ¾", 9-pins per digit. Driver: SN7447.

☐ $5.95 3 for $15.

SPECTROL CERMET "MICRO" POTS



Model No. 53-2-1, Cube 5/16" square, single turn, screw adjust front. **Model No. 42-2-1,** Rectangular 3/4" x 3/16" x 5/16", screw driver adjust, side. PC work. Both cermet sealed. Order by model number and value.

Your Choice Ohms			
☐ 10	☐ 1K	☐ 100K	
☐ 20	☐ 2K		
☐ 50	☐ 5K	☐ 100K	
☐ 100	☐ 10K	☐ 200K	
☐ 200	☐ 20K	☐ 500K	
☐ 500	☐ 50K	☐ 1 Meg	

Any 2 for $1

OO program booster. WA4BXT working more DX with a new TR-4C. WB4SKJ left for college; WN4EBZ passed General and Advanced. The LARA Novice class at Lake-Sumter CC taught by WB4SGU and K4UYN. W4CJJ was guest speaker at Aug. meeting in Daytona Beach. WB4GUH received EE degree from FTU. The GCARC received ARRL affiliation. WA4BGW repairing damage from lightning hit on ham shack. Traffic: (Aug.) WB4VYU 259, WB4OMG 245, WA9QVT/4 238, K4BSS/4 160, WB4WHK 128, KØBAD/4 127, W4SDR 112, WB4IER 102, WA4EYU 76, K4IZT 58, W4GUJ 46, WA4IZM 45, W4RKH 41, WB4NJI 38, WB4SKJ 34, W4AFT 23, WA4BXT 21, WB4ZQC 21, WB4DXN 20, WA4FJA 20, WB4PNJ 20, K4EZE 17, W4LSR 15, WB4FJY 11, K4FCZ 9, *W4LDM 8, WB4NHH 7, WA4BGW 6, K4RNS 5*, WB4VAP 5, WB4ZPC 5, W4DFP 4, W4IKB 3, KØLCG/4 2, K4FLV 2. (July) WA4IZM 49, K4FCZ 26, WB4PSJ 7, KØECG/4 3, WB4WTL 3.

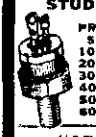
SOUTHERN FLORIDA – SCM, John F. Porter, W4KGJ – Asst. SCM: Woodrow Huddleston, K4SCL. SEC: W4IYT. Asst. SEC: W4SMK. RMs: WB4NCH acting CW and K4EBE RTTY. WA4BPF new EC for Martin County. Those receiving endorsements on their appointment are W4DQS. W4GDK, W4NTE, ORSs and W4GDK OPS. WA4CGQ earned his FAST Net Certificate. WB4CBP elected pres. of SERA at Melbourne Hamfest meeting. If you missed the Platinum Coast Amateur Radio Society's 8th Annual Hamfest you missed a good one. Congratulations to the officers and members for putting on such a good show. About the only complaints I heard was the cost of the dogs. Yours truly even won a couple of prizes. No, I did not suffer from cardiac arrest. W4DQD our Southeastern Director was present for the LO meeting. He gave us a run down on the last Board meeting. Plenty of discussion took place regarding the FCC 224-225 MHz docket (Docket 19759). All were urged to file a protest. Other League officials present were K4THA vice-Dir., W4IYT SEC, WB4BWS, W4NTE, WA4BPF ECs. OO report received from W4OZF. VHF report from WB4TYP. WB4AJL made PSHR. W4OZF YL harmonic 10 year old, studying for Novice ticket. WN4BTA and WN4BTR acting as instructors. W3AIZ/4 on GN from Motel, until new home is ready. WN4AWQ age 11 on 40 cw. W4GIE working at WPD Tampa "Wireless". WB4TUP at U of Fla. studying DVM. WA4VEI son of WA4HDH taking pre'med at U. of So. Fla. Sorry to report that K4GQP, vice-pres. of the St. Petersburg ARC became a Silent Key Aug. 19. Do you have your bumper sticker "Hams Have More Fun"? W4BRB fathered the idea. They sold like hot cakes at the Melbourne Hamfest. See Sept. Florida Skip for details. Traffic: WA4SCK 307, K4WKY 300, WB4GHD 255, K4SCL 250, W4EH 154, WB4AJL 136, K4BLM 67, WB4DQS 61, WB4AIL 59, WB4TRI 57, WA4BPF 53, WA4CJM 49, W4DVO 45, WA4PDM 44, W4FFF 37, K4QCG 37, WA4HDH 32, WB4HJW 27, W4IYT 23, K4MV 17, K4OG 16, W4GDK 15, W4BCZ 11, WB4CPZ 11, W4KGJ 8, WB4TUP 8, K4EBE 7, WB4QID 6, W4TJM 6, W4LK 5, W4NTE 5, W4MML 4.

WEST INDIES – SCM, Pedro J. Piza, Jr., KP4AST – SEC: KP4CB. OBSs: KP4QM, KV4FZ. 2-meter activity continues growing rapidly. KP4BBK is aeronautical mobile and has contacted KP4s as far as Turk Island and is planning more aeronautical tests to Curacao and other Islands. KP4s BNP, AAN, AMR; W1OOP/KP4, KP4AFK are now active on 2 meters. KP4AST still waiting for his repeater license but no word from FCC as yet.

SOUTHWESTERN DIVISION

LOS ANGELES – SCM, Eugene H. Violino, W6INH – Asst. SCM: Leigh Jones, WB6OLD. The L.A. Times for Aug. 16 featured W6FO and his activities in support of a raft expedition floating from Ecuador to Asia. Herb can be heard on 20 meters contacting the nine fellows. W6EJJ reports that JPL ARC announces West Coast aircraft test flight of Oscar 7 432 to 145 MHz translator. Those interested check into West Coast AMSAT Net on 3850 kHz at 8 P.M. PDT Mon. nights. Test flight was Oct. 6, 1973. K6YQ has a very good editorial in the latest TRW RC paper. W6MLC and WA6LWE have spruced up the Ramona RC club house. The club has also erected the Repeater antenna with the help of K6SUJ, WA6GSV, WB6NGC and WA6NRB. The So. Calif. VHF RC reported that K6QLH and WA6JRA contacted KH6-Land on 50 MHz during a three day tropo opening from Hawaii. Members of the several traffic nets have started to object taking traffic without phone numbers. With the price of postage it can be understood, so please try to request tel. numbers when originating messages. Tel. numbers will effect faster delivery, using the mails takes another two days time. The 1973 Southwestern Division ARRL Convention was held at the Sheraton Universal Hotel in North Hollywood Oct. 19 to 22. WB6KOL has been elected director of the WPS Net filling the term formerly held by WA7IHKV. W6OAW has retired from his long 30-year employment with Los Angeles, and now will devote

STUD 'TRIACS'



PRV	15 amp	25 amp
50	☐ $.65	☐ $.85
100	☐ .85	☐ 1.05
200	☐ 1.25	☐ 1.45
300	☐ 1.45	☐ 1.65
400	☐ 1.85	☐ 1.95
500	☐ 2.55	☐ 2.25
600	—	☐ 2.65

"AEROSPACE" BABCOCK & LEACH CRYSTAL CAN RELAYS

12 for $3.50 ☐

All hermetically sealed. Submini, 1/6, half, and full crystal can types in 6-12-24V in asst contacts up to 4PDT, 1 amp up 10 amps. Such types as BR40, 41, 10, 44, 16, 24, etc. Sorry, no choosing voltages or types. From factory mixtures . . . to you! Good asst. if you are space-minded, at low prices.

SILICON TUBES

☐ SU4	$1.49
☐ SR4	3.95
☐ 866	7.95

'HAM' UHF 400 MC HIGH POWER TRANSISTORS

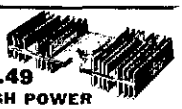
3 for $10. ☐ **$3.95**

By RCA or equal 2N3632. NPN, 23 watts, 3 amps, TO-60 case, with stud mtg. VCEV max 65.

GI "GLASS AMP II" SPACE AGE FEATURE

Type	PIV	Sale
☐ 1N4245	200	$.14
☐ 1N4246	400	.22
☐ 1N4247	600	.39
☐ 1N4248	800	.49
☐ 1N4249	1000	.59

Meets critical JAN specs. A glass "ball of silicon strength" that meets JAN specs, high relinbility, withstands avalance power surges to 1K watts. ONE amp ratings with 2 amp capabilities. Axial leads.

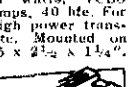


☐ **$1.49**

HIGH POWER TRANSISTOR 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, 40 hfe. For ignition, high power transmitters, etc. Mounted on heat sink 5 x 2¾ x 1¼".



Buy Any 3— Take 10% Discount!

INTEGRATED CIRCUIT SOCKETS

☐ 14-Pin, DIP	$.45
☐ 14-Pin, Wire Wrap	.59
☐ 14-Pin, Side Mount	1.00
☐ 14-Pin, DIP	.50
☐ 16-Pin, DIP	.59
☐ 16-Pin, Wire Wrap	.59
☐ TO-5, 8 or 10-Pins	.29

KRONOS WITH "TIME BASE"'* NEW FOR 1974!

Cabinet is compact 6" x 5½" x 6".

- Now two clocks in one!
- For 12VDC* and 110VAC!
- Now adaptable to boats, planes & cars too!
- The only clock of its kind in USA today!
- 12 or 24-hr clock, 6-digits!

$47. Any Type Clock less time-base

* With TIME BASE **$64.95**

CHOOSE YOUR READOUT

Type	LED	Charac.	Sale
KR-101	MAN-3	.12	$47.
KR-102	MAN-1	.27	47.
KR-103	MAN-4	.19	47.
KR-104	Nixie*	.45	47.
KR-105	707†	.33	47.
KR-106	704†	.33	47.
KR-107	SLA-1†	.33	47.
KR-108	Same as SLA-1 but GREEN, add $12.		

† "MAN" LED readouts are "all LEDs" but the Litronix 707 and Opcon SLA-1, like the MAN-1 are of the reflective bar segment technique, the 704 is the reflective bar version of the MAN-4. *The Nixie tube is a 7-segment device as others.

Scientific Devices introduces the new any LED Kronos digital clock. That's right, you can choose the "ALL-LED" Man-1, Man-3, and Man-4, and the new reflective bar types with the larger digits, at only one price, $47. This is a Scientific Device first! We even hav the GREEN LED readouts at a slightly extra cost. We have more . . . for $19.95 we have available as an (*) extra option to Naval Observatory your clock, or making it an all-purpose all-duty unit. For indoor and outdoor activity. This **"TIME BASE"** is the simplest on the market today with the help of one of the largest time-base manufacturers for the famous digital wrist watches. Therefore, current drain is negligible, not like other cumbersome types. It's easy to construct, easy to slip into the Kronos of your choice and connect with easy instructions. Its overall design is simple and easy to construct. The kit is complete with famous black-and-white TEN-TEC cabinet, plus all accessories with booklets. Features include 2 setting controls, 1-hour per second, 1-minute per second, and hold button. Scientific Device exclusive!

CRYSTAL TIME BASE FOR ANY KRONOS **$19.95** Includes precision crystal, time-base IC, pc board & accessories with info.

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	.32
☐ SN7406	.55
☐ SN7407	.55
☐ SN7408	.35
☐ SN7409	.35
☐ SN7410	.30
☐ SN7411	.35
☐ SN7413	.95
☐ SN7415	.55
☐ SN7416	.55
☐ SN7417	.55
☐ SN7420	.30
☐ SN7421	.35
☐ SN7422	.35
☐ SN7425	.30
☐ SN7426	.37

☐ SN7430	.30
☐ SN7432	.50
☐ SN7437	.60
☐ SN7438	.50
☐ SN7440	.30
☐ SN7441	1.40
☐ SN7442	1.25
☐ SN7443	1.50
☐ SN7444	1.50
☐ SN7445	1.50
☐ SN7446	1.65
☐ SN7447	1.50
☐ SN7448	1.50
☐ SN7450	.35
☐ SN7451	.35
☐ SN7453	.35
☐ SN7454	.50
☐ SN7460	.35
☐ SN7461	.35
☐ SN7462	.35
☐ SN7464	.50
☐ SN7465	.50

☐ SN7470	.45
☐ SN7472	.35
☐ SN7473	.52
☐ SN7474	.52
☐ SN7475	.95
☐ SN7476	.55
☐ SN7477	1.30
☐ SN7478	.95
☐ SN7480	.75
☐ SN7481	1.15
☐ SN7482	.95
☐ SN7483	1.15
☐ SN7485	1.41
☐ SN7486	.55
☐ SN7489	4.25
☐ SN7490	1.50
☐ SN7491	1.50
☐ SN7492	1.30
☐ SN7493	1.30
☐ SN7494	1.30
☐ SN7495	1.30
☐ SN7496	1.30

☐ SN74104	.55
☐ SN74105	.55
☐ SN74106	1.25
☐ SN74107	.70
☐ SN74108	1.25
☐ SN74112	1.25
☐ SN74113	1.25
☐ SN74114	1.25
☐ SN74121	.80
☐ SN74122	.85
☐ SN74123	1.20
☐ SN74139	1.50
☐ SN74140	.50
☐ SN74145	1.40
☐ SN74148	4.50
☐ SN74151	1.25
☐ SN74153	1.60
☐ SN74154	1.95
☐ SN74156	1.42
☐ SN74157	1.55
☐ SN74158	1.55
☐ SN74160	1.95

☐ SN74161	1.65
☐ SN74162	1.95
☐ SN74163	1.95
☐ SN74164	2.50
☐ SN74165	2.50
☐ SN74166	2.05
☐ SN74174	2.10
☐ SN74175	2.10
☐ SN74176	2.10
☐ SN74177	2.10
☐ SN74179	2.10
☐ SN74180	1.20
☐ SN74181	4.50
☐ SN74182	1.20
☐ SN74192	1.95
☐ SN74193	1.95
☐ SN74194	1.95
☐ SN74195	1.35
☐ SN74196	1.50
☐ SN74197	2.10
☐ SN74199	2.65

• Factory Marked * Money Back Guarantee

Buy 100 — Take 20%

LINEAR Op Amps

• FACTORY GUARANTEED • FACTORY MARKED FACTORY TESTED

Buy Any 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
☐ 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 (A)	3.25
☐ 567 Tone generator (A)	3.25
☐ 595 Four quadrant multiplier	3.10
☐ 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
☐ 747C Dual 741C (A)	1.25
☐ 748C Freq. adj. 741C (A)	.49
☐ 748CV Freq. adj. 741C (mini DIP)	.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
☐ 75150 Dual peripheral driver	.88
☐ 75154 Dual peripheral driver	.88
☐ 7455I2 Dual line driver	.39
☐ PA265 5-Watt voltage regulator	1.95
☐ ULN2300M Op amp with SCR	1.50
☐ CA3065 Video Audio system	1.50

Buy 3 or more, 10% discount

(A) TO-5 or DIP dual in line pak

NATIONAL 'OP' AMPS

BUY ANY 3 — TAKE 10%

Type	Description	Sale
☐ LM-300	Super 723 V. reg.	$1.49
☐ LM-301	Hi-performance amp	.49
☐ LM-302	Voltage follower	1.49
☐ LM-304	Neg. V. reg.	1.49
☐ LM-305	Pos. V. reg.	1.49
☐ LM-307	Super 741	.59
☐ LM-308	Hi-Q Fet Type Op Amp	1.50
☐ LM-309H	5V 200 mil V. reg.	1.50
☐ LM-309K	5V 1-amp V. reg.*	2.25
☐ LM-311	Comparator	1.50
☐ LM-320	Minus 5V 1-amp V.R.*	1.95
☐ LM-320	Minus 12V 1-amp V.R.*	1.95
☐ LM-320	Minus 15V 1-amp V.R.*	1.95
☐ LM-350	Dual peripheral driver	.59
☐ LM-370	AGC squelch op amp	1.49
☐ LM-371	R-F, I-F, op amp	.69
☐ LM-373	AM-FM, SSB, I.A.D.	3.75
☐ LM-374	AM-FM, SSB, IVAD	3.75
☐ LM-380	2-watt audio amplifier	1.95
☐ LM-3028	Differential RF/IF amp	1.50
☐ LM-3070	Chrome regenerator	1.50
☐ LM-3071	TV chroma IF amp	1.50

*TO-3 case, — others TO-5

1" SQ MINI METERS

* Plastic case
* Red needle indicators **$1.49**

☐ Balancing, stereo, tape, amps.	3 for
☐ VU, side mtg, plus 3 minus 20 db.	$3.75
☐ VU, front mtg, plus 3 minus 20 db.	

HIGH VOLT 1 AMP

PIV	SALE
☐ 2000*	1.00
☐ 3000	1.35
☐ 4000	1.65
☐ 5000	2.25
☐ 6000	2.96
☐ 8000	3.50
☐ 10000	3.95

☐ 15¢ CATALOG on Fiber Optics, 'ICs', Semi's, Parts

POLY PAKS

P.O. BOX 942M LYNNFIELD, MASS. 01940

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

more time to WPS activities. W6CDM recovering after illness. Herb was putting up new antenna and became ill, shortly after retiring. His QTH is South Gate and may still like to have antenna up. OO K6CL has been doing a bang up job monitoring the 27 MHz bands and sending reports to headquarters. Novices please get in touch with WA6YWS if interested in emergency or traffic nets. WB6OYN won Heath SB-303 in drawing at Heath open house in Mar. W6NKE has been DXing and checking into SCN with QRP rig 2 watts battery operated. The LERC held their auction the first part of Sept. and a very large group attended. There were six tables of goodies which went to the highest bidders; a very successful venture. San Gabriel RC reports AREC events: Oct. 13 Azusa Golden days celebration; Oct. 21 Pikathon, National Cancer Society drive. Traffic: W6INH 314, K6UYK 186, WB6OYN 97, W6QAE 90, W6LYY 85, WA6IDN 62, WA6ZKI 42, W6USY 28, WA6RCO 24, *W6NKE 18, W6OAW 8, W6DGH 5, K6LSO 3, K6CDW 2*, K6CT 2, W6IVC 2, WN6OYD 2.

ORANGE – SCM, William L. Weise, W6CPB – Asst. SCM: Richard Birbeck, K6CID. SEC: WA6TVA. PAM: K6YCI. RMs: WB6AKR, W6BNX. On Aug. 21 the Fullerton RC was host to joint meeting of all Orange County Radio Clubs. Guest speaker was W6KW. John spoke on current action being taken by the Board and ARRL. Many questions relating to regulations were discussed. Corona RC provided communications Sept. 15 and 16 for the *250 mile boat races at Lake Elsinore. WA6YWS plans a vacation motor* trip to the Great Lakes and New York during Sept. and Oct. Hope you had a safe trip Bill. Vacations have taken many out of the area resulting in a reduction in monthly reports. Will be looking forward to reports on the trips. All league appointees and members are urged to check-in on the SW Division Liaison Net Wed. at 9 P.M. local on 3907 plus or minus QRM. W6CPB should have his Rohn tower and TB-4HA beam up by the time you read this. Will be on DRN6 for Orange County. Those with 2-meter fm gear should check-in on the AREC nets Mon. 2030 local 145.52 or Tue. 1930 local or try Sun. at 1600 on 3965. PSHR: WA6TVA 52, WB6AKR 37. Traffic: K6GMI 379, WB6AKR 125, W6ISC 108, W6WRJ 26, WA6YWS 25, WA6IVA 23, K6LJA 13, K6GGS 12, W6CPB 11, W6BUK 2.

SAN DIEGO – SCM, Paul C. Thompson, W6SRS – Asst. SCM: Art Smith, W6INI. SEC: W6GBF. The election for SCM has been completed this month. Your new SCM is Cy Huvar, W6GBF. I know that you will continue to support the many programs for amateur radio that we have in the section. You should forward your Oct. reports to Cy at 105 Jamul Avenue, Chula Vista, CA 92011. I want to thank all of the amateurs in this section for their continued support. My thanks also to the many Official Stations who through their efforts have made this section active on a number of fronts. I know you will continue in your support of the section and assist Cy in the next two years. Elections were held for SANDRA. K6MZW, pres.; K6OL, vice-pres.; K6GAO, treas.; W6GIC, secy. New club in the area is at the Naval Electronics Lab, Cubic ARC had W6INI as speaker on AREC activities. Things are picking up in El Centro now that summer is over. NTS stations will be needed to assist in this holiday season traffic load. MTN liaison and DRN6 stations are especially needed. K6DYD made contact with KH6AFS in Hawaii. This is the first such contact on 2 meters since 1957. Congratulations Jerry. Hope you remembered the Southwestern *Division Convention. Traffic: W6BGF 490, W6VNQ 149, WB6PVH* 70, W6DEY 45, WA6IIK 13, W6SRS 3.

SANTA BARBARA – SCM, D. Paul Gagnon, WA6DEI – RM: W6UJ. PAM: K6EVQ. Our new SEC is WB6HJW from Santa Maria. Contact him regarding AREC registration. There was a big 2-meter opening into Hawaii the end of July. Stations all over the section worked direct and through repeater KH6EQN. Some who made it are WA6EIR and WB6QLY; WA6OBB, K6ITY, K6YLQ worked 12 stations from Oxnard. WA6SSN visited Oscar champ K7BBO while on vacation in W7-Land. Other vacations included K6QPH to VE7, WA6WYD to the West Indies, WB6NNP to New York and W6CDN to VE-Land. WB6PGK took a trip back home to England and helped celebrate RSGB 60th anniversary. WB6JYV built an 80/40-meter QRP cw rig. W6OAL/WB6LLT put on a 1296 demo at the FRICAR picnic. OAL is building a 2300 MHz beamtracking system. His maritime mobile OSCAR station worked W1JSM-Over 5000 km from the west coast. K6QPH worked CT2 on 80 meters for WAC on 80. CVARC sponsors code classes on the air at 8:30 each week night on 7088. Operators are W6GCW, WA6YWU, W6GEB, WB6IWF. WB6MWJ gave a talk on FM at the Poinsettia ARC in Ventura. W6MHK has worked his 100th country on the indoor loop antenna. New Ventura Novice is WN6YMU, 61 years young! K6VFE has 19 Novices to her credit the past two years including WN6MGK. The Estero ARC and AREC in Morro Bay provided parade communications and operated a station at the Rock-A-Rama with the help of W6CDN, W6JTA, W6KW, WA6DDQ, DHS, WB6YCH,

PYD, ECM, K6TOE, ELO and others. MAKRAC from Camarillo won the TRICAR Field Day award with over 1500 points per transmitter. The Santa Barbara AREC provided Fiesta Parade communications with help of WB6s WKC, THO, MSC, ENU, K6EAQ, K6HTX, WA6PFF, WB6SDR and W6JXU were big doorprize winners at TRICAR picnic. WB6NYH and CVARC are holding theory classes in T.O. An excellent chance to upgrade your ticket. WN6VOI has a Novice Net at 8 P.M. on 7134 limited to 5 wpm. Traffic: (Aug.) W6JTA 108, WA6MBZ 102, WA6DEI 41, (July) W6JTA 133, WA6DEI 69, WB6PGK 64, K6QPH 4, WA6PFF 2.

WEST GULF DIVISION

NORTHERN TEXAS – SCM, L.E. Harrison, W5LR – Asst. SCM: Frank Sewell, W5IZU. SEC: K5KQM. RM: W5QU. Thanks to SEC K5QKM for your reporting the past two months. Your SCM and XYL attended trailer meetings in Ind., Ill., Ky., Tenn., Ark., Mo. and Okla. Now folks let's hear from all proponents re: 220-225 MHz. Dir. W5EYB gave you the lead line so now follow through. Texoma comes next, see you there. All OOs were instructed to do special monitoring on 224-225 segment ham bands and report. Hope all hams can do same. Applications for OOs on increase. Lone Star Bulletin came in good season. W5QPX renovating ham shack. Attention all Hams: Bob Rhoden Fund activated. SoWest Radio Council, Bx 47382 Dallas 75247, donations accepted. WA5UNK request vhf renewal. W5QU very active. Congrats to WB5GBR and WA5TCM for saving a life in Greenville Ave. fire (Motel) 2929 No. Haskell has gigantic "Flea Market" sale each month. W5TI reports many volunteers to pour concrete ramp at KC club. Painted front door and released 6-meter gear for CD work. W5FIR gained another certificate from AFComm crowd in Wash'n. FB. Levelland swapfest held Sun. Aug. 5. Excellent attendance. WA5KHE sent his certificate for renewal. The Post Office Net reports W5IAR winner of "PON" of the month award. He also has 2-meter capability. Congrats OM. The following ORSs are due endorsement: WA5VJW, K5LZA, WA5EVS, K5SXO, W5FCX, WB5AQI, WA5DQP, W5UF, W5LUJ, WA5KHE and WB5BFX. Your SCM planning trips to Westexas area. Your cooperation in arranging such contacts and trips would be appreciated. Call me or write if you please. SEC K5QKM sends in an FB report and cancelled several ECs. Plano ARC meets Wed. evenings monthly 1st Ntl. Bank Bldg. Traffic: (Aug.) W5QU 208, W5TI 159, WA5NSJ 125, WA5QGE 38, W5OWV 36, W5IAR 24, W5GY 21, WB5BFW 19, W5PW 12, W5SHN 12, WB5EEE 11, W5LR 11, WB5BFX 10, WB5GRZ 5, WB5CPG 1, (July) WB5BFW 42, (June) W5QU 156.

OKLAHOMA – SCM, Cecil C. Cash, W5PML – Asst. SCM/SEC: Leonard R. Hollar, WA5FSN. RM: W5RB. Asst. RM: WB5EEY. PAMs: W5MFX, WB5CWX and K5DLE. Summer vacations are over and activity has picked up greatly. Sure glad to know that the top Tom-cat of the Okla. City Red Cross disaster communications has finally come around, now holding the call WN5KEZ but I'm taking bets that it won't be any time now until Jack will go on up to General or even Advanced. The little birdies tell me that Sid Blalock is a grandfather. WA5OUV reports visiting with the Panhandle, Tex. ARC and that there is extensive 2-meter activity in that area. WA5FSN reports a new 50-ft. Rohn tower for his VHF antennas. K5OCX has a new Quad up to talk with his brother who is in Norway. Bill, we are sorry to hear you still have sickness in your family, but I am getting good reports through the RM of your great help on OLZ, SSZ and RN5. RM W5RB reports a marked improvement in the interest in OLZ along with Asst. RM WB5EEY on SSZ. The Enid Repeater has their new call WR5ABW. W5CVZ is a new member of the Enid repeater group. Congratulations to new Advanced Class in Enid, WA5NYX and WA5UJF, also WB5HUP of Okla. City who just very recently went from Novice to General. Traffic: W5RB 84, WA5ZOO 49, W2FIR/5 42, WB5EEY 34, W5MFX 31, W5FKL 28, W5SUG 28, WA5CUJ 25, WB5AZS 17, W5PML 17, WB5ELG 16, WA5OUV 9, WA5FSN 5, WB5FIK 4, K5OCX 3.

SOUTHERN TEXAS – SCM, Arthur Ross, W5KR – SEC: WA5YXS. RM: W5ABQ. PAM: W5HWY. OOs reporting this month: K5MEN, W5RBB, WA5MIN, K5HGB, W5NUW. Hats off to amateurs in Galveston, Baytown, Houston area for emergency communications services and to Gulf Coast Hurricane Net for efficient exchange of information as storm Delia made its way through the Gulf of Mexico. Houston ARC opting for fancy new EOC. W5KWU Houston Red Cross, solid on RTTY to Victoria and will soon be moving to temporary location. W5KWU was Disaster Committee OBS W5AIR, W5FJU, W5FFM. OPS K5HZR, former SCM, in the with sick father; we wish him well. OPS WB5CUR again made BPL

WA5VMN moved from Baton Rouge to San Antonio. Orange ARC new officers: WB5AJG, pres.; WA5DIK, vice-pres.; K5BBN, secy.-treas. WA5AUZ has HB, 15- and 20-meter beams up 85-ft. TEX SS Net Mgr. WB5DBK reports net meets daily 0100Z 3748 kHz. EC WB5FMA has new Ringo up 85-ft. OO K5HGB QRL with work and graduate school but manages to monitor CRS and OSCAR. ORS K1ONW/5 attended RNS meeting at Decatur, Ala; will soon have SB200 amplifier. W5QO traded OBS for ORS. OO/ORS W5RBB on 40-20 QRP. WN5GOH upped license to General. ECs W5TFW, WA5NJM. WA5OCV, WA5UVD made Tex VHF-FM Soc. bash at Houston. OPS WA5VBM re-strung quad with no. 12 Copperweld, works FB. ORS W7WAH/5 working on DXCC with 75 W and center fed Zepp. ORS WA5YEA soon on NTS daytime morning fone net. ORS WB5IOG reports W5YG (Rice U ARC) again active. OPS K5YHX passed First Phone. ORS WA5ZBK got chirp out of QRP rig. ORS WB5BWV has new inverted V. OVS K5CWS reports new SW Repeater Assn. at El Paso which is in addition to El Paso Repeater Orgn; plans to put 146.22/.82 on top of mountain plus repeaters on 6 meters and 432 MHz. OVS K5CWS has new test equipment. WB5HGN new SBE-450 transconverter (sic). Old timers at FCC Kingsville Monitor Station retired in last year: W5IKB, W5DAA, W5ZD, K5LSG. W5FA (formerly W5RIH) joined Silent Keys Sept. 6. OO W5NGW running 1900V at 500 mA to 4-811As. Traffic: WB5CUR 580, WA5YXS 237, K1ONW/5 201, WA5YEA 160, WB5BWV 131, WA5VBM 125, W7WAH/5 114, WB5AMN 78, W5QO 71, WA5ZBN 70, W5HWY 60, K5HVI 55, W5TFW 41, WB5DBK 36, WA5TJI 35, WB5FQU 30, WB5FMA 29, W5KLV 28, WA5ZBK 27, WB5GVO 24, W5BGE 19, W5RBB 16, W5ABQ 15, W5UKN 12, K5YHX 11, K5RVF 4, W5AIR 3, W5YG 1.

CANADIAN DIVISION

ALBERTA – SCM, Don Sutherland, VE6GK – Asst. SCM: Mrs. Donez Booth, VE6YL. SEC: VE6XC. I wish to thank everyone for their kind expressions of sympathy after the sudden loss of my wife Nora. Nora helped me and amateur radio in general. She was a firm believer in the Amateur Code. Perhaps more of us should read it and live by it. OPS, EC VE6AXH passed his grade 12 with an almost unbelievable high average. He has left for UBC. Best of luck and success in your new endeavors, Alberta's loss is BC's gain. DNTS now operating with a high degree of success. The CTN is a most efficient net. APSN has had the usual summer difficulties – holidays, solar plexes and QRN. However the QNI and coverage by the NCS has been very good. CARA will host the Canadian Division Convention in 1975. The committee is already hard at work under the chairmanship of VE6XJ. OPS VE6FS is doing an excellent job with his net liaison work. Traffic: VE6FK 43, VE6FS 15, VE6AZI 12, VE6MJ 4, VE6ABV 2, VE6AXH 2, VE6WN 2.

BRITISH COLUMBIA – SCM, H. E. Savage, VE7FB – British Columbia Net 3650 RM. VE7QQ reports an active summer. BCARPSC Net also shows a good summer activity with a great number of mobiles from all parts of U.S. and Canada checking in while visiting B.C. Pacific Rim Net 3740 was well supported during the summer. This I hope is an indication for an active coming winter. Glad to welcome back an old timer with new call VE7AVW ex-7YL. Sad to report an untimely end this summer to VE7TY, auto accident and VE7BAE, motorcycle accident. HMCS Terra Nova VE0NWE had 887 contacts and HMCS Kootenay VE0NWF 200 contacts with their families in Victoria during their stay in Vietnam waters. VE7AXL has returned from Eastern Canada Navy course and is now quite bilingual. Traffic: (Aug.) VE7CCJ 35, VE7CDF 30, VE7ZK 15, VE7AKJ 13, VE7BLO 12. (July) VE7BLO 39, VE7ZK 37, VE7MW 34, VE7TT 26, VE7CDF 24, VE7AZG 4.

MANITOBA – SCM, Steve Fink, VE4FQ – Amateur activity seems to be back in high gear once again. The summer saw many transients using 2-meter fm on their way through Manitoba. VE4EA took an extended bicycle trip as far as Mexico, visiting many hams en route. Best wishes to VE4SW on his marriage. We welcome VE4FI to Flin Flon, VE4NH in Brandon, and ex-SP5QQ to Winnipeg. VE4MA has gone to Calgary, but promises regular VE4 activity. A late Aug. windstorm damaged many antenna farms in southern Manitoba, but hopefully these have been fixed by now. MTN: 30 sessions, 114 QNI, 30 QTC. MEPN: 31 sessions, 573 QNI, 38 QTC. MTN could still use some Winnipeg stations; please support your nets. Traffic: VE4PG 27, VE4OW 25, VE4JP 20, VE4RO 16, VE4CR 12, VE4FK 7, VE4TY 7, VE4OP 5, VE4UN 5, VE4LN 4, VE4FO 3, VE4HR 3, VE4RV 3, VE4XN 3, VE4IL 2.

MARITIME – SCM, W.D. Jones, VE1AMR – SEC: VE1HJ. Ex-VO2AB is now VE1LL, welcome to Moncton. The attendance at the Maritime Convention in Charlottetown was halved by the uncertainty of ferry operations. Those who did attend had a most enjoyable time. Most of the usual trophies were presented. CI1ARE

winning the cw copy contest for YLs while VE1RO took top honors for the OMs. VE1AHM was presented with the 2-meter DX trophy for 1972-'73, this makes two in a row for Gary. It was nice to meet old friends again and to meet a lot of people for the first time in person. The annual meeting of NSARA was held during the Convention. The new slate of officers for NSARA include VE1ALB, pres.; VE1JA, 1st vice-pres.; VE1QM, 2nd vice-pres.; VE1AKO, secy.-treas. Traffic: VE1AMR 87, CH ARB 36, VE1ZH 13, VE1AWP 11, VE1AFM 2.

ONTARIO – SCM, Holland H. Shepherd, VE3DV – SEC: VE3EWD. ECs: VE3EBY, VE3BPC, VE3DOC, VE3AYR, VE3VP, VE3GFN. It is with much pleasure that I report on two items which should be of great interest to every active Ont. amateur. The first is the very real progress made by CARF and the ARRL Canadian Division to cooperate, which has resulted in a joint effort to disseminate radio amateur news through the pages of the CARF "The Canadian Amateur." The sponsors and/or licensees of Canadian repeaters have already received a letter setting out the objectives and functions of the newly formed Canadian Repeater Advisory Group (CRAG) which will ensure the coordination of the exchange of all information affecting repeater operations. The second item referred to above is to the resurgence of interest by the Canadian Emergency Measures Organization (CEMO) to seek the full support of the Canadian amateur in emergency communications. Coordination in this vital and important area will be through your SCM who was recently appointed to the ARRL Emergency Communications Advisory Committee and VE3CDC. ECs, listed above, will have already received a list of Ont. EMO officials, and you are urged to establish liaison as quickly as possible. Traffic: VE3FOZ 142, VE3SB 141, VE3GJG 131, VE3AWE 75, VE3DPO 60, VE3DVE 56, VE3GT 43, VE3FRG 38, VE3EWD 25, VE3GFN 25, VE3ASZ 20, VE3ARS 19, VE3ATR 13, VE3GCE 13, VE3EBC 10, VE3FGV 10, VE3DBG 8.

QUEBEC – SCM, Joe Unsworth, VE2ALE – The VE2CWR once again had a display of Ham Radio at the West Island Mall. VE2WM once again back to Ottawa the nations capital from seven more months of studies. VE2UY complains of high heat and humidity during the month. VE2ALH now active on 2 meters. VE2PH handles QTC via VE2XW and repeater VE2AT is now output on 147.120 MHz. VE2SW held open house at summer cottage for hams in the Three Rivers Area. VE2BU is now a on and off regular weekly visitor to Montreal area since moving to VE3-Land. VE3BSL joins the Unimetric rig gang on two meters. VE3RP was in Montreal for a week end and had many enjoyable chats with the old group from the mobile unit. All Emergency Coordinators for the AREC in Que. who wish to retain this appointment must send confirmation to arrive at the SCM's QTH no later than seven days when this appears in print. If RAQI and their man suggested to me as SEC do not take more active interest in AREC in Que. that will mean a total cancellation of AREC here in Que. As SCM, I will not take on these duties. The Canadian Rep. for the ARRL Emergency Communications Advisory Committee is Holland H. Shepherd, VE3DV, 3016 Cowan Crescent, Ottawa, Ont K1V 8L1 Canada. Your SCM was not very active during Aug. PSHR: VE2ALH 34, VE2APT 27. Traffic: VE2ALH 88, VE2DR 67, VE2EC 27, VE2APT 17, VE2ALE 7.

SASKATCHEWAN – SCM, Percy A. Crosthwaite, VE5RP – We were sorry to hear that VE5RD is a Silent Key. The two meter activity is beginning to pick up since the lull during the holiday season. There has been some thought with a few of the amateurs to link Regina-Saskatoon with two meter teletype system. This experiment will be carried out by fellows such as VE5s SO, DA and FP. We would appreciate some articles for our SARL magazine QSO as well as QST. If you have something in mind but do not know how to present it, or write it, please let VE5HP or myself know. We shall be happy to help you out. We are pleased to report that we have another ARRL affiliated club called the Last Mountain Radio Club with VE5TA pres. Traffic: VE5HP 35, VE5GL 18, VE5UK 18, VE5KZ 12, VE5HF 6, VE5SM 6, VE5XY 3, VE5CB 2, VE5NJ 2, VE5OW 2, VE5PD 2. QST

(Continued from page 11

7030 14030 21030 28030; phone, 3910 7210 14280 21355 285 all approx. plus/minus 10 kHz. Some operating time will be devot to the novice class sections of the above bands. In addition, OSCAR satellite ground station will be set up. A special co memorative QSL will be available to those contacting KH4N S.a.s.e. please, via K4CIA.

15-23 *VHF Space Net Contest*, commemorating Apollo 8 a 17. Usual rules and further info. from Tony Slapkowski, WBMT Box 909, Sicklerville, NJ 08081.

23 *HA5-WW Contest*, sponsored by the BRAL. Full d GMT, single and multiop, categories plus SWLs. All bands, emissions. Call WW Test de. Send report plus ITU zone (p. 87 Ap 1972 QST). Contacts within your own continent count 1 poin between cocontinents 3 points, with HA/HG5 stations 4 points a with HA5 stations 5 points. Score QSO points times the sum different ITU zones. Logs as usual with declaration postmarked later than Jan. 15. Appropriate awards. Send to BRAL Cont Committee, Box 2, Budapest 134, Hungary.

27 *WIAW Morning Qualifying Run.*

31 *Straight-Key Night.* Reserve some time during New Yea Eve, full details Dec. issue.

JANUARY

5-6 *VHF SS.*

9-10 *DX-YL to Stateside YL Contest* cw, sponsored by t Young Ladies Radio League, from 1800Z Jan. 9 through 180 Jan. 10. All licensed women operators throughout the world invited to participate. Contacts with OMs will not count. N contacts do not count. Call CQ DX YL. All bands may be us Cross band not permitted. Stations may be worked and counted each band. Exchange QSO no., RS(T), country or state. Entr must show band worked at time of contact, time, date, transmitt and power. Phone and cw are separate contests (phone version J 23-24). DX-YLs may count contacts with all 50 states, contestan in the 48 contiguous states may score contacts with DX countri Hawaii and Alaskan YLs. Entries in Hawaii and Alaska may sco contacts with all DX YLs and with YLs in the other 49 states. station may be contacted once on each band for credit, and o point is earned for each station worked. Multiply QSOs by the n of states or countries worked. Contestants running 150 watts or l on cw and 300 watts PEP or less on ssb may multiply the results 1.25. Copies of logs with claimed scores, signed by the operato must be postmarked no later than Jan. 31 and received by t YLRL v.p. (WA2YBA), no later than Feb. 23 or they will disqualified. Please file logs separately for each section of t contest. Trophies, plaques, certificates will be awarded. Rememb to submit legible entries!

12-13 *CD Party cw, DL Activity Group cw QRP Contest, YU D Contest.*

15-17 *OOTC QSO Party.*

19-20 *CD Party, phone.*

23-24 *DX-YL to Stateside YL Contest phone (see above).*

26 *SIMULATED EMERGENCY TEST*

Feb. 2-3, DX Competition phone.

Feb. 16-17, DX Competition cw.

Mar. 2-3, DX Competition phone.

Mar. 16-17, DX Competition cw.

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.

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 50 cents per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 15 cents per word will apply to advertising which, in our judgement, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 15-cent rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 50-cent rate. Provisions of paragraphs (1), (2) and (5) apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., Box 394, Matnaroneck 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.

AN invitation NYC area hams and SWLs are invited to attend NY Radio Club meetings — 2nd Monday of every month, Williams Club, 24 E. 39th St., near Madison Ave., at 8 PM — New members welcome. Interesting programs.

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. 34 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. Heliare welded aluminum. Al's Antennas, 1339 So. Washington St., Kennewick WA 99336

VERY in-ter-est-ing! Next 6 big issues $1. "The Ham Trader," Sycamore IL 60178

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando FL 32806

GREENE Center Insulators, with or without balun. A tough number to beat. Free flier. Kaufman Industries, Box 8170, Reeds Ferry NJ 03054.

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.

QSLs?? Made-to-order!! Samples 35c. DeLuxe 50c. Religious 35c. (Deductable). Sakkers, W8DED, Box 218, Holland MI 49423.

3-D QSLs — Increased returns assure users' satisfaction. 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. Samco, Box 203, Wynantskill NY 12198

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-t, 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.

QSLs, SWLs, WPE samples 15c. Nicholas & Son Printery, PO Box 11184, Phoenix AZ 85017

FRAME Display, and protect your QSLs with 20 pocket plastic holders. 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.

QSL's 300 for $4.95! Samples 15c, Colourcard Box 326 Topanga CA 90290

QSLs — Dime or your present card brings samples. 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

200 TWO color QSLs $5.20, stamp for samples. Mark, WB6NKO, 2534 El Tonas Way, Carmichael CA 95608.

FREE samples, good designs, fast service. W7IIZ Press. Box 2387, Eugene OR 97402.

RUBBER stamps for hams — free catalog — Brock's, K9OSC, 11021 W. Jeffrey Court, Milwaukee WI 53225.

C. FRITZ, yes, we're still printing better QSLs! Samples 25c. Box 1684, Scottsdale AZ 85252.

PICTURE QSLs made from your photo. 1,000 $16 postpaid. Full color $35. Picture Cards, Box 5471, Amarillo TX 79107.

QSL Cards, Rubber stamps. Free catalog & samples. Marshall's, Dept. Q, 1900 Faulkner Rd., Little Rock AR 72204.

WANTED — Receivers and test equipment made by McMurdo Silver and Guthman. George Publow, Box 969, Picton ON Canada.

WANTED: tubes— transistors, equipment, what have you? Bernard Goldstein, W2MNP, Box 257, Canal Station, New York NY 10013

OFFER $10 for Electrical Experimenter May 1913, Popular Electricity May 1908. Wayne Nelson, Concord NC 28025.

JEHOVAH's Witnesses who are amateurs write Bob Ellis WA4UQQ, 160 Lagoon Rd. SE, Winter Haven FL 33880 or call (813) 293-3595.

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.

WANTED: ARC-5/vhf components. Mounting racks MT-65 and MT-71. Control unit C-42, junction box J-28. Also need connectors. WB8NLM, 146 Schonhardt, Tiffin OH 44883.

WANTED: Old QSL cards. Vendy Johnson, W6CWK, 4960 5th St., Fallbrook CA 92028.

60 YEARS accumulation of 50,000 dollars worth of radio and experimental equipment. World War I, World War II mica transmitting condensers, variable condensers, tubes, meters, etc. What do you want? John Stoddard, 4262 N.E. 124th, Seattle WA 98125.

STANDARD 146-A still in factory carton with warranty card, battery pack stubby antenna incl. — $248. W4OAQ, Box 17222, Nashville TN 37217. (615) 834-8999.

WANTED: Swan 350, with or without power supply. W4ZKH, Don Rose, 11 Ivanhoe Circle, Greenville SC 29607

WANTED: Teletype No. 33, receivers 51J3, R-388, 51J4, R-390A, cash or trade for other equipment. We pay freight. Alltronics-Howard Co. Box 19, Boston MA 02101. (617) 0048.

YAESU transceiver owners — present and prospective. Join the international Fox-Tango Club. Send business size sase or IRC for information and sample newsletter. Milt Lewens, WA2AOQ, 3977-F Sedgwick Ave., Bronx NY 10463.

DRAKE 2C. 2CQ, xtal calibrator, manual — perfect condition $195 FOB. Al Vazquez, 311 Harpertown Rd., Elkins WV 26241.

FOR SALE: KWM2 516F2 $695, and Henry 2K HD power supply $475. Price firm. Pick up only. Frank Andrews, Route 1, Box 193, Newfield NJ 08344.

MOTOROLA P33-BAC 5W handi-talkie, excellent condition with antenna, mike, Ni-Cads, 34/94 and 94/94 - $95. Heath HX20, HR20 and HP20, good condition — $195. FOB W5PNY, 2606A 35th St., Los Alamos NM 87544.

WANTED: (6) modified 1625s for the LA400, will consider 1625s that can be modified, RCAs won't do it. K5LIQ/4, 1587 W. Churchill Downs, Germantown TN 38138.

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 or band limits — $9.95. General purpose: FT-243 .01% 32 pF. 3500-8600 kilocycles $1.90, (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, WØLPS, "Since 1933" C-W Crystals, Marshfield MO 65706.

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.

COLLINS KWM1, 516F1 and 516E1 supplies. Mobile mount, noise blanker, DX adapter. 2.1 kc and 3.1 kc filters. Excellent condition. $450. Frank McJannet, 11557 Evanston, North, Seattle WA 98133.

HALLICRAFTERS HT37 $165. Hammarlund HQ170 $140. Two meter RCA CMC20 Carfone $75. Alan Hochberg WA3PPV, 718 Pyne Hall, Princeton University, Princeton NJ 08540.

CLEANING shack of Raytrack horizon 6 2kW PEP linear amp, Drake MS4 and TR6 power supply, Shure 444 mic, Weston 1240 DVM, Knight WB scope, Signal Gen and Signal tracer, Amphenol "millivolt" Commander FFTVM, Cushcraft 3 & 5 element 6 meter beams. All items are like new, complete with all manuals. Andrew Mueller, WB9GAC, R+1 Box 203, Germantown WI 53022.

HEATH HX10 $110, SB620 Scanalyzer $80, FR4 freq meter $40, Heath Impedance bridge $75, telequipment D54 $475. WB4UZT, 271 Tollgate Trail, Longwood FL 32750.

BRAND new Clegg 66 transceiver $145. Jim LaTorre, P.O.Box 521, Lawrence MA 01842. Tel at work (617) 475-5000, X3236.

SALE entire station W1TPV. AR-88 TX-1 Johnson Match Box keys, mikes, coils, condensers, transformers, meters, tubes. QST back to 1947 plus 25 years accumulated parts, first firm offer. (203) 655-9439.

PCs — I can supply boards for any construction article that includes artwork in stock. D. L. "Mac" McClaren, W8URX, 19721 Maplewood Ave., Cleveland OH 44135.

DRAKE R4A, excellent — $300; Navy Model 19 with table — $100; T47/ART-13, good, unmodified — $10. WB4WZR, 8441 SW 142 St., Miami FL 33158.

SELL Heathkit HA-10 linear amplifier $110. W2EDR, 153 Hylan Blvd., Staten Island NY 10305.

STATION SELLout, all in mint condition with manuals. Best offer accepted. FOB Jacksonville, Fla. Drake T-4X with MS4 power supply/speaker, R4, Heath Ham-Scan panoramic adapter; Heath HD-10 elkeyer, Harry D. Gray, ex-VE3CIO, 1863 River Road, Jacksonville FL 32207, (904) 396-7370.

WANTED: For NCX5 — One crystal calibrator, factory made. Ernest A. Lynch, 2700 Magnolia St., Portsmouth VA 23704.

FOR SALE: Practically new Hustler 4-BTV vertical antenna — $25. Edward Wise, 1534 Clifton Road, N.E., Atlanta GA 30329.

FOR SALE: HW-16 + xtals — $80; Vibroplex original — $20; headphones — $5; SWR bridge — $5; straight key — $5; or all for $110. Contact Eric Rosenberg, WA2THV, 1686 Magnolia Drive, Cleveland OH 44106. Or call (216) 368-3100.

SELL: Millen Grid Dipper model 90661 in steel carry case with low freq. coils — like new — $50; measurements model 80 lab signal generator — good cond. — $100. K2ITO, 2226 E. 28 St., Bklyn NY 11229.

WHAT happened to Kay Lab of San Diego? Need dope on 203 voltmeter. Fred Tucker, W8YBS, 6122 E. Pierson Rd., Flint MI 48506.

FOR SALE: Kenwood TS-900 transceiver with PS-900 supply and cw filter — $900. Doug Beck, WA6QQI, 925 Redwood Ave., Sunnyvale CA. (408) 739-7688.

HEATH SB-101, ac supply; Heath HP-13 supply; mobile mount — $325. W2FOR, John Merry, 40 Phelps Ave., New Brunswick NJ 08901. (201) 846-9243.

NOVICE rig: W2OR, Drake Q mult; Globe trans, xtals, key, antenna & manuals — $100 or trade for beam. Ralph, WB6PCZ, 1100 N. Buena Vista St., Burbank CA 91505.

TEN-Tec PM-2A, AC3, AC4 and AC-5, plus hi-Z headphones and patch cables; also includes leatherette carry-case to fit all the above for portable operation. All are new, with manufacturer's manuals. Also Millen 92201 300-watt transmatch (built-in SWR bridge), like new. Much more spare ham gear, too! Steve, WB2WIK, 44 Center Grove, Apt. F-14, Mt. Fern, Randolph Twp. NJ 07801. (201) 366.9326.

LATE complete S-line Henry 3K package deal only. Marsley, 2242 Stevens Avenue, Kalamazoo MI 49008. (616) 342-8338.

COLLINS 75S-3 — $400; 32S-3 — $625; 516F-2 — $100; 312B-4 — $130; Henry 2K — $395. Also best offer CX7A & Alpha 70 vapor phase cooled. M. J. Fein, One David Lane, Apt. 8H, Yonkers NY 10701.

HEATH SB301 — $185. Want Collins receiver & trans. McCool 301-77 St. N. Bergen NJ 07047.

SWAN 500CX, 117 XC, 508, VX2. Perfect. WB8DAR Van (419) 833-5386.

QST 1949 to 1972 in binders as one lot — $70, plus shipping. W1ACG, 17 Park St. Ct., Medford MA 02155.

NEW Kenwood TS900, speaker/power supply, perfect — $775; excellent KWM-2, 516 supply, speaker — $700. Ed Heubach, W9AO, 216 Edgewood, Morton IL 61550.

TEMPO FMV 2-mtr, xcvr, 3 sets crystals, excellent with manual — $150. FOB. Wm L. George, WA5YSC, 1920 Ashland, Houston TX 77008.

FOR SALE: HQ170 with clock and manual; A1 condition — $100. C. G. Phillips, WAØTST. (515) 782-5187, 1000 North Oak St., Creston IA 50801.

WANTED: Collins 3QS1 linear amplifier. Please state condition/price. K1CYY, Al Bombardier, RFD 2, Essex Junction VT 05452.

WANTED: VHF TV pre-amp, old style tunable channels 2-13. J. Brown, W5DRP/4, 1400 S. Joyce, No. C306, Arlington VA 22202.

FOR SALE: Model 15 Teletype with table - $50, come get; Heathkit Oscilloscope,$40, shipped $45; Heathkit 2 meter transceiver, 5 watts $25, shipped $30. Fred Beihold, WB9CTC, 455 North Independence St., Tipton IN 46072.

WANTED for cash QST for years 1965 and 1966. Complete years only. W8EVT, W. G. McEwen, 3271 Midland Rd., Saginaw MI 48603.

DUMMY LOAD good to 500W PEP $7.95, Drake 1A SSB CW receiver $105. Heath HR10B receiver $45; Collins 75A3 w/filter $225; Sonar four bander ssb xcvr $195; Galaxy 300 w/ac 3 bands $145. List for Sase, John Kakstys, 18 Hillcrest ter., Linden NJ 07036.

HALLICRAFTERS SR-160 transceiver, with matching P.S. Turner M360 mike included. All good condition, best offer. WA7RBC Ronald K. Hobson, 900 Wright, Richland WA 99352.

SELL: Two Heath Twoers $35.00 each. One Knight TR-108 matching VFO $85.00. One Lafayette HA-460 $85.00. One Ten-Tec 40/20 cw$50.00, Will ship prepaid. Poston W5MOO, PO Box 9, Port Arthur TX 77640.

2MTR Progress Line 30-watts, vibrator supply, all cables, controls, pwr relay plus 2 four channel 2N5133 oscillator boards $95; ELCO 720 (needs work) plus Heath UF-1 and homebrew supply, all manuals $50.00. Simon, WB2AKU, Rutgers U, RPO 7147, New Brunswick NJ 08903.

FOR SALE: Johnson matchbox with directional coupler model 250-23-3 275 watts. Mint condition $90. Dr. Mort D. Solomon K2MYW, 4 Atkinson Road, Rockville Centre NY 11570. (516) 536-2104.

6 METERS Swan 250 with 117XC, $245; P&H 6-150 transverter, 14 Mz. in — 50 Mz. out, $75; Ameco CN-50, no xtal $19; all in top working condition. J. Huffman, 15 Bertrand Road, Niles MI 49120, Tel. (616) 684-4071.

DRAKE R4A $250, 2-NT $125. Both mint condition. W6FTQ (213) 376-9398.

HRO-500 receiver with LF-10 converter-speaker. All solid state general coverage receiver. Range from 500 Hz to 30 MHz! A laboratory instrument not a toy, this is one of the world's great receivers and is in mint condition. Seller prefers that buyer examine and pick up personally. 800 dollars, cash or certified check only. Dr. Bill McGrannahan, KØRB, P.O. Box 11307 Kansas City MO 64112.

CW: Heath HW-16 transceiver, HG-10B VFO, HS-24 speaker, cables. Mint condition, excellent wiring, manuals, will ship all for $125. Good mixture Novice crystals — will ship all 20 for $35. WB4MSS.

HAVE 4-page list Ham items, No. 10 sase appreciated. Examples: Beckman counters $30; Panoramic indicators $25; Med-Science DVM computer, $60; RTTY set $110. Want SX-73, SP-600 or similar, handguns, .22 rifle, good transceiver. WA9DYE, 114 Lakeview, Milwaukee WI 53217.

"DON AND BOB" New guaranteed buys. Discount prices plus full warranty. Write low prices: Hygain TH6DXX, TH3MK3, 204BA, DB1015A, 402BA; Mosley CL33, CL36, $402; Tri-ex tower MW50, MW65, W61 (FOB Cal); Midland 13500 219.95, 13520 Wt 209.95; Regency HR2B; SBE144 199.95; Standard 826MA, 146A; CDE HAM-M 99.00; TR44 59.95; AR22R 31.95; Belden 8448 rotor cable 10 cents/ft; Belden 8214 RG8FOAM 17 cents/Ft. Used guaranteed: Collins 75A4 345.00; Kenwood R599 300.00; TS99 350.00, write Demo prices; Heath SB300 filters 250.00; write quote Swan, Drake; Motorola HEP170 Epoxy Diode 2.5A/1000Ply 29 cents, 25.00/100lot; shipping charges collect. Madison Electronics, 1508 McKinney, Houston TX 77002,(713) 224-2668, nite/weekend (713) 497-5683.

COMPLETE antenna system Hygain TH-3, Rohn 12 tower, TR-44 plus cables mint, must sacrifice — $75.00, Maurice Silberman, 22 Stephen Drive, Englewood Cliffs NJ 07632. (201) 568-4064.

HOOSIER ELECTRONICS — Your ham headquarters in the *heart of the Midwest where only the finest amateur equipment is* sold. Individual, personal service by experienced and active hams. Factory-authorized dealers for Standard, Clegg, Genave, Drake, Regency, Hallicrafters, Tempo, Kenwood, Ten-Tec, Midland, Galaxy, Hy-Gain, Cushcraft, Mosley, Hustler, Ham-M, Sony, plus many more. Orders for in-stock merchandise shipped the same day. Write or call today for our quote and try our personal, friendly Hoosier service. Hoosier Electronics, R. R. 25, Box 403, Terre Haute IN 47802, (812) 894-2397.

FOR SALE: Eddystone slide rule dial-new $17.00, Montanye W2WRO Yolanda Dr., Burnt Hills, NY 12027.

HALLICRAFTERS SX-115 receiver Exceptional mechanical and electrical stability; outperforms most receivers made today. College costs force sale. $230. Jacobson, Kirkland C33, Harvard Univ., Cambridge MA 02138.

DRAKE R-4 with MS-4 speaker $240.00 or Drake R-4B with MS-4 speaker $340.00. Both mint. Take your pick Dave Lappman, W9MRA, New Richmond WI 54017. (715) 246-2358.

SELL Swan 250-C 6M ssb transceiver $210, Hallicrafter SX110 receiver $55, Sonar FR2513 24 channel vhf monitor $80. All in mint condition. K9PYY 5271 N. Shoreland, Milwaukee WI 53217. (414) 962-4546.

UHER REPORTER 4000L, all extras, leather case, like new, $180. QST's 1955 to 1971 each 5 cent u pay postage. Also DL QTC-CQ-DL. Kurt Silber, WA9UVI., 414-748-5911, 915 Ransom, Ripon WI 54971.

HAMMARLUND HQ-145, VG condition, manual, $130. Koplin WA3EXJ RD1, Zionsville PA 18092, (215) 679-9745.

FOR SALE: McCoy SSB-9 9 Mhz. crystal filter with upper and lower side band osc. Crystals also 9 Mhz. osc. crystal. $30.00. BC-221-AH frequency meter with calibration book and power supply and TM11-300 Tech Manual $35.00. QST in binders 1956-1957-1958 and 1960 QST 1964 thru 1968 complete not binders will take $18.00 for whole batch FOB BC-453-B Aircraft receiver low frequency $10.00. Broadcast band aircraft receiver $10.00. All items to be shipped FOB. M. T. Donnell, Jr., W5HSE, 2805 First St., Brownwood TX 76801.

SELLING OLD QSTs. Send your want list. Beardsley, 119 Wythburn Rd., South Portland ME 04106.

HEATHKIT DC Power supply HP-13A professionally wired $50.00, W6BLZ, 528 Colima, La Jolla CA 92037.

SELL: 32S-3 $525, Square emblem, purchased 1968; 62S-1, $475; both good condition; W3GN, 209 Florida St., Laurium, MI 49913, (906) 337-2499.

DXERS: Write ham sentences in 54 languages! Get QSLs! K3CHP's DX QSL guide, $3.95, Joe Mikuckis, 6913 Furman Pkwy, Riverdale MD 20840.

HT-32 Hallicrafters ssb, cw, a-m transmitter w mike, extras-$175 negotiable. Richard Ball, WA2ZPX, 2700 Grand Concourse, Bronx NY 10458, (212) 584-0316.

COLLINS 30L1, linear amplifier, mint condition, manual and original carton for shipping $325., W6NUE 19641 Scotland Dr., Saratoga CA 95070.

SELL: HW-32 & ac ps plus manual running condition $100, you pay ship. Box 8352, Savannah GA 31402.

WANTED: KWM-2, 516F-2, Round emblem model, mint condition. Henry Martin, W8DYA, Box 1275, Bluefield WV 24701.

WE BUY late model Collins-Drake-Swan. Top prices cash. Associated Radio. 8012 Conser, Overland Park KS 66204. Call: (913) 381-5901.

SELL: Henry 2K-2 linear amplifier, mint condition. WB2MOI, 16 Raynor Ave., Mt. Vernon NY 10552.

LINEAR amplifier SB2LA for SBE-34 transceiver. $120. Paul Mazon, W2DYN, 5 Ingle St., Greenbrook NJ 08812.

FOR SALE: Heath SB-401 transmitter, with crystal pack. Excellent condition, factory calibrated. Will ship, $250, K9LWA, Robert White, 300 North Salisbury Road, Richmond IN 47374.

COLLINS mechanical filters, 455, 500 kHz usb and lsb sets. Crystal filters. Large selection, good prices. Sase list. WB6ORT, C. Isham, 6275 Arnold Way, Buena Park CA 90620.

NATIONAL NCX-3 xcvr w/ac supply, Astatic DA-10 mic, $225, Hallicrafters HA-1 TO keyer w/Vibroplex keyer $45, all impeccably preserved. WA1EUJ, Gary Hunter, 39 Cable Road., Rye, NH 03870.

SELL: Clegg Zeus-new 4CX250B, Dow-Key Relay-$235; HQ110A-VHF and matching speaker-$140; two 7 el. 2 meter beams with matching harness $25.00. Pkg. price $375. WA2JLM 175 E. 17th St., Huntington Sta. NY 11746.

HEATHKIT SB200 1KW linear amp, excellent, $210.00, Pick-up only. W2CNM, Johnson 59 Bellmore St., Floral Park NY 11001.

FOR SALE: Heathkit HW-7 cw transceiver with ac power supply. Factory aligned, in perfect condition. Hughie McKnight, 901 Pyatt St., Georgetown SC 29440.

FOR SALE: Heathkit SB-220 linear, 2 kW PEP. Exc. Cond. $325. Collins 75S-1, matching spkr and Heathkit Q multiplier, $250. K7PRU, 14826 Madison Wy., Lynnwood WA 98036, (206) 743-4441.

WANTED: Squires Sanders SSIR receiver. K. Sorensen W9HWT, 706 Harriet Drive, Stillwater MN 55002 (612) 439-1460.

MOBILE OPS — Write for info on shielded ignition systems and noise suppression components. Summit Enterprises, 36 Winchip Road, Summit NJ 07901.

FOR SALE: Collins KWM-2 with DX engineering speech compressor $700, 516F2 ac supply $135.30L1 linear $360. D-104 Mike $15. B&W Q multiplier for KWM-2 $50. Dynacam amplifier $25. Tristao MM-35 telescoping mast $175. Mosley TA-33 beam $85, 11 Elem. 2M beam $15 AR-44 Rotor $55. Standard walkie-talkie 146A with Nicads, charger, leather case and crystals $300. All above in excellent cond. All equipment prepaid in USA. John Onderwyzer, W1FDA, Shelburne VT 05482. (802) 985-2843.

DRAKE 2C, $189; 2NT, $ 109; Ten-Tec model 200 VFO fused 2 hours) $60; Lafayette 99-2532 Ham speaker, $5.00, Bob Mauro, 257 Center Lane, Levittown NY 11756.

COLLINS 75S-3B, 32S-3, 516F2 plus speaker, manuals and interconnecting cables and original packing boxes, complete station only, no partials. $1,500. WA5OFT, 10 LeFever Lane, Little Rock ARK 72207. Tel: (501) 225-5655.

SELL or trade Hasselblad 500C camera with accessories $1250 or factory sealed new 75S3C or make offer! Sase for info. Jim K4YBB, 942 NW 116 St., Miami FL 33168.

SELL: Heath HW-16 with crystals, SWR bridge, 150 ft. RG-8U polyfoam, HY-Gain 18AVT/WB vertical. System complete and only one year old. $150 plus postage. Rick Brown, 287 Mangels Ave., San Francisco CA 94131.

FOR SALE: SB300, SB600 $130.00 TH6DXX New in carton $130.00. Want HDP-21A W2UGM, 66 Columbus Ave., Closter NJ 07624. (201) 768-1884.

HEATHKIT SB-102 w/acps, spkr, CW filter $350., John Seboldt WAØQXG, Luther College, Box 911, Decorah IA 52101.

COMPLETE Heath station, professionaly wired like new condition, SB101, SBA301-2, HP-23, SB600, SB200, HD-10, HD-15, $600. WA6DET Ph. (213) 377-6266.

WANTED: Collins 62S-1, must be clean and complete PSE airmail offer to: Radio P. O. Box 6072, Auckland, New Zealand.

TRADE My Knight Vtvm w hi-voltage probe for good Vibroplex. Sell Valiant, $125; HQ170A, $200. Package $300., Both fine operating condition w/manuals. K1TVV, 5 Kingfisher Road, Tewksbury MA 01876.

SELL or trade Heath HX — 10 in A-1 shape, asking $130 or will trade for Heath SB-650. Martin Drift, Box 207, River Rd., Belle Mead NJ 08502.

SELL: Conar model 500 rcvr Conar model 400 Xmtr, $25 each. Rcvr. factory checked. Xtmr been on air. Dick Poplin WN4DGF, Shelbyville TN 37160.

WANTED: Eimac 8072W tube, pair 3-400Z or 3-500Z tubes, Johnson KW matchbox. State age and condition. Haynes, Box 552, Running Springs CA 92382.

SELL: Hygain vertical antenna. Mint condition, all bands 80-10 meters pick up only $40. K2MYW, Dr. Mort D. Solomon 4 Atkinson Road, Rockville Centre NY 11570. (516) 536-2104.

SELL: Drake TR3 with ac supply and matching speaker. Mint condition. Price $385. Will ship R. Mazzocca, 63 E. End Ave., Shrewsbury NJ 07701. (201) 741-6896.

DRAKE T4X $ 275, MS4-AC $75, R4 $250 L-4 $360. Absolutely immaculate. All manuals, package $900. Varitronics FDFM2-S 2M FM 5 watts 31/91 etc. PS1500 AC $130. Clegg interceptor $150, Allied A2516 receiver $65. K9PYY 5271 N. Shoreland, Milwaukee WI 53217. (414) 962-4546.

SELL: Drake R4-B, T4X-B, AC-4, MS-4, excellent condition $700 firm. Ben Helman, Reslyn NY 11577. (516) 621-3056.

DRAKE T4-XB excellent condition — $ 370. Delivered to first cashiers check I receive. Stan, WB2QQX, 15 Myrteldale Rd., Scarsdale NY 10583, Tel. (914) 723-6050.

DX35 excellent condition 3 crystals 80M, ARC-5 VFO 80M, 120 VAC $35, WA2SAE, 2630 N. French, East Amherst NY 14051.

BIBLE translators in Africa need amateur equipment, especially used transceivers, beams, linears and split units. Please help if you can. Donations of equipment tax deductible. Missionary Radio, Concordia Seminary, Box 366, Springfield IL 62702.

HEATH SB-301-4-1 all filters — crystals — cables complete $350. Robert Meyer VE3FLW, 154 Concept Dr., Lima OH 45807.

NATIONAL NCX3 with ac supply $150, Heath DX60A and HR10 $50 each or $90 for pair. All with manuals and operating. R. Gargull, WN1PUC, 52 Milbern Ave., Hampton NH 03842. (603) 926-8211.

SWAN 350, 117XC, $235. You ship, K1KXA, 4 Roberts Road, Enfield CT 06082.

CENTRAL ELECTRONICS 200 V completely refurbished by former C. E. personnel, $325 plus shipping in original crate. K4DP 1004 Drake Ave., SE, Huntsville AL 35802.

FOR SALE: 2M Drake TR-22 plus Dycom 500E amp 3 channel supplied, includes case, 12 Vdc and 120 Vac cords, speaker, batteries $225 plus shipping. Bill Ellis, 5688 Oakhurst Dr., Cargo FL 33542, PH. 392-8609.

DRAKE TR-22, new condition $170. Tempo 502B Vhf 45 watt amplifier $80.00, like new. Stan Palasek, 23 Bayside Ave., Port Washington NY 11050.

JOHNSON Navigator wanted for backup or parts, state price and condition. WB2AMI.

FREE, well almost. Four, new 4-250A tubes, each $29. Going QRP. Other rx/tx tubes available — send sase for list. W4JHB, 11230 Hillwood Drive, Huntsville AL 35803.

WANTED: Collins 51J-4 receiver. Must be excellent condition. WAØGAG, 2049 N. 10th St., Grand Junction CO 81501.

TRIO-7200 (Drake TR-72) 2M FM transceiver w/crystals, mike, mobile antenna mike, new $250. H. Fine, W6NYI, Box 67354, Los Angeles CA 90067, (213) 277-1261.

YAESU FRdx 400SD rcvr, Fldx 400 xmtr and SP-401 spkr, Factory new condition, selling for college $650. WA2NVB, 11 Berkley Road, Scotia NY 12302.

SURPLUS test equipment, vhf and microwave gear: bulletins. David Edsall, 2843 St. Paul, Baltimore MD 21218.

FTdx570 new, only 26 contacts due to extended illness. Bought from Harrison Radio. Serial 312072. Perfect cond. going off air after 53 years due to age. Price $475.Prefer pick-up but will ship in orig. carton FOB.

TENTEC Kr20 keyer, new, $35.00. New EV664 mike with desk stand, $50.00 New 2el, Hy-Gain tri-bander, take it down for $45.00 W3WS Wilmington DE Tel (302) 764-1660. Call first. All checks certified or M. O. All prices firm, no trades. FTdx570 under warranty yet.

HEATH SB-300 with speaker, very clean, works well $165.00. K2SBW, 36 Edison St., Bayville NJ 08721. Tel. (201) 269-1080.

MUST SELL: New signal one CX7A. Instruction schematic manuals included. $1300.00. Contact Lewis Grigsby Jr, Farmers State Bank, Pittsfield IL 62363. (217) 285-2194.

HX-50 ssb transmitter, excellent condition, — $100. Jim Moorman, 3424A N. 48, Milwaukee WI 53216.

WANTED: HRO-60 or NC-183D. R. Stiening, 1178 Chillem, Batavia IL 60510.

WANT Collins Write details, Recent, mint, 32S-3, 75S-3B or C, 30L-1 or S-1, 516-2, 312B-4. I pay shipping. WA5EXD, Route 3, Box 720, Seguin TX 78155.

HEATHKIT HX-10 Marauder Xmtr 180 PEP ssb, cw, mike $150; SB-301 rcvr mint cond, with phones, SB-600 speaker, $225; HO-10 keyer $15; HM-102 SWR watt meter $25, Dow relay, $10; package with cables and manual $375. O. Bohnett, 19040 N. Hills, Brookfield WI 53005. (414)786-1196.

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. $595.00 cash $449.00; New TR-22 Drake two meter transceiver, reg. $219.95, cash $175.0; Demo TR-4C, $479.95; Demo Swan 500CX, $429.00; New Collins in stock: New Rohn 50 ft. heavy-duty foldover tower, prepaid, $255.00; New Mosley CL-33 and demo Ham-m rotor, $215.00; Used equipment: R-4-C $399.00; T4-XC, $425.00; R-4-B, $309.00; Ham-M $85.00; Mint KWM-2, $650.00; FPM-300, $489.00; Moory Electronics Company, Box 506, Dewitt, ARK 72042. Tel: (501) 946-2820.

GROUNDED grid filament chokes, 30 amps — $5, Plate chokes *800 mA* $3, *3-30 Mcs, PP USA43, William Deane, 8831* Sovereign Rd., San Diego CA 92123.

BEST offer QST 1923-54 all but 4 issues with 18 duplicates. Write for details. Also 1930-50 Handbooks, CQ, etc., C. F. Wood, 1 Brookfield Way, Morristown Nd 07960.

FOR SALE: HRO-60 rcvr ABCD Coils, good shape, $165.00 — Heath HO-10 Monitor Scope, needs new pwr xformer, $20.00 — Astatic D-104G mike with stand and switch, LN, $25.00 — Ten-Tec KR-1 keyer paddle, LN, $12.00, W2UPJ, 20 *Ash Dr.*, Neptune NJ 07753. Phone 774-8032.

SIGNAL/ONE, Alpha Seventy, new and used. Also Collins, Tempo, Kenwood, Hallicrafters, Drake, Regency, Hygain, Mosley, etc. A real ham store with complete service department, one of the few left. Write or call Douglas Electronics, W5GEL, 1118 South Staples Street, Corpus Christi TX 78404.

FOR SALE: Collins Radio 7553 good working condition good point $425.00 with manual — 1-HT32A excellent $200.00 dont need, have KWM2. Albert Tatrault, Star Rt. 2 Box 290, Deland FL 32720. (904) 669-2545.

JOHNSON VALIANT I mint condition, Manual, spare tunes 10-11-15-20-40-80-160, $90.00. Pick up only. Tel. (516) 731-6206. Evenings W2GDE 4156 Hamet Rd., Bethpage, Long Island NY.

HT-220, 8-watt tone pad, PL space, earphone, rapid charger & battery antennas, manual, 16-76 76 94 52, need college money first $875. R. Weller, 1412 W. Christine, Peoria IL 61614.

SELL or trade for Drake ML2, frequency selective voltmeter, solid state, Philco Model 128A, tunes 0-15 MHz, input 30 μV to 30 V. Companion Model 129B, tunes 0-100 kHz, .03 V to 300 V. Excellent condition. S.a.s.e. list QST's other gear. K6OT, 18545 Grove, Bloomington CA 92316.

SELL HP 410B VTVM — $100. Lampkim 105 — $50, delivered in U.S.A. W7KV.

NC-300 receiver with manual — NC-300C2 & NC-300C6; 2 & 6 meter converter with cabinet, both $170; microvolter Ferris Model 18-C, 5 to 175 Mc. — $50; transmitter T-22 ARC-5 7-9.1 Mc., new — $20. W2BJD, 94-45 238th St, Bellerose Terrace, LI NY 11426.

KWM-2, 516F-2, *excellent condition* — $875. Dan Reid, W7HAI, 1908 33rd St. S.E. Auburn WA 98002.

SWR and combined wattmeter for sale Heathkit HM-102, good condition — $25. Dan Schreckengost, 614 S. Center St., Corry PA 16407.

COLLINS KWM2, 516F2 — $600, FOB 8401 Atlantic L15, Cape Canaveral FL 32920.

FOR SALE: *Collins 75S1 rcvr with 500-cycle mech. filter,* perfect — $225; Heath SB-401 with all crystals, 20 hours, as new — $275. WA9WGT. (715) 387-4987 evenings.

QUAD — Hygain HyQuad, used 6 months — $50; also RCA rotator with control — $20. WA2BSI, Box 2323, So. Hackensack NJ 07606.

SELL Hammarlund HX-50 — $150; DX-100B — $80, both in excellent condition. Roger Pender, 419 Westbourne, Los Angeles CA 90048.

FOR SALE OR TRADE for firearms (I'm a licensed dealer) or for Silver Dollars this new condition Collins S line Amateur radio equipment used approximately 1 week only. 32-S-1 SSB transmitter, 30 S-1 Linear amplifier, 75 S-1 SSB Receiver, 516F2 Power supply, 312B-4 Speaker console with phone patch, power supply, cables and Astatic Vox microphone 110D. Reason for selling is I never acquired license. A lifetime of use with the best *for a $1500 (plus shipping charges) investment! Wm. H. Long Jr.* 1667 East Shore Drive, Ithaca, NY 14850 or (607) 272-6828 (unlisted) anytime.

IBM ELECTRIC TYPEWRITER, model B, good condition, elite type. Financing law school, $145. K3MNJ, 8361 Langdon St., Phila. PA 19152.

SELL: Collins 32S3 round emblem, mint, with 516F2 AC supply, round emblem, $750. Guaranteed. Jim Cain, WA9AUM, *c/o ARRL or phone nights* (203) 666-0882.

DX'ERS — New logarithmic speech processor. Nominal 8 dB increase in average power, less than 5% distortion @ 1 kHz 1./C filter. Hi—Z meter — $49.95. Also, low noise dual-gate MOSFET receiver preamplifier. Nominal 20 dB gain, 10-30 MHz — $39.95, with cabinets. Dynacomm, 1183 Wall Road, Webster NY 14580.

MINT APACHE/SB—10 $150; W5DZA Box 788, Santa Fe NM 87501.

PUBLICATIONS for sale: RTTY bulletins, 145 issues QST de Jan. 1955; CQ de Jan. 1956. Consider QRP cw wmtr. Offers to WA6NAT, 1341 Morse, Sacramento CA 95825.

HW-7, HWA-7-1, GD-396 factory aligned, in warranty $95. Would like HR-10B or simular. WN1SHO, 58 Mountainview Ave., Avon CT 06001. Phone (203) 678-0361 after 4PM.

SWAN CYGNET 270B mint condition with extra final. $350.00 or best offer. WA5OCV, 2735 Hampton, Port Neches TX 77651

NATIONAL FB7X w/PS in good working condition with all coils except 15m WB Ingerman, 1004 E. Main, Cambridge City IN 47327.

SELL: Mint Galaxy III Transceiver with matching speaker and power supply $159.00, Heath Xmtr DX-60-B with VFO HG10B the pair $79.00. Heath Receiver HR10B with HR10-1 Crystal calibrator pair $59.00 all manuals and mailable you pay mail also Hammarlund HQ-129-X receiver retubed/aligned, sixbands four with band spread $69.00 G. Cope 5011 F St., Little Rock ARK 72205.

FROM the estate of W0MAF Collins 75S3B receiver, 75S3 Receiver, 32S-1 Transmitter with 516F-2 Power supply, 312B-4 Station Control. Excellent condition, complete for $1400.00 Mrs. F. A. Carmichael, 5841 High Drive, Shawnee Mission KS 66208.

COLLINS AND KENWOOD: 75S3B with 2.1 and 0.5 KHz mechanical filters, mint $550.00. KWM2, $595.00. 32S1 with mods. $295.00. Kenwood R-599, 6 & 2 meter converters vanguard preamp, $350, T-599, $350. Hallicrafters HT-18 $35.00, WB9DWU, 4114 Northcote, East Chicago IN 46312.

WANT Yaesu FM-2 auto; Sell Robot SSTV and accessories 6/2/220/1296/2304 gear, list SASE. W4API, Box 4095 Arlington VA 22204.

KWM-2 w/Waters Notch, mint, very little use, $675, 516F-2 $110, both $750; 30S-1, $795; R-390A, manual, $525. FOB Chicago or QTH. H. Strandberg, Box 226, Alma Center WI 54611

FOR SALE: Johnson Ranger 2 $100.00 Al Mack, 4024 N. 10 St., Phoenix AZ 85016.

SSTV: Monitor tubes, focus magnets, yokes, 5 amp, R ammeters. SASE info. Lotz W5HCO, 750 Florida Blvd., New Orleans LA 70124.

COLLINS 32S-3 516F-2 & 32S-3 $985. R-4B $315. Tecraf 220Mhz xmtr am/cw, H.B. Reg pwr sup & relay $55.00 145/220MHz mixer 5W out with pwr sup $35.00 CV-591A/URR SSB rec. conv. as is $35.00. Shipping cost no included. Clements Duval - K8HWW 33727 Brownlea, Sterlin Hts MI 48077.

NATIONAL 200 Transceiver w/ps — $240. WB4ARS, 1010 Cliff Circle, Tampa FL 33612.

SELL CLEGG 2 and 6 meter Zeus 180W excellent $200. W2R Harry Stenger 78-20 74 St., Glendale NY 11227.

HEATH SB-400 xmtr, excellent condition w/crystal an vibratrol monitor scope. Both $250 or best offer. I ship, Bo Chemas, 422 Bromley Hall, Athens OH 45701.

CLASSIC 33, Ham-M, 50ft tower (self supporting) $250. Als Hy-gain 20m Beam $30, (203) 488-8533.

CHRISTMAS is coming! Selling SB-102 with CW filter, HP-23/ SB-200 4BTV, turner mic. All in mint condition! Also comman 80m and 40m transmitters. Make offer, all or part. WB8GXI *Bob, 11900 Carlton Rd., Box 330, Cleveland OH 44106.*

WANTED: Any poly comm senior 33 for modification. Frankli Davy 39 Third St., Frenchtown NJ 08825.

DRAKE 2-C, T-4XB and power supply, many accessories, $65 Fred Peachman, Box 158 Albany Medical College 47 Ne Scotland518) 462-1539.

WANTED: SB-500 if transmit section works. Hurr WB4WXX/5, 3805 Frbbe N.E., Albuquerque NM 87111.

FOR SALE: HVTV transformer, tuner, other parts, goc condition. Mark Bonadies 128 Eastern Dr., Wethersfield C 06109.

CONTACT us for new or reconditioned Kenwood, Tempo-On Drake, Collins, Hy-Gain, Mosley, Henry Linear, towe antennas, rotators, other equipment. We try to meet any de and to give you the best service, best price, best terms, tc trade-in. Write for price lists. Try us. Henry Radio, Butler M 64730.

SALE: Model 19 teletype machine, excellent cond. SASE for price. WA1HKV, Hamden CT 06514.

2 CLEGG 66ers $115.00 ea., Clegg Apollo $140.00, Knight T-150A $65.00. All equipment in perfect condition and appearance. Will also trade for 80-10 ssb trnevr ac/dc. WA1SEM, 9 Elaine Road, Sudbury MA 01776.

WANTED: WWV Comparator, Lavoie LA-8000 or like equipment; also need manuals for Lavoie WA3AAO Stephen Gansky, Oak Hill Apts. N-408, Narberth PA 19072. (215) 664-0648.

SELLING: HW-22A $95.00; HP-13A $60.00; HP-23B $50.00; Excellent WB9ERP 322 Sherry Ave., Park Falls WI 54552.

MILLEN KW 92200 Match Box. Very good condition, shipped to you — $120.00 K1PNL — Tel. (203) 583-5433, Ernest N. Lefebure 226 E. Main St., Bristol CT 06010.

TRADE ONLY: My spare National NCX-500 transceiver with matching spkr /supply and manual for your Heath SB-series receiver, working or not. J. Sandberg, K6HE, 1138 E. Rustic Road, Escondido CA 92025.

HEATH SB-401 $240, SB-300 w/crystals $225, HD-10 Keyer $25; or make offer. Jim Boll 2633 S. East Street, Appleton WI 54911.

WANT to buy: — in original condition — Gonset 3063 W@TI — 602 4th Ave., E., Milbank SD 57252. Tel. (605) 432-6512.

ROSS-WHITE vhf fm transceiver. Brand new $ 175.00. W@NMM 1956 Bookbinder Dr., Creve Coever MO 63141.

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.

TRADE sell 6 m beam, crank-up tower, Ham-M rotor, Johnson Matchstick. Want mobile gear — 2 m HW-12A etc., remote-tune antenna, Ten-Tec, etc. ssb QRP. WA1NNT. (617) 262-1295.

COLLECTORS: Crosley Model 51 with 2-UV199 tubes. Excellent working and physical condition. W5RNC, 1841 Grapes Pampa TX 79065.

SELL: 2M Standard 826MA, crystals for 94/94, 52/52, 28/88, 34/94, 09/69, 01/61, good condition $275. Motorola HT220, 2 frequency transmit, 1 frequency receive, crystals for 01/61, Nicad, battery charger, and mobile antenna adapter — $290. Gonset G76 transceiver with power supply — $85. School expenses necessitate sale. WA6ILN/0, James R. George, St. Thomas Seminary, 1300 South Steele Street, Denver CO 80210.

YAESU FT-101 and SP400P speaker patch perfect $550.00 I ship. Swan 500 and 117XC supply perfect $450.00 I ship. Rex Bassett W4QS, Box 4163 Fort Lauderdale, FL 33304. (305) 566-0181.

FOR SALE: 10 Motorola Sensicon 450-460 mhz Receiver Chassis in operating condition: Complete set of tubes and schematic, no power supply. $25.00 each or 5 units for $100.00. C. V. Smith, 216-15 113 Ave., Queens Village NY 11429.

SELL: Receiver, page 14, August QST — $100, plus shipping. W7YBF.

CASH for SSB gear (working or repairable). State condition and price in first letter. Elvin Miller, Box 869, Marion IN 46952.

HALLICRAFTERS HT-32, HT-41 1200 W amp.; Collins 75A4 No. 3822, 2.1 k & 3.1 Kc. filters, 50' tower tilt-over, Moonraker antenna & rotor. All equipment 10-11 to 80 plus many accessories. $1000. Tom Gschwind. After 5 PM 289-3778.

HEATHKIT HW-16 and HG-10B VFO — $100. Ten-Tec Argonaut and 405 amplifier — $250. All in excellent condition. Tom Wall, WB2VPR, 4 Blum Lane, Netley NJ 07110.

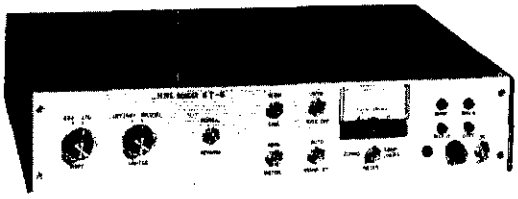
FOR SALE or Trade: Make offer Johnson Kilowatt amplifier — 2000 watts ssb — 1000 watts cw and a-m. Continuous coverage 3.5 to 30 MHz. Excitation requirements, 30 watts rf and 20 watts audio for a-m, 10 watts for ssb. A. Ehramjian, W2LXD, 1381 Richmond Court, East Meadow NY 11554. (516) 481-5571.

Index of Advertisers

Alltronics-Howard Company . . . 17
Accu Creations . . . 16
Amateur Electronic Supply . . . 125, 130, 14
Amateur License Instruction . . . 17
Amateur Wholesale Electronics . . . 17
American Radio Relay League . . .
Calculators . . . 18
Gateway . . . 15
Log Books . . . 17
Membership . . . 17
Publications . . . 16
Single Sideband . . . 12
VAR . . . 14
VHF . . . 12
Amidon Associates . . . 17
Amtech Research . . . 16
Andy Electronics . . . 17
Astatic . . . 15
ATV Research . . . 17
Autek Research . . . 15
Bauman Sales . . . 17
Bird Electronics . . . 15
Bitel . . . 14
CapCo . . . 16
Collins Radio . . .
Command Productions . . . 15
Creative Enterprises . . . 17
Cush Craft . . . 12
Dames, Ted . . . 156, 173, 17
Drake, R. L. . . . 13
Dycomm . . . 14
DX Engineering . . . 16
Ehrhorn . . .
Elmac . . . Cover I
Electronic Distributors . . . 17
E-Z Way . . . 17
Fair Radio Sales . . . 17
Gotham . . . 17
Gregory Electronics . . . 14
Hal Communication . . . 18
Ham Radio Center . . . 15
Hamtronics . . . 15
Harrison Radio . . . 18
Heath Co. . . . 12
Henry Radio . . . Cover I,
Hy-Gain . . . 11
Icom . . . 13
Instructograph . . . 16
International Crystal Mfg. . . .
Jan Crystal . . . 14
Janel Labs . . . 16
Kaufman Industries . . . 13
Kirk Electronics . . . 14
KW Electronics . . . 17
Lattin Radio . . . 17
Leader Instruments . . . 15
Leland Associates . . . 17
Logic Newsletter . . . 17
Matric . . . 16
MFJ Enterprises . . . 15
Midland Electronics Inc. . . . 14
Military Electronics . . . 17
Millen Mfg., James . . . 15
Mini Products . . . 16
Muggs 'N Stuffe . . . 16
Murch Electronics . . . 17
National Radio Institute . . . 153, 17
Omega-T . . . 15
Palomar Engineering . . . 160, 16
Pickering Radio . . . 16
Poly Paks . . . 163, 16
Radio Amateur Callbook . . . 15
Radio Publications . . . 15
Rectifier Components Corp. . . . 14
R. J. Communication . . . 16
Robot Research . . . 13
R. P. Electronics . . . 15
Ruggles & Associates, David M. . . . 17
Sams, Howard . . . 14
SAROC . . . 17
Savoy Electronics Inc. . . . Cover I
Skylane Products . . . 15
Smith, Peregrine . . . 16
Swan Electronics . . . 120, 121, 122, 12
Teletron Corp. . . . 16
Telrex Comm. . . . 1
Ten Tec Inc. . . . 1
Trigger Electronics . . . 1
Unadilla Radiation Products . . . 16
Unique Products . . . 16
Van Gorden-Engineering . . . 17
Van Sickle . . . 16
Venus Scientific . . . 16
Vintage Radio . . . 17
Wilson Electronics . . . 134,1
World QSL Bureau . . . 17
Worldradio . . . 15
Yaesu Musen USA, The . . .

CW or RTTY, whichever way you go,

HAL HAS TOP QUALITY YOU CAN AFFORD!

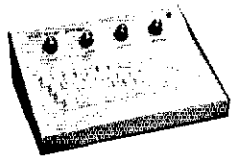


TOP QUALITY RTTY...WITH THE HAL MAINLINE ST-6 TU. Only 7 HAL circuit boards (drilled G10 glass) for all features, plug-in IC sockets, and custom Thordarson transformer for both supplies, 115/230 V, 50-60 Hz. Kit without cabinet, only $135.00; screened, punched cabinet with pre-drilled connector rails, $35.00; boards and complete manual, $19.50; wired and tested units, only $280.00 (with AK-1, $320.00).*

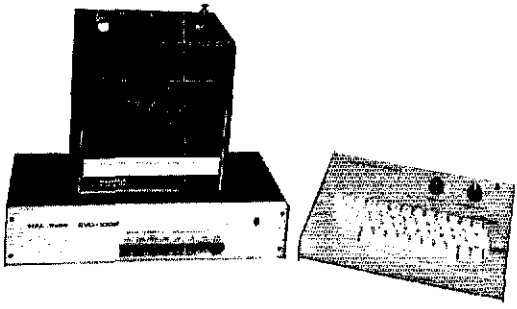
TOP QUALITY...WITH THE HAL 1550 ELECTRONIC KEYER. Designed for easy operation; perfectly timed CW with optional automatic ID for sending call letters, great for DX and RTTY; TTL circuitry, transistor switching for grid block, cathode keying. Handsome rugged crackle cabinet with brushed aluminum panel. 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 1¾" 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, semi-conductors, and IC's to fill practically any construction need. Send 24¢ to cover postage for catalog with info and photos on all HAL products available.

*Above prices do not include shipping costs. Please add 75¢ on parts orders, $2.00 on larger kits. Shipping via UPS whenever possible; therefore, street address required.

HAL COMMUNICATIONS CORP., Box 365 A, Urbana, Illinois 61801

Harrison says: "WHY SETTLE FOR HALF A RIG"

Get ALL the versatility, capability and quality you REALLY want... at a surprisingly low price!

Clegg FM 27B

The only 2-meter rig with any combination of Transmit or Receive Frequency from 146 to 148 MHz.

The Clegg FM 27B ACTUALLY COSTS YOU LESS in the long run!
Check these specifications:

GENERAL

POWER REQUIREMENTS: 12 to 14 VDC
Current Consumption at 13.5 VDC:
Receive: 400 Ma squelched,
1.2 amps unsquelched.
Transmit: 6 amps max.
DIMENSIONS: 7⅜" x 3½" x 9¼" deep; 4 lbs. net weight.

RECEIVER

TUNING RANGE: 146.00 to 148.00 MHz, continuously tuneable with reset capability of approx. 1 KHz to any frequency in range.
SENSITIVITY: .35 μv max. for 20 db quieting; .1 μv for reliable squelch action.
SELECTIVITY: 11 KHz at 3 db; Less than 30 KHz at 70 db. Adjacent (30 KHz spaced) channel rejection more than 70 db.
AUDIO OUTPUT: 2.0 watts (min.) at less than 10% THD into internal or external ohm speaker.

TRANSMITTER

TUNING RANGE: Same as RECEIVER.
POWER OUTPUT: 25 watts Min. into 50 ohm load. P/A transistor protected for infinite VSWR.
MODULATION: Internally adjustable up to 10 KHz deviation and up to 12 bd peak clipping.

After buying any other transceiver, plus an amplifier with 25 watts or more and a handful of crystals, you've spent more than the cost of the Clegg FM 27B. And you still don't have the only rig that's totally integrated with all the coverage built-in. Why settle for half a rig? Get it all—get a Clegg FM 27B!

Amateur Net $479.95

CHARGE IT!

Harrison

"HAM HEADQUARTERS, USA"®

PROMPT ORDER DEPT.

We carefully pack and ship ham gear, accessories and parts to most any part of the world. Address your orders to:
20 SMITH STREET
Farmingdale, N.Y. 11735
Or – Phone your orders to
(516) 293 - 7990

FARMINGDALE, L.I.
2265 ROUTE 110
2 miles South of LIE exit 49S
(516) 293-7990

NEW YORK CITY
8 BARCLAY STREET
Near City Hall
BArclay 7-7922

VALLEY STREA
10 SUNRISE HW
(At Rockaway Ave
(516) 872-9565

OPEN NITES TIL 9 ALL STORES OPEN SAT. OPEN NITES TIL

Savoy

BASSETT

gh efficiency mobile
d portable antennas
r all amateur bands,
P, MARS, CB,
CURITY,
BLIC SERVICE,
RINE, AND
VERNMENT USE.

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

Identical size, cost, and appearance

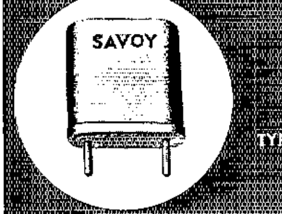
FULLY ADJUSTABLE TO FREQUENCY IN FIELD

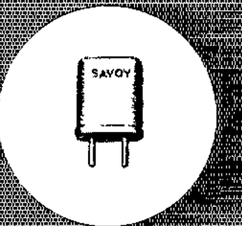
Low weight, low drag, high strength fiberglass

Polished chrome brass standard 3/8-24 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.

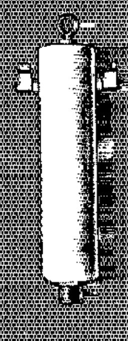
Quotes on request for amateur or commercial crystals for use in all other equipments.

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.

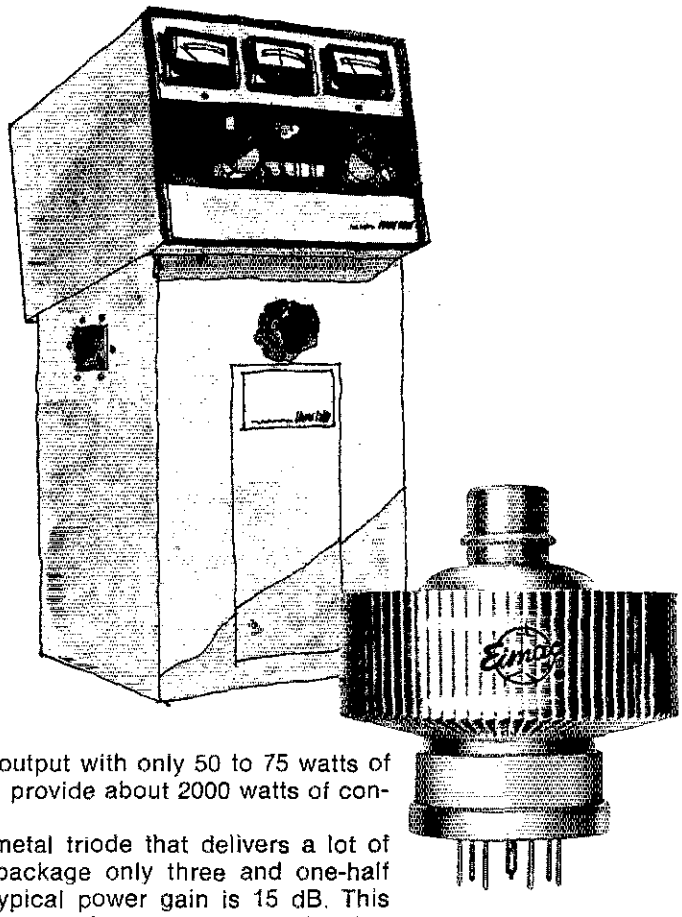
CONTACT YOUR DISTRIBUTOR OR WRITE FOR DATA

Savoy Electronics, Inc.

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

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

EIMAC's rugged 8877 powers Henry Radio's reliable 4K Ultra linear commercial amplifier.



When Henry Radio set out to design a sophisticated linear amplifier for high reliability communications in the high frequency range, they chose EIMAC's high-mu 8877 power triode.

The result is the new 4K Ultra, which operates with 4000 watts input in heavy-duty commercial service. The 4K employs continuous variable capacitive and inductive elements tunable over the 3.0 to 30 MHz range. Optimum input and load conditions are provided for a wide variation in antenna systems. EIMAC's 8877 enables the 4K to deliver over 2500 watts of continuous SSB or CW output with only 50 to 75 watts of drive. For RTTY the 4K will provide about 2000 watts of continuous duty output.

The 8877 is a ceramic-metal triode that delivers a lot of power and linearity in a package only three and one-half inches high. At 30 MHz, typical power gain is 15 dB. This impressive gain is achieved with 3rd order intermodulation products −38 dB below one tone of a two equal-tone drive signal.

With Henry Radio, you know quality counts. And they know you can't do better than EIMAC. For full specifications on the 8877, write to EIMAC Division of Varian, 301 Industrial Way, San Carlos, California 94070. Or contact one of the more than 30 Varian/EIMAC Electron Tube and Device Group Sales Offices throughout the world.

Eimac®
division
varian